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EDITORIAL

Dear and respected readers of the scientific journal Health Bulletin,

In front of you is the twentieth issue of the electronic journal Health Bulletin, in which we once again publish a variety of works from the field of healthcare. We strive to maintain the achieved level and continuously work on improving our quality. We are very satisfied and proud of being part of eleven internet databases and of our continuous progress each year. I am fortunate to have excellent assistants (Josip Šimić, PhD; Roberta Perković, PhD and Darjan Franjić, PhD) and immense support from our Dean, Professor Vajdana Tomić, PhD. For future issues, we wish to broaden our scope to works from other countries around the world, and become indexed by international databases.

This issue contains eighteen quality works (nine original scientific papers, four review papers, three professional papers, one case report and one book review) written by our current and former students and, of course, our doctoral students and teachers.

I hope that by reading the Health Bulletin, you will benefit by expanding your knowledge on selected topics, which will also help you in your practical work, and that you will find additional motivation to have your work published in our journal. I would like to thank everyone who contributed to the publication of this issue, and at the same time I invite all those interested to send their works for our next editions exclusively in English language.

Mostar, November 2024 Dragan Babić

COMPARATIVE ANALYSIS OF ADVERSE EFFECTS FOLLOWING BOOSTER DOSE BY DIFFERENT mRNA COVID-19 VACCINES AFTER TWO DOSES OF ADENOVIRAL VACCINATION IN HEALTH-CARE WORKERS

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ABSTRACT

Objective: This study explores the adverse effects to different messenger RNA (mRNA) vaccines (BNT162b2/Pfizer or mRNA-1273/Moderna) in health-care workers (HCWs) who received a third (booster) dose and were previously vaccinated twice with the adenoviral vector vaccine (ChAdOx1-S/Astra Zeneca).

Materials and methods: The data were collected based on surveys of 175 HCWs at the University Clinical Hospital (UCH) Mostar from October 2021 to March 2022. The participants filled out the initial general survey form immediately before the booster vaccination and a second survey form regarding adverse effects after the vaccination. Based on the administered vaccines, HCWs were divided into two groups – Pfizer and Moderna. Data organisation and statistical analysis were performed using Microsoft Excel and SPSS statistical software.

Results: Out of 175 participants, 132 (75.4%) had mild adverse effects post-vaccination, while no severe adverse effects were recorded. Adverse effects overall were significantly more frequent in participants vaccinated with the Moderna vaccine compared to the Pfizer vaccine (82.7%, $P < 0.001$) and were significantly more prevalent in women (82.5%, $P = 0.031$). Specifically, shoulder pain, chills, shivering, and fever were more frequently reported by participants vaccinated with the Moderna vaccine.

Conclusions: Both mRNA vaccines were considered safe to use, while the use of the Pfizer vaccine as a booster dose in a heterologous vaccination approach might have a lower incidence of adverse effects. Thus, the wide range of available vaccines is favourable during pandemic, and their dosages should be reconsidered primarily according to their immunological effectiveness in the future.

Keywords: COVID-19, COVID 19 Vaccines, booster vaccination, adverse effects, health-care workers.

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INTRODUCTION

Coronavirus disease 2019 (COVID-19) is caused by severe acute respiratory coronavirus 2 (SARS-CoV-2), and it was first officially confirmed in December 2019 in Wuhan, China (1). The World Health Organisation (WHO) declared the COVID-19 pandemic on March 11, 2020, and it remains a threat to global health due to several variants still emerging and circulating (2). The incubation period of the disease ranges from 2 to 14 days, and common symptoms include fever, chills, sore throat, coughing, difficulty breathing, shortness of breath, and loss of smell or taste (3,4). More severe clinical manifestations are most often presented in the elderly, immunodeficient, persons with chronic diseases, and children with cardiovascular and respiratory diseases (5–7). Considering there is no adequate-targeted treatment, prevention of the disease through self-protection measures and vaccination is a key course of action in the fight against COVID-19 (8, 9). This is especially important for health-care workers (HCWs), who are at occupational risk and whose systemic vaccination and regular use of protective equipment could ensure a safer work environment for both themselves and the patients they treat (10).
Initially, vaccination with two doses of messenger RNA (mRNA) vaccine was considered sufficient to provide protection against symptomatic COVID-19 (9,11). However, as the pandemic progressed and new SARS-CoV-2 variants of concern (VOCs) predominated, it was shown that two doses were not sufficient to prevent symptomatic disease, its severe forms, and fatal outcomes, suggesting the use of a third (booster) dose (12). From 2021 onwards, the recommendation for the use of a booster dose remained in order to provide additional protection, especially for the elderly and immunodeficient patients (13). However, in Bosnia and Herzegovina (BiH), booster vaccination was initially recommended to everyone over the age of 18 (6 months post-primary vaccination or disease recovery).

A certain number of people experience mild adverse effects from COVID-19 vaccinations, which include pain and swelling at the injection site, headaches, fatigue, muscle and joint pain, and fever, while more serious adverse effects include thrombosis with immune thrombocytopenia, anaphylactic reactions, and Guillain-Barré syndrome (9,11,14). Despite the occurrence of adverse effects, which are mostly of a milder form, there is insufficient data on this topic in the population of BiH where various vaccines against COVID-19 were administered, depending on their availability at the time. In this study, we aimed to assess the frequency and severity of adverse effects to different mRNA vaccines among HCWs in order to determine a more suitable vaccination regimen.

PARTICIPANTS, STUDY DESIGN, AND METHODS

Study population

A total of 175 HCWs of University Clinical Hospital (UCH) Mostar who received a booster dose of mRNA vaccine after previously being fully vaccinated with the adenoviral vector (ChAdOx1-S/Astra Zeneca) vaccine were included in the study. The relevant sociodemographic

and clinical data were collected from survey forms between October 2021 and March 2022. The participants were divided into two groups based on the type of vaccine they received as a booster dose. Group 1 (Pfizer) included 42 HCWs who received the BNT162b2 vaccine, and Group 2 (Moderna) included 133 HCWs who received the mRNA-1273 vaccine. The participants' inclusion in the study was based on the time period, while the allocation into groups was based on the type of vaccine they selected. A notable difference in group sizes can be explained by the voluntary selection of vaccines by the HCWs and the vaccine availability that was not stable at the time.

Surveys

Two survey forms were filled out by the participants, one prior to vaccination and the other 7-14 days after the vaccination. The first form that HCWs filled out immediately before receiving the booster dose included questions regarding age, gender, profession, acute conditions, or fever 2 days prior, other vaccines administered 2 weeks prior, previous SARS-CoV-2 infection, previous life-threatening allergy reactions, allergy to ethanol, other allergies, pregnancy, and breastfeeding. After the booster dose, HCWs filled out the second form regarding adverse effects related to the vaccination. The questions included: type of vaccine, allergic reaction (local or systemic), and adverse effects (redness and swelling at the injection site, shoulder pain, chills, shivering, fever > 37.2ºC, rash, headache, nausea, fatigue, vomiting, and neurological disorders). Participants had the option to write additional adverse effects that were not listed in the questionnaire itself.

Statistical analysis

Collected data were processed using Microsoft Excel and IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY). Standard statistical methods were utilised (Chi-square test or Fisher's exact test), and all tests were two-tailed, where values of $P < 0.05$ were considered statistically significant. The results were presented as absolute numbers (n) and percentages (%) in the form of graphics or tables.

Ethical statement

The study was conducted in accordance with the ethical standards stated in the 1964 Declaration of Helsinki and its subsequent amendments. Since this study involved the analysis of standardised questionnaires, obtaining informed consent was not necessary, and any participant identifying information was excluded.

RESULTS

The study included 175 HCWs of UCH Mostar who previously received two doses of the ChAdOx1-S (Astra Zeneca) adenoviral vector vaccine and were additionally vaccinated with BNT162b2 (Pfizer) or mRNA-1273 (Moderna) vaccine. Of the total number of participants, 42 (24%) were vaccinated with the Pfizer vaccine, and 133 (76%) were vaccinated with the Moderna vaccine. The median age of all HCWs included in the study was 49 (25-65) years, and 89 (50.9%) were male. In the Pfizer group, the median age was 49 (25-64) years, and there were 23 females (54.8%), while in

the Moderna group, the median age was also 49 (26-65) years, and there were 70 males (52.6%). There was no statistical difference among participants between the two established groups regarding age and gender distribution (P = 0.403) (data not shown).

Table 1. *Adverse effects of participants regarding the type of vaccine administered*

	Group 1 (Pfizer) n (%)	**Group 2 (Moderna) n (%)**	***P* value**
Number of participants	**42**	**133**	
Shoulder pain	20 (47.6)	102 (76.7)	**<0.001**
Redness/swelling at the injection site	2 (4.8)	22 (16.5)	0.070*
Chills	3 (7.1)	33 (24.8)	**0.015***
Shivering	0 (0)	16 (12.0)	**0.013***
Fever > 37.2ºC	6 (14.3)	48 (36.1)	**0.007**
Rash	0 (0)	2 (1.5)	1.000*
Headache	5 (11.9)	34 (25.6)	0.063
Nausea	2 (4.8)	13 (9.8)	0.527*
Fatigue	10 (23.8)	49 (36.8)	0.119
Vomiting	0 (0)	1 (0.75)	1.000*
Neurological disorders	0 (0)	0 (0)	1.000*

*Fisher's exact test; Bold values represent statistical significance.

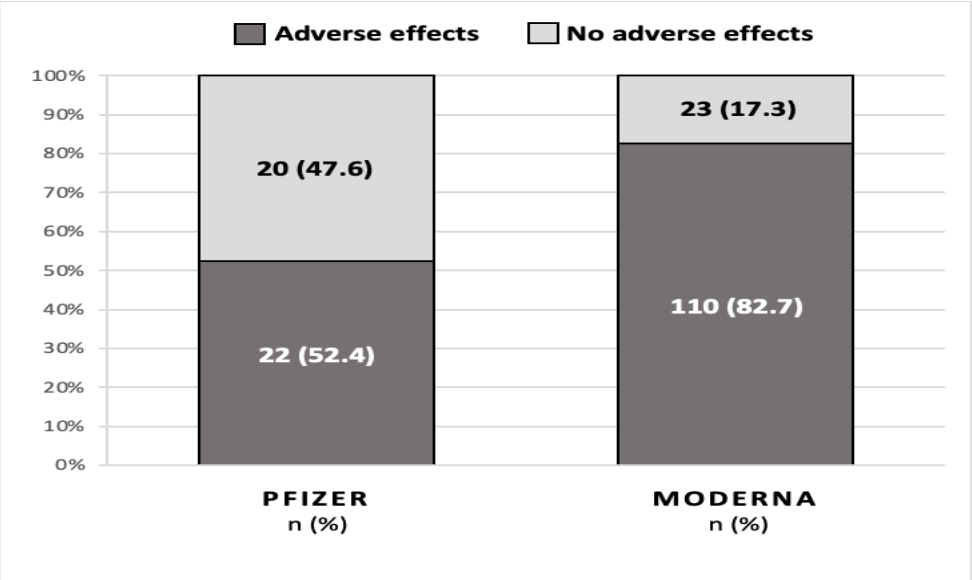

Figure 1. *Comparison of total adverse effects reported after different vaccines*

Adverse effects to mRNA vaccines were reported by 132 participants (75.4%). Of those, 22 out of 42 (52.4%) participants from the Pfizer group reported adverse

effects, while 110 out of 133 (82.7%) participants reported adverse effects to the Moderna vaccine, which was statistically significant ($P < 0.001$) (**Figure 1**). Our results indicate a significantly higher occurrence of certain adverse effects in participants who were vaccinated with the Moderna vaccine. These included shoulder pain (102/133, 76.7%, $P < 0.001$), chills (33/133, 24.8%, $P = 0.015$), shivering (16/133, 12%, $P = 0.013$), and fever (48/133, 36.1%, $P = 0.007$) (**Table 1**).

Table 2. *Adverse effects of participants regarding gender*

	Female n (%)	**Male n (%)**	***P* value**
Number of participants	**86**	**89**	
Total adverse effects reported	71 (82.5)	61 (68.5)	**0.031**
Shoulder pain	66 (76.7)	56 (62.9)	**0.046**
Redness/swelling at the injection site	15 (17.4)	9 (10.1)	0.158
Chills	23 (26.7)	13 (14.6)	**0.047**
Shivering	9 (10.5)	7 (7.9)	0.550
Fever > 37.2ºC	34 (39.5)	20 (22.5)	**0.014**
Rash	1 (1.2)	1 (1.1)	1.000*
Headache	25 (29.1)	14 (15.7)	**0.034**
Nausea	12 (13.9)	3 (3.4)	**0.014***
Fatigue	35 (40.7)	24 (27.0)	0.054
Vomiting	0 (0)	1 (1.1)	1.000*
Neurological disorders	0 (0)	0 (0)	1.000*

*Fisher's exact test; Bold values represent statistical significance.

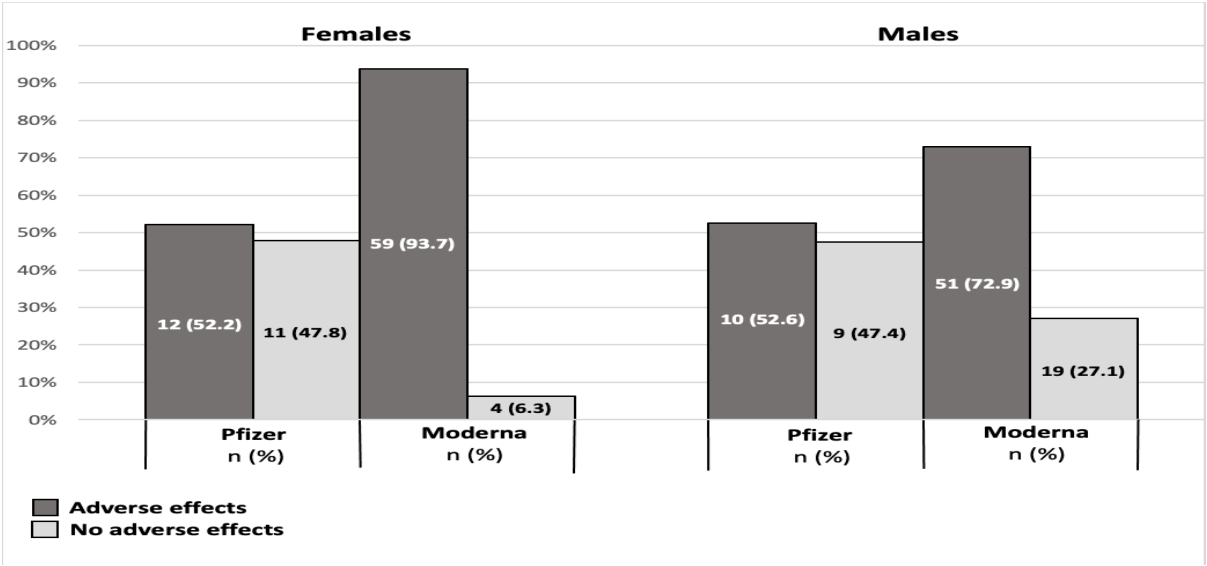

Figure 2. *Comparison of total adverse effects reported in regard to gender and vaccine type*

Adverse effects to mRNA vaccination were reported by 71 out of 86 (82.5%) women who participated in the study, compared to 61 out of 89 (68.5%) men, which was also statistically significant ($P = 0.031$). In the Pfizer group, 12 out of 23 (52.2%) women and 10 out of 19 (52.6%) men experienced adverse effects (P = 0.976). However, in the Moderna group, a significantly higher proportion of women (59/63, 93.7%) compared to men (51/70, 72.9%) reported adverse effects (P = 0.001) (**Figure 2**). When comparing individual adverse effects reported between genders, women experienced shoulder pain (66/86, 76.7%, $P = 0.046$), chills (23/86, 26.7%, $P = 0.047$), fever (34/86, 39.5%, $P = 0.014$), headache (25/86, 29.1%, $P = 0.034$), and nausea (12/86, 13.9%, $P = 0.014$) more frequently than men (**Table 2**). When we further stratified participants based on gender and analysed individual adverse effects, we found no influence of gender on the occurrence of adverse effects between the Pfizer and Moderna groups of participants (**Supplementary Table 1**).

Supplementary Table 1. *Adverse effects of participants regarding gender and the type of vaccine administered*

		Group 1 (Pfizer) n(%)	Group 2 (Moderna) n(%)	*P* value
Number of participants		**42**	**133**	
Shoulder pain	Male	9 (21.4)	47 (35.3)	0.929
	Female	11 (26.2)	55 (41.4)	
	Total	20 (47.6)	102 (76.7)	**<0.001**
Redness/swelling at the injection site	Male	0 (0)	9 (6.7)	0.510*
	Female	2 (4.8)	13 (9.8)	
	Total	2 (4.8)	22 (16.5)	0.070*
Chills	Male	0 (0)	13 (9.8)	0.288*
	Female	3 (7.1)	20 (15.0)	
	Total	3 (7.1)	33 (24.8)	**0.015***
Shivering	Male	0 (0)	7 (5.3)	1.000*
	Female	0 (0)	9 (6.7)	
	Total	0 (0)	16 (12.0)	**0.013***
Fever > 37.2ºC	Male	0 (0)	20 (15.0)	0.074*
	Female	6 (14.3)	28 (21.1)	
	Total	6 (14.3)	48 (36.1)	**0.007**
Rash	Male	0 (0)	1 (0.75)	1.000*
	Female	0 (0)	1 (0.75)	
	Total	0 (0)	2 (1.5)	1.000*
Headache	Male	0 (0)	14 (10.6)	0.139*
	Female	5 (11.9)	20 (15.0)	
	Total	5 (11.9)	34 (25.6)	0.063
Nausea	Male	0 (0)	3 (2.3)	1.000*
	Female	2 (4.8)	10 (7.5)	
	Total	2 (4.8)	13 (9.8)	0.527*
Fatigue	Male	3 (7.1)	21 (15.7)	0.505*
	Female	7 (16.7)	28 (21.1)	
	Total	10 (23.8)	49 (36.8)	0.119
Vomiting	Male	0 (0)	1 (0.75)	1.000*
	Female	0 (0)	0 (0)	
	Total	0 (0)	1 (0.75)	1.000*
Neurological disorders	Male	0 (0)	0 (0)	1.000*
	Female	0 (0)	0 (0)	
	Total	0 (0)	0 (0)	1.000*

*Fisher's exact test; Bold values represent statistical significance.

From other adverse effects, two participants reported leg pain, one in the Pfizer and one in the Moderna group. No participants reported acute conditions,

fever, other vaccinations, allergies to ethanol, and pregnancy prior to booster vaccination, while one participant was breastfeeding during our study period. Two HCWs reported previous life-threatening allergic reactions, but no such reactions were reported after COVID-19 vaccine administration.

DISCUSSION

In this study carried out in UCH Mostar from October 2021 to March 2022, we analysed adverse effects after administration of a booster dose of mRNA COVID-19 vaccines. The study included 175 HCWs who received two doses of adenoviral vector vaccine, and then a booster dose of either the Pfizer or Moderna mRNA vaccine, whose gender and age distribution across the two established groups were quite uniform. Adverse effects after vaccination were reported by 75.4% of all participants, and the results indicated a significantly higher occurrence of adverse effects after vaccination with the Moderna vaccine. The influence of gender on the occurrence of adverse effects was also evident from the results, which showed that women experienced adverse effects more frequently. Our results showed the higher occurrence of adverse effects in women only in the Moderna group, while there was no correlation between gender and the occurrence of adverse effects after Pfizer vaccine administration. Out of all the adverse effects observed, participants from the Moderna group reported a significantly higher frequency of shoulder pain, chills, shivers, and fever as compared to the Pfizer group. On the other hand, women reported more cases of shoulder pain, chills, fever, headache, and nausea compared to men, and no significant difference was observed when further comparing individual adverse effects by gender between the Pfizer and Moderna groups. It is important to point out that none of the participants of this study reported the occurrence of severe adverse effects after being vaccinated either with booster mRNA vaccines or primary adenoviral vaccines.

The more frequent occurrence of mild adverse effects to mRNA vaccines has been documented (10,14), while our results showed a significant increase in the frequency of such reactions after the administration of the Moderna vaccine. This is in accordance with other studies that found post-Moderna vaccination adverse effects to be more frequent compared to the Pfizer vaccine, while noting that the Moderna vaccine is easier to transport and store since it is less sensitive to temperature (15,16). The reason for the higher occurrence of adverse effects across our study population may be the Moderna vaccine dosage of 50 µg at the time, which was the same as the dosage used in the primary vaccination against COVID-19. Previous reports of adverse effects to the full dose of the administered Moderna vaccine were significantly more frequent compared to the half dose, while the immunological effects remained unchanged (17,18). Meanwhile, the use of a booster dose of 25 µg was recommended for the Moderna vaccine, given the almost identical effectiveness compared to the full 50 µg dose (19).

Our results point towards more frequent adverse effects to the mRNA vaccine in women, which is in accordance

with previous studies (20–22). This was evident among our Moderna group participants, indicating that it was not the case for mRNA vaccines in general. Again, this may be the result of the higher dosage of the Moderna vaccine and the fact that women are more likely to report their symptoms (23). Besides that, historically, females and males have shown different reactions to vaccines, and it seems that women's immune system is more reactive (24,25). This only became more prominent during the pandemic, with mass vaccinations taking place globally. Considering the hormonal and physiological variations between men and women which may influence their immune response (26), it may be advisable to reconsider the vaccination dosage for women in the future.

Frequently reported adverse effects after vaccination were both systemic (fever, chills, fatigue, and headache) and local (redness or swelling at the injection site and shoulder pain), and were again reported more frequently by women. Among all the study participants, not a single case of severe allergic reaction or anaphylaxis was recorded. The results of other studies based on online surveys indicate the possibility of the occurrence of such severe adverse effects to mRNA vaccines in 0.2-2% of the population (15,27), and show that their occurrence is quite rare for all the other COVID-19 vaccines as well (28). The reason for no reports of such reactions in our study may be the relatively small number of participants and the fact that they were interviewed on site by health professionals at the vaccination centre. On the other hand, all the participants in this study were properly vaccinated with two doses of the ChAdOx1-S vaccine, which expresses the S (spike) protein as an immunogen and elicits a substantial cellular response after the second dose (29). Pro-inflammatory cytokines secretion can be induced by S protein alone (30), while higher existing immunity can influence the local and systemic inflammatory impact of cytokines upon subsequent dosing (31). Therefore, milder adverse effects could be attributed to better immunological acceptability across our study population. Also, the question arises as to whether the high incidence of adverse reactions to the Moderna vaccine is in correlation with prior SARS-CoV-2 infection. It has been suggested that previous COVID-19 recovery was associated with higher odds of reporting adverse effects (15). However, 79 out of 175 (45.1%) participants in our study have previously recovered from COVID-19, and this data did not influence the overall results, as there was no significance in regard to the vaccine type (P = 0.468), gender (P = 0.115), and total adverse effects reported (P = 0.884) (data not shown).

Considering the wide range of participants' ages and their different roles within the health-care system, our results can be translated to the population of BiH and can indicate COVID-19 vaccine safety in regard to their quality and availability during the pandemic. Our findings are in accordance with other studies that demonstrate low mRNA vaccine severe adverse effects and overall safety, which would be acceptable for people in the indication groups for booster vaccination (32). Since the time of our study, as SARS-CoV-2 evolved, vaccine formulations and

policies have also been updated. Bivalent mRNA vaccines were developed in late 2022 as a response to the emergence of the Omicron (B.1.1.529) variant, and they targeted both the original and new SARS-CoV-2 strains (33). As of late 2023, the updated (2023-2024 formula) mRNA COVID-19 vaccines by Pfizer-BioNTech and Moderna that are aimed at the XBB.1.5 Omicron subvariant have been created and are recommended for everyone 6 months and older (34). The wide range of available vaccines and their continuous variant-targeted development leave room for medical experts to prescribe the best vaccination regimen against SARS-CoV-2 and potentially hold the answer to controlling future pandemics.

This study has several limitations. A relatively small number of participants might have resulted in difficulty obtaining significant relations from the data. On the other hand, there is a notable difference in sample sizes between our two established groups. Observing a larger group of HCWs and having them separated into two groups of comparable sizes might provide more reliable results regarding our study points.

CONCLUSIONS

The data presented in our study point towards the overall safety of mRNA vaccines, despite the mild adverse effects. The administration of the Pfizer vaccine during the COVID-19 pandemic might have ensured a safer vaccination regimen in regard to the lower frequency of adverse effects. A wide range of available vaccines is favourable in order to provide a personalised and secure immunisation, while the higher occurrence of adverse effects among females may point towards reconsidering the vaccine dosage.

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USPOREDNA ANALIZA NEŽELJENIH UČINAKA DOCJEPE RAZLIČITIM mRNA COVID-19 CJEPIVIMA NAKON DVIJE DOZE ADENOVIRUSNOG VEKTORSKOG CJEPIVA KOD ZDRAVSTVENIH DJELATNIKA

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SAŽETAK

Cilj: Ova studija istražuje neželjene učinke različitih glasničkih RNA (mRNA) cjepiva (BNT162b2/Pfizer ili mRNA-1273/Moderna) kod zdravstvenih djelatnika koji su primili treću (booster) dozu, a prethodno su dva puta cijepljeni adenovirusnim vektorskim cjepivom (ChAdOx1-S/Astra Zeneca).

Materijali i metode: Podatci su prikupljeni na temelju anketiranja 175 zdravstvenih djelatnika Sveučilišne kliničke bolnice (SKB) Mostar od listopada 2021. do ožujka 2022. Sudionici su ispunili početni opći anketni obrazac neposredno prije docjepljivanja te drugi anketni obrazac u vezi s nuspojavama nakon cijepljenja. Na temelju cjepiva, ispitanici su podijeljeni u dvije skupine – Pfizer i Moderna. Organizacija podataka i njihova statistička obrada su provedeni pomoću softvera Microsoft Excel i SPSS.

Rezultati: Od 175 sudionika, njih 132 (75,4%) je imalo blage nuspojave nakon docjepe, dok teže nuspojave nisu zabilježene. Ukupno gledano, nuspojave su bile značajno češće kod sudionika koji su primili cjepivo Moderna u usporedbi s onima koji su primili cjepivo Pfizer (82,7%, $P < 0,001$) te su bile značajno češće kod žena (82,5%, $P = 0,031$). Točnije, bolove u ramenu, zimicu, drhtavicu i vrućicu su češće prijavljivali sudionici cijepljeni Modernom.

Zaključci: U ovom radu je pokazano da su oba mRNA cjepiva sigurna za upotrebu, dok je upotreba Pfizer cjepiva za docjepu u heterolognom pristupu cijepljenju rezultirala manjom učestalošću neželjenih efekata. Širok raspon dostupnih cjepiva je povoljan u vremenima pandemije, a njihove doze bi u budućnosti trebalo preispitati prvenstveno prema njihovoj imunološkoj učinkovitosti.

Ključne riječi: COVID-19, cjepiva protiv COVID-19, docjepljivanje, štetni učinci, zdravstveni djelatnici.

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ASSOCIATION OF RISK FACTORS WITH THE INCIDENCE OF LUMBAR PAIN SYNDROME IN PHYSIOTHERAPISTS AT THE CLINIC FOR PHYSICAL MEDICINE AND REHABILITATION

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ABSTRACT

Introduction: Lumbar pain syndrome encompasses various entities manifested by pain, muscle tension, or discomfort between the lower rib arch and the lower gluteal fold, with or without radiation to the leg.

Aim: To examine the association of existing risk factors with the incidence of lumbar pain syndrome in physiotherapists.

Subjects and Methods: The research was designed as a cross-sectional study and conducted at the Clinic for Physical Medicine and Rehabilitation, University Clinical Hospital Mostar. The study included physiotherapists of both genders and all age groups who did not have a previous history of spinal disease and had more than one year of work experience. Data were collected through anonymous surveys, and the modified Nordic Questionnaire for musculoskeletal symptom analysis was used as the research instrument. This questionnaire consists of four parts: socio-demographic data, healthcare provision, lower back pain, and job satisfaction.

Results: The prevalence of lumbar pain in the last 12 months was around 94.0%. The study involved 56 participants, most of whom were female, with the majority being in the 31-40 age group with higher education. Males were slightly overweight, and the duration of lumbar pain was associated with the gender of the participants.

Conclusion: Participants who lifted heavier loads experienced significantly more lumbar spine pain, while the duration of work experience was not significantly associated with the incidence of lumbar pain syndrome.

Keywords: lower back pain, risk factors, physical activity, daily life activities, physiotherapists

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INTRODUCTION

Lower back pain conditions represent a growing economic and psychosocial burden and often lead to temporary work disability. Lumbar pain syndrome encompasses various entities manifested by pain, muscle tension, or discomfort between the lower rib arch and the lower gluteal fold, with or without radiation to the leg (1, 2). Most conditions that cause disabling pain in the lumbar region have a benign course and do not require active treatment. Symptoms and changes may vary depending on the involvement of certain segments, structures, and systems, including vertebrae, vertebral dynamic segments, intervertebral discs (discogenic) with or without nerve root pressure (radiculopathy), and degenerative changes (3, 4). Various factors, such as lack of physical activity, improper lifting techniques, genetics, sudden jerks, obesity, and stress, can cause lumbar pain syndrome (5, 6). Clinically, it manifests as reduced mobility and pain, with the acute form characterized by sudden onset, limited mobility, and exacerbation of pain during coughing, sneezing, and laughing, while the chronic form lasts more than 3 months, with milder symptoms, increased muscle tone, and limited mobility (5, 7).

Lumbar pain syndrome represents a significant medical-economic challenge, affecting 75-80% of the working population aged 35-55, with frequent work absences. Its prevalence increases with age and affects both men and women equally, although postmenopausal women are more likely to suffer from lumbar syndrome than men (8). Risk factors include age, gender, smoking, physical strain, job characteristics, and psychological factors. Physical and psychosocial factors, such as lack of physical activity, obesity, increased workload, reduced time for rest or recreational activities, job dissatisfaction, and stress, are also associated with the onset of pain (7, 9, 10). Work organization risk factors include low job satisfaction, excessive job demands, lack of support from colleagues and superiors, and fear of recurrence of the problem (7).

Diagnosis of lumbar pain syndrome involves the use of the Visual Analog Scale (VAS) for pain (11-13) and physical therapy assessments of spinal mobility using various methods, including the Thomayer method for range of motion measurement (14), the Schober method for assessing sagittal flexibility of the lumbar spine, and lateral flexibility tests in a standing position (5).

Treatment of lumbar pain syndrome may require a multidisciplinary approach and an individualized treatment plan. The acute form usually has a favorable outcome, with recovery in 70% of cases within a month, and almost 90% of patients are symptom-free after 3 months. Promotion of physical activity and a healthy lifestyle should be based on the example set by healthcare workers, as prevention and health preservation play a crucial role (15).

Lumbar pain syndrome among physiotherapists is a serious issue caused by repetitive physical efforts such as manual procedures, lifting loads, and improper movements (10, 16, 17). Physiotherapists often perform physically demanding work that includes repetitive movements and awkward body positions, significantly straining their musculoskeletal system (17).

Physiotherapy includes kinesitherapy, physical therapy, and massage, each with different stress loads on the spine (18, 19). Physiotherapists' work activities involve forced body positions, trunk bending and rotation under load, and often lifting patients, which increases the risk of injury (20). Moreover, physiotherapists' working hours often exceed legal limits, further increasing the load (21, 22).

Despite research on the prevalence of lower back pain among healthcare professionals, little attention has been paid to specific specializations within physiotherapy (kinesitherapy, physical therapy, massage) and their association with the risk of back pain (23). Given the high prevalence of spinal problems among physiotherapists, it is important to investigate whether the nature of work in a particular specialization is associated with a higher risk of these problems.

Aim of the research: To examine the association of existing risk factors with the incidence of lumbar pain syndrome in physiotherapists.

SUBJECTS AND METHODS

The study was designed as a cross-sectional study and conducted at the Clinic for Physical Medicine and Rehabilitation, University Clinical Hospital Mostar, between May and June 2022. A total of 56 physiotherapists participated in the study.

Inclusion criteria were individuals employed as physiotherapists at the Clinic for Physical Medicine and Rehabilitation, of both genders and all age groups. Exclusion criteria included individuals with previous spinal injuries, spinal deformities and/or lower limb deformities, pregnant women (due to possible spine pain associated with pregnancy), and individuals with less than one year of work experience.

The survey was conducted voluntarily and anonymously. All participants were verbally informed in detail about the nature of the study and that it would not harm their health, after which they were offered to sign informed consent

along with the questionnaire, which described the research objectives, who conducted the study, and instructions on the format of the questionnaire. All data obtained from the study were used solely for research purposes.

For the purpose of this study, a modified Nordic Questionnaire for the analysis of musculoskeletal symptoms (24) was used, which contains four categories of questions divided into four sections: socio-demographic data, healthcare provision, lower back pain, and job satisfaction.

The first part, which related to socio-demographic data, included information on gender, age, education level, body weight and height, years of work experience, working hours, overtime, and physical activity.

The second part of the questionnaire, related to the performance of healthcare tasks, was filled out only by participants involved in healthcare services, and the questions concerned the length of work experience in these tasks, the number of patients, lifting loads, and other job duties.

The third part of the questionnaire, related to the presence of lumbar pain, consisted of questions about the presence of lumbar pain in the last 12 months, the duration of lower back problems in the past 12 months, the duration of pain in the lower back in a single episode, reduction in work and free-time activities, the presence of lower back problems at any point in the last 7 days, episodes of lumbar pain in the last 12 months, time off work due to these issues, medication use and treatment, as well as changes in work position due to pain.

The final part of the questionnaire consisted of questions aimed at gathering information about psychosocial work factors through the Standardized Nordic Questionnaire for psychological and social work factors, which provides a comprehensive measure of stress. The questions in this part of the questionnaire were divided into three groups: work task levels, social and organizational levels, and individual levels (15). The research was approved by the Ethics Committee of the Faculty of Health Studies, University of Mostar and University Clinical Hospital Mostar.

Statistical Analysis

The data were subjected to statistical analysis using descriptive statistical methods. To assess the significance of differences between nominal and ordinal variables, the chi-square test was applied, with the significance level set at $p<0.05$. Values less than 0.001 were expressed as $P<0.001$.

For statistical analysis of the obtained data, the software system SPSS for Windows (version 13.0, SPSS Inc, Chicago, Illinois, USA) and Microsoft Excel (version Office 2007, Microsoft Corporation, Redmond, WA, USA) were used.

RESULTS

A total of 56 participants (100.0%) took part in the survey, of which 18 (28.57%) were male, and 40 (71.43%) were female. Most of the participants were aged between 31 and 40 years (32.80%), while 24 (42.86%) had higher education, and 33 (58.97%) had between 5 and 15 years of work experience (Table 1).

Table 1. *Socio-demographic data of the participants*

	Gender		
	Women N (%)	**Men N (%)**	**Total N (%)**
Total number of participants	40 (71,43)	16 (28,57)	56 (100)
Dob			
<20	0 (0)	0 (0)	0 (0)
21-30	8 (20)	2 (12,50)	10 (17,85)
31-40	21(52,50)	12 (75)	33 (58,93)
41-50	5 (12,50)	0 (0)	5 (8,93)
>50	6 (15)	2 (12,50)	8 (14,29)
Height (cm)			
	20 (50)	1 (6,25)	21 (37,50)
170-180	18 (45)	3 (18,75)	21 (37,50)
	2 (5)	12 (75)	14 (25)
Weight (kg)			
	13 (32,50)	0 (0)	13 (23,21)
70-80	17 (42,50)	6 (37,50)	23 (41,07)
	10 (25)	10 (62,50)	20 (35,72)
Work experience			
	4 (10)	3(18,75)	7 (12,50)
5-15	24 (60)	9 (56,25)	33 (58,93)
16-25	4(10)	4 (25)	8 (14,29)
	8(20)	0 (0)	8 (14,29)
Work with patients (hours/week)			
	0 (0)	0 (0)	0 (0)
30-40	39 (36)	12 (26)	51 (34)
	1 (13)	4 (31)	5 (20)
Education level			
Secondary education	6 (15)	3 (18,75)	9 (16,07)
Post-secondary education	6 (15)	0 (0)	6 (10,71)
Higher education	18 (45)	6 (37,50)	24 (42,86)
Master's degree	14 (35)	3 (18,75)	17 (30,36)

The average body mass index (BMI) of all participants was normal (24.94). The average BMI for women was normal (24.33), while men had slightly overweight BMI (26.67).

The duration of lumbar pain was associated with the gender of the participants ($p<0.05$). Compared to women, men reported longer durations of lumbar pain (Table 2).

Table 2. *Characteristics of work-related lumbar pain in physiotherapists*

	Women N (%)	Men N (%)	Total N (%)	Significane
Back pain in the last 7 days				
Yes	20 (50,00)	6 (38,00)	26(46,43)	p<0,05
No	20 (50,00)	10 (62,00)	30 (53,57)	p<0,05
Back pain in the last 12 months				
None	4 (10,00)	1 (11,00)	5 (8,77)	P>0,05
Mild pain/discomfort	10 (25,00)	6	16 (28,07)	P>0,05
Moderate – does not require a work break	10 (25,00)	4 (54,00)	14 (24,56)	P>0,05
Moderate – requires a work break	9 (22,50)	4 (21,00)	13 (22,80)	P>0,05
Severe pain	7 (17,50)	1 (14,00)	8 (14,03)	P>0,05
Duration of work-related back pain (weeks)				
<1	27 (67,50)	10 (62,50)	37 (66,07)	p<0,05
2-4	7 (17,50)	3 (18,75)	10 (17,86)	p<0,05
>4	6 (15,00)	3 (18,75)	9 (16,07)	p<0,05
Impact of back pain on daily activities (shopping, household chores, gardening)				
Yes, it affects	26 (65,00)	9 (5,25)	35 (62,50)	P>0,05
No, it does not affect	14 (35,00)	7 (43,75)	21 (37,50)	P>0,05
Reduced work activity due to back pain				
Yes	24 (60,00)	6 (37,50)	30 (53,57)	P>0,05
No	16 (40,00)	10 (62,50)	26 (46,43)	P>0,05
Consequences of back pain in the last 12 months				
Sick leave	10 (25,00)	4 (25,00)	14 (25,00)	P>0,05
Hospitalization	1 (2,50)	0 (0,00)	1 (1,79)	P>0,05
Medication use	29(72,50)	12 (75)	41(73,21)	P>0,05
Change of workplace	0 (0,00)	29 (0,00)	0 (0,00)	P>0,05

Three participants (10.35%) with a BMI below 25 reported severe lumbar pain, while five participants (18.51%) with a BMI over 25 reported severe lumbar pain. Higher body weight in most participants caused discomfort or moderate pain, which was statistically significant (Table 3).

Table 3. *Association between lumbar pain and body mass index (BMI)*

BMI / Level of lumbar pain	**<= 25 N (%)**	**>25 N (%)**	**Total N (%)**	**Significane**
None	4 (13,79)	1 (3,70)	5 (8,77)	p<0,05
Mild pain/discomfort	9 (31,03)	7 (25,93)	16 (28,07)	p<0,05
Moderate – does not require a work break	7 (24,14)	7 (25,93)	14 (24,56)	p<0,05
Moderate – requires a work break	6 (20,69)	7 (25,93)	13 (22,80)	p<0,05
Severe pain	3 (10,35)	5 (18,51)	8 (14,03)	p<0,05

BMI – Body Mass Index

Participants who lifted heavier loads experienced significantly more lumbar pain, which was statistically significant (p<0.05) (Table 4).

In this study, the length of work experience did not affect the level of lumbar pain (Table 5).

Table 4. *Association between lifting weights (in kilograms) and lumbar pain*

Weight of the load / Level of lumbar pain	**Do 10kg N (%)**	**Između 10-25kg N (%)**	**Više od 25kg N (%)**	**Total N (%)**	**Significane**
None	0 (0,00)	3 (25,00)	2 (5,13)	5 (8,77)	p<0,05
Mild pain/discomfort	1 (20,00)	3 (25,00)	12 (30,77)	16 (28,07)	p<0,05
Moderate – does not require a work break	2 (40,00)	2 (16,67)	10 (25,64)	14 (24,56)	p<0,05
Moderate – requires a work break	2 (40,00)	1 (8,33)	10 (25,64)	13 (22,80)	p<0,05
Severe pain	0 (0,00)	3 (25,00)	5 (12,82)	8 (14,03)	p<0,05

Table 5. *Association between work experience (in years) and lumbar pain*

Length of work experience / Level of lumbar pain	<5g N (%)	5-15g N (%)	16-25g N (%)	>25g N (%)	Total N (%)	Significane
None	1 (14,29)	4 (12,12)	0 (0,00)	0 (0,00)	5 (8,77)	P>0,05
Mild pain/discomfort	0 (0,00)	9 (27,27)	3 (37,50)	4 (50,00)	16 (28,07)	P>0,05
Moderate – does not require a work break	2 (28,57)	7 (21,21)	2 (25,00)	3 (37,50)	14 (24,56)	P>0,05
Moderate – requires a work break	2 (28,57)	8 (24,24)	2 (25,00)	1 (12,50)	13 (22,80)	P>0,05
Severe pain	2 (28,57)	5 (15,15)	1 (12,5)	0 (0,00)	8 (14,03)	P>0,05

DISCUSSION

This study reported a prevalence of around 90.0% of work-related lumbar pain syndrome among physiotherapists at the Clinic for Physical Medicine and Rehabilitation, University Clinical Hospital Mostar. Among them, 46.0% of physiotherapists stated that they were experiencing pain at the time of the study. The results of this study show that gender, heavy workloads, and body weight were associated with the occurrence of lumbar pain syndrome in physiotherapists. The findings of this study are similar to other international studies from New Delhi (25), the United States (26), and Slovenia (27), which reported an incidence of work-related lumbar pain among physiotherapists ranging from 26.0% to 84.0%.

The high prevalence of lumbar pain among our participants may be due to the use of the Nordic Questionnaire, where the presence of pain also includes discomfort, so it is possible that a certain number of participants experienced only discomfort but not actual pain.

Professions such as physiotherapy, which involve frequent lifting, bending, or standing, are at risk for developing lumbar pain syndrome. If we add to that the fact that physiotherapists have appropriate knowledge of musculoskeletal injuries and various prevention strategies, this does not protect them from developing lumbar pain syndrome (28). Evidence shows that physiotherapists tend to work while in pain or with musculoskeletal injuries, even while worsening their condition. They are less likely to report their injuries or seek care, relying on self-treatment based on their clinical expertise (29).

The higher prevalence of work-related lumbar pain among physiotherapists could be a consequence of either extreme workload in the work environment or improper musculoskeletal techniques used in patient treatment. Physiotherapists can overstrain their muscles and joints during work, increasing the risk of pain development (23).

In this study, 56 participants took part, of whom 40 were female, and 16 were male. The study showed a statistically significant higher occurrence of lumbar pain among female participants compared to males. The results of this study align with other studies, which indicate a higher

prevalence of lumbar pain in women than in men, showing that lumbar pain syndrome is more common in women than in men (30). This could also be related to the fact that a large portion of physiotherapists are women, who, due to the smaller number of male workers, often have to perform physically demanding tasks, which also contributes to the high prevalence of lumbar pain among them (31).

Algadir and colleagues, in their study, found that female physiotherapists were at a higher risk of developing lumbar pain after becoming physiotherapists compared to male physiotherapists. They believe that women's smaller physical stature (heavier but shorter) compared to men is a disadvantage for women when lifting or transferring patients and applying physical force during treatment, which increases spinal strain and consequently leads to back pain (25).

Most studies show that the first episode of lumbar pain usually occurs between the ages of 30 and 50. The participants in our study had an average age of around 38 years. The results of this study are consistent with other studies, which indicate a high statistical correlation between lumbar pain and age, where a larger number of healthcare workers under the age of 30 reported the presence of lumbar pain (32).

Previous studies have found that lumbar pain syndrome is more common among newly graduated students and young physiotherapists, primarily within the first five years of practice (33), while in this study, the length of work experience did not affect the incidence of lumbar pain syndrome.

Obesity and the additional strain on the spine caused by extra weight also trigger back pain (30). In our study, there is a positive correlation between BMI and lumbar pain. More than half of the participants with a BMI over 25, i.e., those who are overweight, experienced moderate to severe lumbar pain, while a smaller percentage of lumbar pain was observed in participants with ideal body weight, representing a statistical difference and indicating a connection between excessive body weight and lumbar pain.

Lifting patients is identified in most literature as the primary activity associated with the onset of lumbar pain during patient transfers. This includes lifting heavy patients, frequent lifting, and lifting without the help of colleagues (25). In our study, for the majority of participants (66.07%), lumbar pain lasted up to one week, while for a smaller number of participants (16.07%), it lasted slightly more than four weeks. Due to the presence of lumbar pain, 53.57% of participants in our study experienced reduced work activities, and slightly more than half of the participants had reduced activities during their free time and were unable to perform daily activities.

Homaid and colleagues, in their study, showed that lumbar pain had an impact on leisure activities in 39.5% of participants and on work activities in 41.8% (32). Such data increase the risk of future injuries and absences from work.

According to data from Cilliers and colleagues, 46% of participants first consulted a general practitioner or physiotherapist, 28.0% chose rest as a treatment method, while 12.0% used medications (34). Such data can be

explained by the fact that healthcare professionals have access to medications, which they use on their own initiative.

The limitations of this study are primarily the small sample size and the lack of functional measurements of spinal mobility, as this is a survey-based study. Recommendations for future research on this topic include: a larger sample size, covering more institutions where physiotherapists work, and applying a division by specialty due to the nature of the work that individual physiotherapists primarily perform (kinesitherapy, massage, electrotherapy, etc.), as well as including functional measurements of spinal mobility in the research methodology.

CONCLUSION

The average body mass index (BMI) for women was within normal limits, while for men, it was slightly elevated. The duration of lumbar pain averaged up to one week, with severe lower back pain more frequently affecting women. It was observed that participants exposed to heavier workloads had a significantly higher predisposition to lumbar pain syndrome, while the length of work experience did not significantly affect the occurrence of this issue. A statistically significant negative correlation was found between gender, workload, and body weight with lumbar pain syndrome among physiotherapists.

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POVEZANOST RIZIČNIH ČIMBENIKA S POJAVNOŠĆU LUMBALNOG BOLNOG SINDROMA KOD FIZIOTERAPEUTA NA KLINICI ZA FIZIKALNU MEDICINU I REHABILITACIJU

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SAŽETAK

Uvod**:** Lumbalni bolni sindrom obuhvaća različite entitete koji se manifestiraju bolnošću, mišićnom napetosti ili nelagodom između donjeg rebrenog luka i donje glutealne brazde, sa ili bez širenja u nogu.

Cilj**:** Ispitati povezanost postojećih faktora rizika na pojavnost lumbalnog bolnog sindroma kod fizioterapeuta.

Ispitanici i metode: Istraživanje je ustrojeno kao presječna studija i provedeno je na Klinici za fizikalnu medicinu i rehabilitaciju Sveučilišne kliničke bolnice Mostar. U istraživanje su uključeni fizioterapeuti oba spola i svih dobnih skupina koji nisu imali prethodnu povijest bolesti vezano za kralježnicu a imaju više od jednu godinu radnog staža. Podaci su prikupljeni anonimnim anketiranjem ispitanika, a kao instrument istraživanja korišten je modificirani Nordijski upitnik za analizu muskulo - skeletnih simptoma. Ovaj upitnik se sastoji od 4 dijela: socio-demografski podaci, obavljanje zdravstvene njege, bol u donjem dijelu leđa, te zadovoljstvo na radnom mjestu.

Rezultati: Prevalenca lumbalnog bola u posljednjih 12 mjeseci bila je oko 94.0 %. U Istraživanju je sudjelovalo je 56 ispitanika od koji je više bilo ženskog spola, a prevladavala je starosna skupina od 31-40 godina sa visokom stručnom spremom. Muškarci su imali blago prekomjernu tjelesnu težinu a trajanje lumbalnog bola povezano je sa spolom ispitanika.

Zaključak: Ispitanici koji su podizali više tereta imali su značajno veću bol u lumbalnom dijelu kralježnice, dok duljina radnog staža nije značajno povezana s pojavnošću lumbalnog bolnog sindroma.

Ključne riječi: križobolja, faktori rizika, tjelesna aktivnost, aktivnosti svakodnevnog života, fizioterapeuti

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CLINICAL AND LABORATORY CHARACTERISTICS OF PATIENTS WITH MYASTHENIA GRAVIS: AN EXPERIENCE FROM UNIVERSITY CLINICAL HOSPITAL MOSTAR

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ABSTRACT

Introduction: Myasthenia gravis (MG) is an important health problem that affects significant number of patients. Proper understanding of the disease characteristics is important for adequate therapeutic approach.

Aim: The aim of our study was to determine clinical and laboratory characteristics of patients with MG that were cured at the University Clinical Hospital Mostar.

Subjects and methods: Data from the University Hospital Mostar Registry were used. In our study, we included all patients with MG (n=39), over the age of 18, regardless of gender, who regularly visit outpatient clinic. We analyzed following parameters: age, gender, clinical presentation, antibodies (AChR, MuSK), associated comorbidities, therapy, disease history, thymus pathology and applied treatment.

Results: MG occurred more often in female patients (58%). In female patients, MG occurred mostly at the age range from 30-70 years, compared to male patients where MG mostly occurred at the age range from 50-90 years. Generalized form of MG was present in 74.36% of patients, and 25.64% had the ocular form. Anti-AChR antibodies were positive in 78.38%, anti-MuSK in 5.41% and 16.22% of patients were seronegative. The prostigmine test was positive in 97.37% and negative in 2.63% of patients. Among the initial symptoms, the most patients had ptosis and fatigue, while dysarthria, dysphagia, and diplopia were less common signs.

Conclusion: Based on our study we can conclude that MG mostly affects older female population. The most of the patients had positive Anti-AChR antibodies and positive prostigmine test.

Keywords: myasthenia gravis, anti-AChR, anti-MuSK, pyridostigmine, corticosteroids

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INTRODUCTION

Myasthenia gravis (MG) is the most common disorder of the neuromuscular junction, where autoantibodies are directed against different components of the postsynaptic membrane in neuromuscular junction, resulting in characteristic weakness of the ocular, bulbar, respiratory muscles, and muscles of the trunk and limbs (1). Incidence and prevalence of this disease have significant geographical variations, but it is considered that MG incidence has increased worldwide over the last decades. Incidence rates have a bimodal distribution in women, with peaks around the age of 30 and 50, and in men, the incidence increases with age, with the highest rates between the age of 60 and 89, while in the fifth decade of life, women and men are equally affected (2). MG is caused by autoantibodies that bind to functional molecules on the postsynaptic membrane of the neuromuscular junction thus blocking normal transmission of nerve impulses. As many as 80% of patients have positive antibodies to acetylcholine receptors (AChR), a certain proportion of patients have positive antibodies to muscle-specific tyrosine kinase (MuSK) or low-density lipoprotein receptors (LRP4), while minority of patients with MG do not have any detected positive antibodies (3-5). Two thirds of patients report isolated ptosis, diplopia, or both as their first symptoms (5,6). The vast majority of these patients will develop generalized weakness over the next 2-3 years with specific deterioration of muscle function during exercise and pronounced fatigue at the end of the day (1, 3). Although 15% of patients have only ocular symptoms, vast majority have a generalized form of MG, sometimes leading to myasthenic crisis, as a medical emergency (7). Myasthenia gravis is divided into subgroups according to the age at onset, clinical manifestations, presence of antibodies and thymus pathology, and accordingly there are some differences in the treatment of specific patients (3,5).

Fatigue is the main symptom of MG that fluctuate during the day, worsened by exertion and improved by rest, but also can be a consequence of steroids, apnea syndrome, depression, etc. (1,8). One of the main bulbar signs in severe forms of MG is facial muscle weakness, which can often be asymmetrical, with characteristic facial expression, called "myasthenic sneer" (9). The speech becomes more nasal and the difficulties in articulation are more pronounced leading to flaccid dysarthria and dysphagia. In some patients, airway obstruction occurs due to weakness of the vocal cords (10). Sometimes head-drop can occur, predominantly in male, and limb muscle weakness tends to be symmetric and proximal, leading to difficulty climbing stairs, getting up from chairs, and raising arms above their head. Although mostly proximal muscles affected, symmetrically or asymmetrically distal muscles can also be affected (2,11). In most patients with the generalized form, a reduced vital capacity and other respiratory parameters can be observed, regardless of the fact that there are no preceding signs of dyspnea (12).

Diagnosis of myasthenia gravis relay on a history, clinical neurologic examination and the result of the tensilone test or the prostigmine (neostigmine) test. A CT scan of the mediastinum and thymus,

if present, should be performed. Laboratory tests detect antibodies to acetylcholine receptors, anti-MuSK antibodies, anti-LRP4 antibodies. Anti-AChR and anti LRP antibodies can be demonstrated in enzyme-linked immunosorbent assay (ELISA), anti-MuSK radioimmunoassay (RIA). Even if laboratory tests for these antibody are negative, this does not rule out the disease (13). In this case, the diagnosis is based on the clinical picture, response to acetylcholinesterase inhibitors and electrodiagnostic tests (13).

The first line treatment for myasthenia gravis is oral acetylcholinesterase (AchE) enzyme inhibitors such is Pyridostigmine bromide (Mestinon), effective in cases of mild and moderate MG (14,15). However, their benefit is temporary and partial, so most patients eventually need immunosuppressive therapy, thymectomy and immunomodulatory therapy (15).

Until now, the number of patients with myasthenia gravis in the area of western Herzegovina is not known, and this was the focus of this research. Additional goal was to determine clinical and laboratory characteristics of these patients, in order for better understanding and treatment of these patients. The aim of this research is to determine the clinical characteristics of patients with myasthenia gravis (ocular and generalized form of the disease) and to determine the laboratory characteristics (seropositive and seronegative form of the disease). Additional goals are:

- Determine the distribution of patients with regard to gender
- Determine the age of onset of the disease and initial symptoms in patients with MG
- Determine the results of the prostigmine test and the neuromuscular junction test
- Determine thymectomy status in patients with MG
- Determine the therapy of patients with MG and the incidence of myasthenic crises.

SUBJECTS AND METHODS

Patients and study design

Patients diagnosed with myasthenia gravis, treated at the Department of Neurology of the University Clinical Hospital Mostar were included into our study. Criteria for inclusion were: all patients with MG over the age of 18, regardless of gender, who visit outpatient clinic for monitoring their clinical condition. Patients who were once registered, but no longer come for check-ups due to relocation or other personal reasons, were excluded.

This cross-sectional study was conducted retrospectively by examining the medical documentation of the University Hospital Mostar. The data were collected from the hospital information system (BIS). The parameters we considered are: age, gender, clinical picture, antibodies (AChR, MuSK, seronegative), associated comorbidities, therapy, family history and thymus pathology.

The study was approved by Ethical Committee of University Clinical Hospital Mostar.

Statistical analysis

The results of the statistical analysis are expressed in absolute and relative frequencies. The significance of the differences was tested with the $\chi 2$ test (in the absence of expected frequencies with Fisher's exact test). A $p<0.05$ was taken as statistically significant. Statistical analysis of the collected data was performed in IBM SPSS Statistics (version 25.0, SPSS Inc, Chicago, Illinois, USA) and Microsoft Excel 2019 (Microsoft Corporation, Redmond, WA, USA).

RESULTS

A total number of 39 of patients with diagnosed myasthenia gravis were included in this research. MG occurred more often in female patients (58%) ($P<0.05$). In female patients, MG occurred mostly at the age range from 30-70 years, compared to men where MG mostly occurred at the age range from 50-90 years.

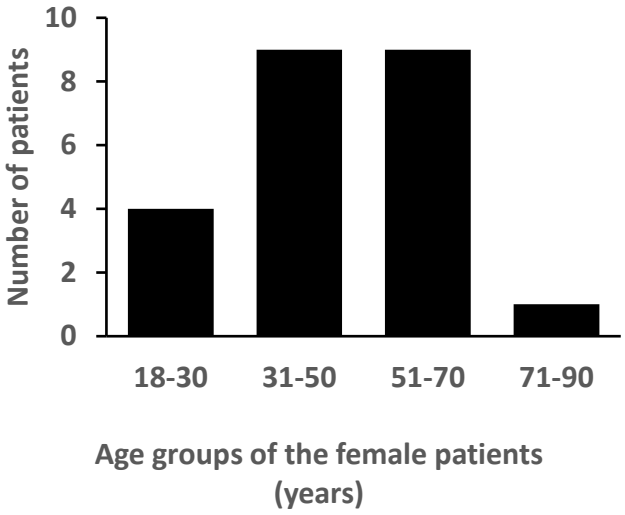

Figure 1. *The onset of the myasthenia gravis in female patients according to the age. On the figure the absolute number (N) of patients is shown.*

Figure 2. *The onset of the myasthenia gravis in male patients according to the age. On the figure the absolute number (N) of patients is shown.*

Only 2.86% of patients have a positive family history, and 97.44% does not have any relatives with MG. A large number of patients, 74.36% have the generalized form, and 25.64% have the ocular form ($p<0.05$).

AChR antibodies are positive in 78.38% patients with MG, MuSK antibodies in 5.41% and 16.22% of patients are seronegative ($p<0.05$).

Only 2.56% of patients had a positive neuromuscular junction test, while 97.44% were negative.

Only 7.69% were thymectomized, and 92.31% were not operated. So far, 17.95% of patients have had a myasthenic crisis, and 82.05% have more stable course of disease. In context of other autoimmune diseases, 74.36% of patients have no other diseases, 5.13% have hypothyroidism, 5.13% diabetes, 2.56% dermatomyositis, 5.13% rheumatoid arthritis, 2.56% have hypothyroidism and Crohn's disease, 2.56% asthma, 2.56% systemic lupus erythematosus (SLE) with myasthenia gravis.

Regarding medicamentous therapy, 58.97% of patients use Mestinon and prednisolone, 35.90% use only Mestinon, 2.56% use Mestinon, prednisolone and cyclosporine, and 2.56% use prednisolone and Imuran in combination (Table 1).

Table 1. *Clinical and laboratory characteristic of patients with MG*

	Form of MG					
	Generalized		Ocular		χ^2	p
	n	%	n	%		
Gender					1,085	0,264*
M	10	34,5	6	60,0		
F	19	65,5	4	40,0		
Family history					0	1*
Positive	1	3,4	0	0,0		
Negative	28	96,6	10	100,0		
MG antibodies					1,013	0,757*
AChR-p	23	79,3	6	75,0		
MuSK-p	2	6,9	0	0,0		
Negative	4	13,8	2	25,0		
Neuromuscular junction test					0	1*
Positive	1	3,4	0	0,0		
Negative	28	96,6	10	100,0		
Thymectomy status					0,137	0,556*
Operated	3	10,3	0	0,0		
Unoperated	26	89,7	10	100,0		
Myasthenic crisis					1,531	0,158*
Yes	7	24,1	0	0,0		
No	22	75,9	10	100,0		
Other autoimmune diseases					4,176	0,874*
No	21	72,4	8	80,0		
Hypothyroidism	2	6,9	0	0,0		
Diabetes	1	3,4	1	10,0		
Dermatomyositis	1	3,4	0	0,0		
Rheumatoid arthritis	1	3,4	1	10,0		
Hypothyroidism + Mb. Chron	1	3,4	0	0,0		
Asthma	1	3,4	0	0,0		
SLE	1	3,4	0	0,0		
Current therapy					3,696	0,303*
M	8	27,6	6	60,0		
M+P	19	65,5	4	40,0		
M+P+C	1	3,4	0	0,0		
P+I	1	3,4	0	0,0		

*Fisher's exact test

Most patients had ptosis as an initial symptom, followed by fatigue, dysarthria, dysphagia and diplopia (Figure 3).

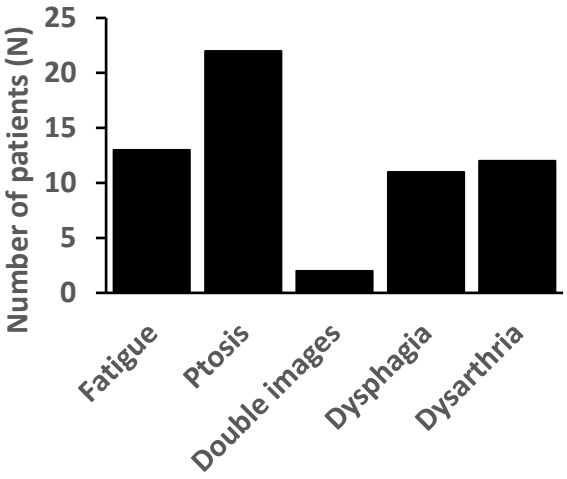

Figure 3. *Number of initial symptoms in patients with myasthenia gravis*

DISCUSSION

Our research provided important data about clinical and laboratory characteristics of patients with myasthenia gravis. Although myasthenia gravis is in the focus of numerous researches, data provided from the patients in this geographic area were not analyzed so far. In our research the majority of MG patients in Mostar are female, supporting most of other studies, such is the one conducted in Riyadh, Saudi Arabia (16). However, their subjects had a much earlier onset of the disease compared to the subjects in Mostar. Although we expected a larger number of younger patients with myasthenia gravis, our research was concordant with that from Korea, where an increase in the number of patients with myasthenia gravis in older age is being recorded (17). We found that the majority of patients in Mostar have a generalized form of the disease, and a smaller number have the ocular form of the disease, which suports the results reported in earlier study, where the most of ocular forms becomes generalized (2). The largest number of patients are positive for anti-AChR antibodies, followed by seronegative patients, and the fewest are patients who have positive anti-MuSK antibodies. Previously mentioned research in Riyadh, provided the similar results, although researchs in USA, South Africa and Norway list MuSK MG as the second most common form after AChR MG (17). A positive prostigmine test in the majority of our, but also patients from other international studies showed its clinical importance in diagnosis, as well as the response to therapy (18). As an aditional method for MG diagnosis, the neuromuscular junction test, was used, which on the other hand, was positive only in one patient with a generalized form of MG. We can conclude that almost all of our patients do not have pronounced pathological changes at the neuromuscular junction, which represents great limit of this test. This means that almost all MG patients in Mostar have a milder clinical

picture when it comes to muscle weakness and they respond well to therapy. In Norway, on the other hand, more patients had a positive neuromuscular junction test, which indicates a more severe clinical picture and more pronounced symptoms of muscle weakness (8). Myasthenic crises are an emergency condition in patients with MG which occured in only seven our patients and those of an older age. According to some research, patients who have other comorbidities and/or other autoimmune diseases more often have myasthenic crises. Older age is in favor of possible accompanying infections that can cause impairment of immunity and easier onset of myasthenic crisis. Research in Riyadh showed that significant number of patients had other autoimmune diseases, which is not the case with the results obtained in Mostar (16). Hypothyroidism, diabetes, dermatomyositis, rheumatoid arthritis, Crohn's disease, asthma and systemic lupus erythematosus were diagnosed in ten patients in University Clinical Hospital Mostar. Research conducted in Macedonia also confirmed these diseases as the most common in patients with MG, with an emphasis on thyroid disease. However, only one patient in Mostar had thyroid disease (18).

Most patients with MG undergo thymectomy for the purpose of treatment, although research conducted in USA and later in Baghdad showed that patients with a more severe clinical picture and pathohistological changes only achieved temporary remission after thymectomy (19, 20). Only 3 out of 39 of our patients were operated on. This indicates that patients in Mostar have a milder clinical picture and do not have significant pathohistological changes that require this surgical procedure compared to patients in other countries. Furthermore, it shows that the vast majority of patients in Mostar respond favorably to drug therapy and majority used a combination of Mestinon (pyridostigmine bromide) and prednisolone. This drug combination has also been shown to be successful in other clinical centers and is listed in global treatment guidelines (21). The fact that only one patient in Mostar, had a positive family history supports most of findings that myasthenia gravis appears sporadically and has no connection with family history. Of the initial symptoms, the most patients had fatigue and ptosis, followed by dysarthria and dysphagia, and the fewest had diplopia. Fatigue is the most common and non-specific symptom of the disease and is cited as the main symptom in the literature (2). Ptosis is the most common symptom in patients in Mostar, which corresponds to the clinical picture of MG, in the generalized and ocular form, mostly affecting the ocular muscles first.

CONCLUSION

In conclusion, the results of our research showed that the majority of patients with MG who come to our institution are elderly, with a generalized form of disease, a positive prostigmine test and a positive finding of anti-AcHR antibodies, as well as good response to therapy. These are the results of patients regularly monitored in a tertiary healthcare institution. We must also take into account the part of patients with periodic controls in other healthcare institutions, and those who are not yet included in the study in

order to achieve the most relevant epidemiological picture.

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Pravdić N, Pejanović Škobić N, Markotić M, Vladić A, Bender M, Batinić D. CLINICAL AND LABORATORY CHARACTERISTICS OF PATIENTS WITH MYASTHENIA GRAVIS: AN EXPERIENCE FROM UNIVERSITY CLINICAL HOSPITAL MOSTAR. Zdravstveni glasnik. 2024;10(2):35-45.

KLINIČKE I LABORATORIJSKE ZNAČAJKE BOLESNIKA S MIASTENIJOM GRAVIS: ISKUSTVA IZ SVEUČILIŠNE KLINIČKE BOLNICE MOSTAR

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SAŽETAK

Uvod: Miastenija gravis (MG) je važan zdravstveni problem koji pogađa značajan broj bolesnika. Za adekvatan terapijski pristup važno je pravilno razumijevanje karakteristika bolesti.

Cilj našeg istraživanja bio je utvrditi kliničke i laboratorijske karakteristike bolesnika s MG koji su liječeni u Sveučilišnoj kliničkoj bolnici Mostar.

Ispitanici i metode: Korišteni su podaci iz Registra Sveučilišne kliničke bolenice Mostar. U naše istraživanje uključili smo sve bolesnike s MG (n=39), starije od 18 godina, bez obzira na spol, koji su na redovitim ambulantim kontrolnim pregledima. Analizirali smo sljedeće parametre: dob, spol, kliničku sliku, antitijela (AChR, MuSK), komorbiditete, terapiju, povijest bolesti, patologiju timusa i primijenjeno liječenje.

Rezultati: MG se češće pojavljuje kod bolesnica ženskog spola (58%). Kod ženskih bolesnica MG najčešća dob pojavljivanja je bila od 30-70 godina, u usporedbi s muškim bolesnicima kod kojih se MG većinom pojavila u dobi od 50-90 godina. Generalizirani oblik MG bio je prisutan u 74,36% bolesnika, a 25,64% imalo je okularni oblik. Anti-AChR protutijela bila su pozitivna u 78,38%, anti-MuSK u 5,41%, a 16,22% bolesnika bilo je seronegativno. Prostigminski test bio je pozitivan u 97,37%, a negativan u 2,63% bolesnika. Među početnim simptomima većina bolesnika imala je ptozu i umor, dok su dizartrija, disfagija i diplopija bili rjeđi znakovi bolesti.

Zaključak: Na temelju našeg istraživanja možemo zaključiti da MG najviše pogađa stariju žensku populaciju. Većina bolesnika imala je pozitivna Anti-AChR protutijela i pozitivan prostigminski test.

Ključne riječi: miastenija gravis, anti-AChR, anti-MuSK, piridostigmin, kortikosteroidi

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CHARACTERISTICS OF EXPERIENCED EDUCATORS: A QUALITATIVE ANALYSIS OF PHYSIOTHERAPISTS' PERSPECTIVES ON PATIENT EDUCATION

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ABSTRACT

Introduction: Patient education is a specific type in which physiotherapists provide patients and their caregivers with information to improve their health status. Physiotherapists who possess the competencies needed to provide high-quality patient education are key to meeting the educational needs of patients. This paper aimed to investigate the characteristics of expert educators according to the opinion of physiotherapists with experience in patient education.

Methods: This descriptive qualitative study was conducted through individual interviews with physiotherapists with experience in patient education while working in a hospital. The interviews were audio recorded and transcribed verbatim. Data were analyzed using thematic approaches.

The results: Twenty-five physiotherapists from Bosnia and Herzegovina who worked in physical medicine and rehabilitation clinics for an average of 14 years participated in the research. Being sensitive to the patient's interests and learning needs and adapting education to each patient's needs and the context of the situation are the hallmarks of a professional educator. Educational support resources, observation, experiential training, and guidance from experienced educators are examples that enhance competency development.

Conclusion: Expert patient educators demonstrate sensitivity to the patient's learning needs and the ability to individualize the patient's education. A supportive learning environment, intrinsic motivation, and awareness of the value of patient education were considered the main factors needed to become an expert educator. Experienced educators expressed the need for continuous education and collegial support.

Keywords: experience, educator, physiotherapist, perception

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INTRODUCTION

Providing patient education can be challenging, especially in recent years due to population aging (1, 2), cultural diversity, and reduced length of hospital stay. Developments in both society and science, concerning health and utilizing social media for patient education, tasked educators to be up to date with proof-based medicine while using informational technologies (3). Patients seek more detailed information and prefer to participate in decisions concerning their health (4). Transitioning from a medical model to patient-directed care (5) demands improved competencies in communication skills. Finally, lifestyle changes emphasized in secondary prevention indicate the need for specialized communication and lifestyle counseling training for health workers (6).

Lorig defines patient education as „any collection of planned educational activities designed to improve patients' health-related behavior, health, or both.“ (7). Patient education is a key component in prevention, in addition to lifestyle changes and reducing risk factors (8, 9). Furthermore, patient education results in greater control over illness perception (10) and possible beneficial effects on health-related quality of life (11). Recent research results confirm the role of patient education in health outcome improvements, listed in the literature overview and a meta-analysis of over 360 studies that researched patient education with chronic illnesses (12).

Contrary to this, lack of patient education in health institutions is connected with unfavorable outcomes, including readmission to hospitals, incorrect therapy usage, and improper control (13). It is considered that physiotherapists have a unique position for creating therapeutic relationships with patients due to direct contact over a longer period compared to other healthcare professionals (14). Despite the crucial role of education in patient well-being, ways to effectively implement patient education in practice and required competencies are currently undefined (15). Available indicators show that health professionals, including physiotherapists, usually implement patient education without a plan, spontaneously, and informally as a part of broader care (16). Furthermore, there is a concern over limited possibilities for continuous training directed toward patient education (17, 18). The lack of emphasis on educational and behavioral sciences in educational programs for patients is clear in the available literature (19, 20), and a need for developing continuous health professionals' education is recognized (21, 22).

Forbes and associates implemented a study to create a concise list of competencies for physiotherapists concerning educating patients with a high level of expertise (23). Ascertaining key competencies in this area will enable the evaluation of patient education and can facilitate the improvement of the educational and professional roles of physiotherapists. However, based on our findings, factors improving the development of expert educators are yet to be explored. A previously published research discussed the knowledge and skills required for patient education (24). In this research, we point out the necessary resources and activities for improving competencies development concerning patient education.

OBJECTIVE

This research paper aimed to explore the characteristics of expert educators based on the physiotherapists' opinions in working on patient education while analyzing their personal beliefs on how to become an expert educator.

METHODS

This qualitative descriptive study employed semi-structured, face-to-face interviews to gather data. The chosen design was deemed suitable for collecting information on personal perspectives and beliefs (25). The aim was to interview physiotherapists with experience in patient education in Bosnia and Herzegovina. The researcher sent an online invitation to present the study to physiotherapists working in physical medicine and rehabilitation clinics and requested their written consent to participate. The participants varied in age, gender, education level, patient education experience, and information sources about patient education.

Data collection

Data were collected between January and April 2024. The interviews were conducted online by the authors. The main question asked during the interviews was: "What are the key competencies and characteristics of an effective patient educator?" All interviews were audio-recorded and transcribed verbatim. On average, the interviews lasted 20 minutes (ranging from 13 to 34 minutes). Participants were asked to share their perceptions of novice patient educators and describe the process of becoming an expert educator.

Ethical questions

The research was conducted per the Helsinki Declaration. The study does not require the permission of the Board for research ethics because no sensitive or personal medical data was gathered (26, 27). Participants were provided with written and oral information about the study and were informed about their rights to terminate participation at any point. Before conducting interviews, written informed consent was obtained from participants. Confidentiality was ensured by storing audio files under key and removing transcript identifications; data was available solely to authors.

Data analysis

The analysis was conducted by the authors. To reduce the possibility of bias that could affect the results, reflexivity was ensured through critical discussions with an experienced research team regarding the guidelines for conducting and interpreting interviews. Data were analyzed after each interview, using a thematic approach based on systematic text condensation (26). The analysis process involved careful reading of the interview texts to identify and classify organized themes. After processing each theme, they were broken down into smaller units within their frameworks, and the content was condensed to present quotes while retaining as much of the original terminology as possible.

There is no conflict of interest.

RESULTS

Twenty-five physiotherapists were interviewed (Table 1.). All participants had experience in hospital-based patient education, while eighteen had experience

in patient education after hospital stay. Six participants had experience in counseling in private healthcare institutions and private practice offices.

Table 1. *Demographic characteristics of participants*

Participants		Number
Sex	Male	8
	Female	17
Age	25 – 35	8
	36 – 46	11
	47 – 60	6
Education level	Secondary education	5
	Bachelor's degree in Physiotherapy	11
	Master's degree in Physiotherapy	9
Patient education experience	> 3 years	14
	1 - 3 years	8
	< 1 year	3
Sources of information about patient education	Courses on physiotherapy	12
	Studying under an experienced colleague	8
	Independent study in personal time	5

Physiotherapists initially analyzed their perceptions of novice educators at the beginning of the interviews. Subsequently, they explained the transformation process towards becoming expert educators, drawing on their own experiences. They emphasized the importance of timeframes, professional education, long-term clinical practice, and the significance of work environments that foster professional development and personal motivation.

Table 2 presents a summary of the participants' responses highlighting the key competencies of expert educators in physiotherapy.

Table 2. *Competencies of expert educators in physiotherapy*

Responses
Creating a Supportive Learning Environment - Educators should ensure a positive and supportive environment that encourages patients to engage actively.
Intrinsic Motivation - Educators need to be able to motivate themselves and their learners for continuous learning and personal development.
Analyzing and Evaluating Personal Patient Education - Reflecting on one's own methods and approaches in education to enhance practice.
Seeking Constructive Criticism - Being open to receiving and seeking feedback from colleagues and patients.
Communication Skills - The ability to ask questions and provide clear answers to ensure understanding.
Seeking Feedback from Patients - Actively seeking feedback from patients to confirm learned information and improve practice.
Technical Support - Access to resources and support necessary for the successful implementation of educational practices.
Participation in Educational Activities - Actively engaging in courses, conferences, and forums for knowledge exchange.
Continuous Education - Commitment to lifelong learning and professional development through various educational programs.

Themes in Educator Development

This study identifies three key themes in the development of physiotherapy educators: characteristics of novice educators, the path to becoming an experienced educator, and strategies to enhance professional development. It also discusses the qualities that distinguish expert educators from novice educators.

Characteristics of Novice Educators

Novice educators, usually inexperienced physiotherapists, often have limited clinical experience in patient education. Their underdeveloped communication skills can hinder their ability to effectively assess and prioritize patients' needs. One physiotherapist noted, "Novice educators tend to focus solely on the patient's current situation. It takes years to develop a holistic view that takes into account the broader context of the patient." The critical difference between novices and experts lies in their knowledge and problem-solving abilities.

Transition from novice to professional educator

Participants emphasized that the path to professional educator requires practical experience and structured mentoring from experienced professionals. Such mentoring helps novices understand their unique learning process. One physiotherapist noted, "Different mentors help me see patients' problems from multiple angles, improving my approach to rehabilitation." Effective mentoring fosters a supportive learning environment; an experienced participant noted, "Practical experience is essential for developing skills in patient education. Mastering these skills without mentoring is challenging, and feedback is incredibly valuable."

Beginning educators are encouraged to begin with individualized instruction, focusing on a single patient to facilitate observation and self-reflection. An experienced therapist explained that patient education begins with history taking, including discussions about the patient's diagnosis, symptoms, and holistic concerns. This approach emphasizes the need for knowledgeable educators who can motivate patients to make lifestyle changes, which relies heavily on strong listening skills.

Motivation and Engagement

Intrinsic motivation and engagement are key for transitioning beginning educators to expertise. Participants emphasized the importance of patient education, personal development, and genuine curiosity about patients' needs. An experienced physical therapist noted, "Not every professional excels at patient education; the physiotherapist's personality and understanding of the importance of teaching are key." Active listening is essential for identifying gaps in knowledge; one participant stated: "When faced with questions that I cannot answer, it is important to admit, 'I don't have the answer now, but I will find out,'" confirming that motivation is essential for effective learning.

Encouraging patient involvement in therapy development was also emphasized. "Explaining the patient's problem encourages their active participation. The clearer I am, the more likely they are to engage in the process," explained one physical therapist.

Workplace learning

Creating a supportive work environment is key to fostering motivation and skill development. Participants expressed challenges related to limited opportunities for consultation with colleagues. Suggestions included organizing rehabilitation team meetings and promoting professional networking to share knowledge. One physical therapist noted uncertainty about how colleagues approach patient education, suggesting the need for collaborative learning.

Time constraints complicate ongoing educational efforts. One participant emphasized the importance of asking insightful questions, stating: "The questions I ask not only enhance my understanding but also motivate patients to actively engage."

Improved communication enhances the patient experience and helps educators develop skills through a variety of interactions. Reflective practices such as peer review help identify areas for improvement. Participants agreed that motivation, collaboration, and reflection are vital components for improving health education.

Educational Resources

To address time constraints and enhance learning opportunities, participants suggested establishing guidelines for accessing relevant literature and creating a centralized repository for educational resources. Standardized courses and clear clinical guidelines were identified as valuable tools for novice and experienced educators. Clinical guidelines support quality assurance and evidence-based education. One physiotherapist explained: "Guidelines help me work

effectively with patients and simplify decision-making. Success in physiotherapy requires understanding how to teach; if the patient does not understand their situation, behavior change is unlikely."

However, relying on outdated materials is problematic, as limited access to current information can hinder educators' ability to effectively adapt teaching, especially for novices who may rely too heavily on established guidelines.

Learning through Observation and Practical Experience

Participants indicated that hands-on experience is essential for improving competency in patient education. Practical skills and effective communication are essential, but novice educators are often hesitant due to fear of unexpected questions or insecurity arising from their inexperience. Observation of experienced colleagues is essential for developing these skills. One participant expressed a desire for programs that help novices observe senior educators before engaging in patient education themselves. Practical training methods, such as simulations and rehearsals of educational sessions, were recommended to build essential experience. Participants advocated for increasing awareness of communication skills and building trust during patient interactions. Participating in role-playing with colleagues as mock patients and recording educational sessions for self-evaluation were also suggested as effective learning strategies.

Characteristics of Experienced Educators

Expert physiotherapy educators embody extensive knowledge of physiotherapy and teaching methodologies. They adopt a holistic approach to patient care, demonstrating empathy and the importance of effective education. Confidence and strong communication skills enable them to engage and encourage patients. As one physiotherapist observed: "Building trust is key to successful patient education. When patients feel safe, they are more likely to express concerns and actively participate in their treatment." Key characteristics of expert educators include assessing when patients are ready to receive information and being sensitive to their learning needs.

Experienced educators recognize that well-informed patients feel safe and confident, which leads to greater engagement in therapy. An educator stated: "A professional knows what type of information to give based on the patient's needs and ability to understand."

Sustaining Expertise as an Educator

Participants with extensive experience highlighted the necessity of ongoing education to improve their skills. One physiotherapist observed: "Improving communication, tailoring education to individual patient needs, and keeping up with the latest research are key to maintaining competence."

Self-reflection on strengths and areas for improvement was emphasized. An experienced educator expressed the benefit of training that assesses effectiveness and provides constructive feedback.

Participants also suggested practical strategies for professional development, including visits to hospitals with exemplary patient education practices to

observe best practices. Novice teachers were encouraged to design and lead supervised educational sessions with mentoring and feedback. Although many had not yet experienced this approach, they recognized it as a key next step in their professional development.

DISCUSSION

The ability to know when the patient is ready to receive the information, show empathy for the patient's interests and learning needs, and adapt the education to the needs of every patient and context are pointed out as characteristics of an expert educator. Prerequisites for transitioning from a novice to an expert educator are intrinsic motivation, active participation with mentorship, and an encouraging environment fostering learning. Supplemental educational resources, observation and practical training, and guidance by experienced educators were suggested as actions needed to improve the process of developing expert educators. Experienced educators expressed a need for peer support and professional cooperation while developing their competencies.

An expert educator described in this study is a healthcare professional with advanced and relevant theoretical knowledge in physiotherapy and educational sciences. In addition to awareness of the need for knowledge and where to find it, relevant knowledge is a part of clinical competencies and includes using existing proof-based information (29). Possessing sufficient knowledge (30) and professional promptness are considered crucial in developing competencies (31). Participants in this study were concerned that a lack of knowledge and confidence may contribute to physiotherapists' reluctance to implement patient education, hindering their professional development. Lack of knowledge was identified as an obstacle to implementing patient education (18) and a lack of resources, structured training, and skill development is seen as an obstacle to implementing patient education (22). It is concerning that previous studies showed healthcare professionals indicated their inactivity in reading literature relating to patient education and failures to update knowledge in these areas (32). Aversion towards patient education and a lack of knowledge in this area are questions that must be addressed clearly if physiotherapists aim to improve their competencies in patient education.

Healthcare professionals qualified for educational science and lifestyle counseling are crucial for secondary prevention (15). Continuous education for healthcare professionals may improve professional practice and healthcare outcomes for patients (16).

A working environment with mutual respect, partnership, support, trust, and appreciation of staff is recognized in previous research as an inspiration for learning and growth (33). Time limitations and a great workload present obstacles to motivation for continuous formal education, at least for some of our participants. Professional growth and learning through work depend on the employer's support (31, 34). Several physiotherapists in this study stated that to be up-to-date with new developments, they need to be motivated to study in their free time. This situation is supported by previous studies showing that healthcare professionals use their free time for

continuous learning (22) and that management expects this (31). This emphasizes the importance of considering the preferences and motivations of physiotherapists as well as their clinical reality and management support in designing continuous educational interventions.

Showing empathy for patients' interests and their needs for learning and individualized patient education were seen as characteristics of an expert educator. The ability to satisfy individual patient's needs was the central role of an expert educator for a long time, as emphasized by Benner (35) who thought that capturing the patient's readiness to learn and knowing when to move forward are expert competencies and key aspects of effective patient education. In this study, participants stated that novice educators tend to focus on specific tasks, rather than take a holistic approach, strictly relying on standardized instructions. Research showed that experts are superior to novice educators in recognizing patient signals and obtaining a full image of the patient (36); they do not rely on rules and guidelines, rather they act based on understanding the particularities of each patient's situation.

Experience is perceived as a precondition for expertise (35) and is described as the most important factor in developing competencies (33). In this study, experience was seen as priceless in developing skills that increase the ability to read patients and meet them where they are. An active role and physiotherapist's introspection were deemed necessary if experience results in expertise. Contemplating experiences (23) and training in reflective thinking and relevant feedback (30) are important elements in developing competencies (37). This confirms our findings, considering the participants saw mentorship and constructive critical thinking about educational experiences and the impact on the patient as important factors in improving professional development.

Following previous research (38), further improvements for experienced educators are considered necessary to ensure the quality of patient education. When discussing the educational needs of experienced educators, many complained about the scarcity of possibilities and sought greater peer support, interprofessional cooperation, and mentorship, indicating a lack of meeting experts' needs for learning. A network of patient education experts in physiotherapy was suggested to enable greater contact and interaction with other expert educators. A lack of a forum for sharing knowledge and discussing difficult situations in patient education was previously recorded (37). A need for regular meetings to discuss patient education was suggested (32). In this study, peer support was an often-mentioned important motivational factor in developing competencies in patient education.

Limitations

The main impact of this study comes from the extensive experience most participants had in patient education in physiotherapy, especially because the majority had experiences in different educational settings. Besides this, some had experience in training healthcare professionals for patient education, resulting in a robust understanding of the

educational needs of both novice and expert educators.

However, participants with less experience were a minority, and there were no participants without any experience. Including a larger number of participants with limited experience may provide additional information about the educational needs of novice educators. The main limitation of the study was basing the results on the personal and professional opinions of physiotherapists rather than on their actual work. This approach was purposefully chosen due to the lack of robust descriptions of novice and expert educators in physiotherapy.

CONCLUSION

A holistic view of the patient, sensibilities to patient needs for learning, and the ability to personalize patients' education are perceived as key competencies of an expert educator. In addition to an environment fostering a learning atmosphere, engagement, and motivation for patient education, with an awareness of patient education benefits, are the necessary preconditions to becoming an expert educator. Experienced educators expressed a need for continuous education and support to help improve their competencies. Structured training, peer support, and mentorships by experienced educators may improve the benefits of clinical experience, enhance expert development in patient education, and help in improving expert competencies.

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KARAKTERISTIKE ISKUSNIH EDUKATORA; KVALITATIVNA ANALIZA PERCEPCIJE FIZIOTERAPEUTA O EDUKACIJI PACIJENATA

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SAŽETAK

Uvod: Edukacija pacijenata je specifična vrsta u kojoj fizioterapeuti pacijentima i njihovim skrbnicima pružaju informacije za poboljšanje njihovog zdravstvenog stanja. Fizioterapeuti koji posjeduju kompetencije potrebne za pružanje visokokvalitetne edukacije pacijenata ključni su za zadovoljavanje obrazovnih potreba pacijenata. Ovaj rad je imao za cilj istražiti karakteristike stručnih edukatora prema mišljenju fizioterapeuta s iskustvom u edukaciji pacijenata.

Metode: Ova deskriptivna kvalitativna studija provedena je kroz individualne razgovore s fizioterapeutima s iskustvom u edukaciji pacijenata tijekom rada u bolnici. Intervjui su audio snimljeni i doslovce prepisani. Podaci su analizirani korištenjem tematskih pristupa.

Rezultati: U istraživanju je sudjelovalo 25 fizioterapeuta iz Bosne i Hercegovine, koji su prosječno 14 godina radili u klinikama za fizikalnu medicinu i rehabilitaciju. Osjetljivost prema pacijentovim interesima i potrebama učenja te sposobnost prilagodbe edukacije potrebama svakog pacijenta i kontekstu situacije obilježja su profesionalnog edukatora. Sredstva obrazovne potpore, promatranje, iskustvena obuka i vodstvo iskusnih edukatora navedeni su kao primjeri koji poboljšavaju razvoj kompetencija.

Zaključak: Stručni edukatori pacijenata su oni koji pokazuju osjetljivost za pacijentove potrebe učenja i sposobnost individualiziranja edukacije pacijenata. Podržavajuće okruženje za učenje, intrinzična motivacija i svijest o vrijednosti edukacije pacijenata smatrani su glavnim čimbenicima potrebnim da se postane stručni edukator. Iskusni edukatori iskazali su potrebu za kontinuiranom edukacijom i kolegijalnom podrškom.

Ključne riječi: iskustvo, edukator, fizioterapeut, percepcija

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GENERAL AND LANGUAGE LEARNING SELF-EFFICACY BELIEFS OF GERMAN AND ENGLISH FOREIGN LANGUAGE LEARNERS

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ABSTRACT

The process of learning a foreign language is complex and various internal and external factors have an impact on students' academic success in the foreign language classroom. In the context of foreign language learning self-efficacy is defined as a person's perception of competence, rather than the actual level of competence, since confidence plays a fundamental role in foreign language learning. A student with a high level of self-efficacy tends to put more work into their studying, has higher levels of confidence and optimism when setbacks are encountered, and is more capable of addressing challenges, leading to an overall enhancement of their participation in learning. The present study aims to highlight the relationship between foreign language learning (German and English) and self-efficacy among undergraduate students of nursing, physiotherapy, midwifery, radiologic technology, and sanitary engineering of the Faculty of Health Studies, University of Mostar and establish if there are any differences in the way German and English learners perceive their general and foreign language self-efficacy. The study includes 53 undergraduate students studying at one of five majors and the Faculty of Health Studies in Mostar. Two scales were used in the study, the final version of the German Learning Self-Efficacy Belief Scale and the General Self-Efficacy Scale. The results reveal that the participants do not differ significantly on the levels for general and foreign language learning self-efficacy. Students of the Faculty of Health Studies have moderate levels of general and foreign language learning self-efficacy. These findings indicate that students regardless of the foreign language they study need to foster their abilities and perceptions in foreign language learning.

Keywords: self-efficacy, foreign language learning, German, English

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INTRODUCTION

The process of mastering another language is subject to numerous influences (mother tongue, grammar, cognitive development, and many more). The term of self-efficacy has become the subject of research within the domain of educational psychology. The process of learning a foreign language (FL) is complex and various internal and external factors have an impact on the student's academic success in the FL classroom.

It is also a stressful process and it is natural for the learner to feel anxious. Self-efficacy beliefs have a high impact on the level of anxiety a student has in the FL classroom.

Since, students' success does not only depend on the knowledge and skills they have, it also depends on the necessity to have a high self-efficacy belief in order to use their knowledge and skills effectively (2).

The term self-efficacy, now well-known in many disciplines, was for the first time mentioned by psychologist Albert Bandura in 1977, in the article *Self-efficacy: Toward a Unifying Theory of Behaviour Change*. Today, this particular term is of interest in many different fields such as, sociology, linguistics, medical sciences and many more. The most simple definition of the term self-efficacy would be an individual's beliefs of what they are capable of doing.

In the context of foreign language learning, a more suitable definition would be that self-efficacy is defined as a person's perception of competence, rather than the actual level of competence (3), since confidence plays a fundamental role in foreign language learning.

According to Bandura, self-efficacy is connected with coping mechanisms, level of psychological stress, self-regulation, withdrawal, depression at failure, striving for achievement, internal motivation, and professional career aspirations. Knowledge and skills are necessary, but alone are insufficient for achievements. Efficacy implies the organization of cognitive, social and behavioral skills in achieving a specific goal. The higher the self-efficacy, the better the performance, and the lower the emotional arousal or psychological stress (4). Individual beliefs are the foundation for future success or failure in various aspects of life, including academic success. Good academic results in foreign language learning come from high levels of perceived self-efficacy in learners.

Self-efficacy does not only determine the level of motivation but also the individual's level of resistance to difficulties and failures. People with low self-efficacy beliefs easily begin to believe that their efforts are in vain and therefore easily give up. Accordingly, it is a strong predictor of improving language skills and learning performance (2). People's beliefs about their abilities also affect their way of thinking. Individuals may think pessimistically or optimistically in line with their self-efficacy beliefs. Therefore, more research on self-efficacy beliefs and its status in foreign language learning is important for the prevention of low self-efficacy which can produce numerous negative factors in the language learning process. The main objective of the study is to explore the level of general self-efficacy and foreign language learning self-efficacy among students of undergraduate studies at

the Faculty of Health Studies in Mostar, Bosnia and Herzegovina.

There is a positive correlation between self-efficacy and academic achievement. Specifically, the evidence has shown that students with high self-efficacy in various academic domains choose to engage in tasks that foster the development of their knowledge, skills, and abilities in those areas; exert effort in the face of difficulty; and persist longer at challenging tasks (5, 6).

According to previous research, academic self-efficacy helps students in the following; set clear and specific results and encourage the use of challenging and proximal goals (7). Perceived self-efficacy is also positively correlated with students' choice of majors, success in course work, and perseverance in the field of study. Self-efficacy does not only have a predictive effect, but also plays a mediational role in the relationship between students' learning outcomes and other factors such as academic attitudes (8). High self-efficacy leads individuals to believe in their ability for successfully performing a specific task, while low self-efficacy results in a belief that they will fail at that task (9). Academic self-efficacy is an important subset of self-efficacy, reflecting the perception of the student of their potential success or failure in academic-related tasks and has been defined as a student's belief and confidence in their capability of succeeding in academic endeavors. It has been found to reliably positively predict academic achievement (10). A student with a high level of self-efficacy tends to put more work into their studying, has higher levels of confidence and optimism when setbacks are encountered, and is more capable of addressing challenges, leading to an overall enhancement of their participation in learning (11). The role of self-efficacy in the foreign language learning process is still scarce. Nevertheless, it has been shown as a strong predictor of performance in foreign language learning, and according to previous research, it plays a significant role in the development of foreign language skills, such as writing, reading or listening (12, 13, 14).

LITERATURE OVERVIEW

In the past few decades, the notion of self-efficacy has generated significant attention and a great amount of research in various scientific fields, including foreign language learning. There is a lack of research focusing on self-efficacy beliefs in the context of foreign language learning, especially in German as a foreign language and its comparison to English foreign language learners in any context. However, there has been a growing interest in self-efficacy beliefs within the field of language learning in the past decade. In foreign language learning contexts, research studies have examined self-efficacy in relation to a limited number of variables namely learning strategies, performance, causal attributions, and language anxiety. Among the different findings, the most consistent one is that learners' self-efficacy for foreign language affects performance in different language domains. Considering the critical role of beliefs and thoughts, more research on learners' self-efficacy and how to develop it in university educational settings is necessary for further development in this field of study (15).

A study by Busse suggests that the levels of self-efficacy are higher as students gain more academic experience. This study on 59 university students learning German as a foreign language explores the relationship between self-efficacy belief and foreign language learning, self-efficacy was relatively low at the beginning of the year, and self-efficacy beliefs for speaking and listening further declined over the course of the year (16). Hsieh (2008) in a study on 249 undergraduates learning Spanish, German and French found that self-efficacy was once again a good predictor of achievement. The results indicate significant differences between successful and unsuccessful students. Students with higher self-efficacy reported being more interested in learning the foreign language (17). Tilfarlioglu and Cinkara carried out a study on 175 students of the Faculty of Engineering in order to investigate self-efficacy in English as a Foreign Language. The results showed a high sense of self-efficacy in EFL among students of this particular major. Students with high self-efficacy beliefs reported feeling more efficacious than students with low self-efficacy beliefs in managing academic activities (18). Akin and Akpinar Dellal's study investigated self-efficacy of students studying German, student's self-efficacy was examined according to high school attended, grade level and gender. As a result, no significant relationship was found between high school type and self-efficacy. On the other hand, it was determined that the 4th grade students had the highest self-efficacy and male students had higher self-efficacy than female students (2). Studies on self-efficacy beliefs in FL are almost non-existent in Bosnia and Herzegovina, therefore it is very difficult to compare or validate study results. In 2014, Ozturk and Turkyilmaz investigated beliefs of Bosnian students toward language learning, and came to a conclusion that students' beliefs were generally positive on language learning and in terms of motivation and expectation, the participants showed considerably high scores in foreign language learning (19).

There is a lack of studies studying the relationship of general and FL self-efficacy beliefs among German and English foreign language learners at university level, especially research on the differences in self-efficacy among German and English foreign language learners. The current study will examine the general self-efficacy of FL learners and self-efficacy in language skills, language learning performance and language learning confidence among German and English FL learners.

THE PRESENT STUDY

The present study aims to highlight the relationship between foreign language learning (German and English) and self-efficacy among undergraduate students of nursing, physiotherapy, midwifery, radiologic technology, and sanitary engineering and establish if there are any differences in the way German and English learners perceive their general and foreign language self-efficacy.

PARTICIPANTS AND METHODS

The study included 53 undergraduate students studying at one of five majors and the Faculty of Health Studies in Mostar. There was an unequal distribution of participants (X^2 = 32.208, df

= 1, p < 0.001) in regards to gender, there were significantly more female students (92.45%) when compared to male counterparts (7.55%). The largest number of students was from the nursing and physiotherapy studies (each 16 or 13.19%), students from the study of midwifery made up only 11.32% and sanitary engineering with 9.43% (X^2 = 10.491, df = 4, p = 0.033). Students from the study of radiologic technology made up 18.87% of the total number of participants. An equal number of students study German (26 or 49.06%) and English (27 or 50.94%). The distribution with regard to study major and foreign language is shown in Table 1 (X^2 = 0.019, df = 1, p = 0.891)

Table 1. *Distribution of students according to foreign language and study major (N = 53)*

		English	German
		f (%)	f (%)
Study major	Nursing	9 (56.25 %)	7 (43.75 %)
	Physiotherapy	8 (50 %)	8 (50 %)
	Radiologic technology	5 (50 %)	5 (50 %)
	Sanitary engineering	1 (20 %)	4 (80 %)
	Midwifery	4 (66.67 %)	2 (33.33 %)

STUDY INSTRUMENTS

Two scales were used in the study. The first was the final version of the German Learning Self-Efficacy Belief Scale. The scale has three subdimensions: Language Learning Performance, Language Skills, and Language Learning Confidence. The scale differs from other language learning self-efficacy scales as it includes the effort and psychological state of the student as well as linguistic skills in the measurement. A 5-point Likert-type scale with 28-items was used to measure the self-efficacy beliefs of students learning German or English as a foreign language (2). The second scale or the General Self-Efficacy Scale (GSE) consists of ten items, given in the format of Likert's four-point scale, and according to previous research, it has good reliability and validity and is among the most widely used scale in studying self-efficacy. The result of general self-efficacy was formed as a linear sum of the answers to the statements for examining general self-efficacy on a scale from 1 to 4, where 1 is “strongly disagree”, 2 “disagree”, 3 “agree”, and 4 “strongly agree”.

The internal consistency reliability of Cronbach alpha in this study was an adequate 0.745. The result on German Learning Self-Efficacy Belief Scale was formed as a linear combination of results on individual statements, and in addition to overall self-efficacy when learning a foreign language, results on individual subscales were considered: language skills, language learning performance and language learning confidence. The internal consistency reliability for this scale was a high Cronbach alpha = 0.924, while the reliability of individual subscales ranged from an acceptable 0.726 (language learning performance), to a high 0.895

(language learning confidence) and a very high 0.934 (language skills).

STATISTICAL ANALYSIS

The data were collected through a Google sheet and were analyzed using SPSS 20.0 statistical software (IBM Corp., Armonk, NY, USA). Basic descriptive data for quantitative data are presented through arithmetic mean as a measure of central tendency and standard deviation as a measure of dispersion, graphically using a histogram and box diagram, and qualitative data are presented through frequency, percentage and graphically, using a pie chart. The Shapiro-Wilk test was used to test the normality of the distribution of results, while differences in general self-efficacy and self-efficacy when learning a foreign language were examined with the Student t-test. The relationship between the variables was examined with the Pearson correlation coefficient. A probability level of $p < 0.05$ was taken as statistically significant.

RESULTS

The results on general self-efficacy and foreign language learning self-efficacy are shown in Table 2. It is evident that the minimum score on the general self-efficacy scale is 22 - not a single participant achieves the minimum theoretical score of 9, which means that participants who estimate their self-efficacy as the lowest in this study, score a minimum of 22 points on the scale, while the maximum score achieved is 36, with a score range of 14. The largest dispersion of results is registered around the central value on the foreign language learning self-efficacy scale, while the smallest is on the general self-efficacy scale.

Table 2. *Basic descriptive parameters of the results of general self-efficacy and foreign language learning self-efficacy (N = 53)*

	Min	Max	M	Sd
General self-efficacy	22	36	26.434	2.707
Foreign language learning self-efficacy	42	96	70.302	11.893
Subscale: language skills	8	30	19.283	4.857
Subscale: language learning performance	16	37	27.132	4.048
Subscale: language learning confidence	13	35	23.887	4.945

The results reveal, that the participants do not differ significantly on the levels of general self-efficacy and foreign language learning self-efficacy (Figure 1), that is, they report a similar level of general self-efficacy and FL learning self-efficacy ($t = 0.111$, $df = 52$, $p = 0.912$).

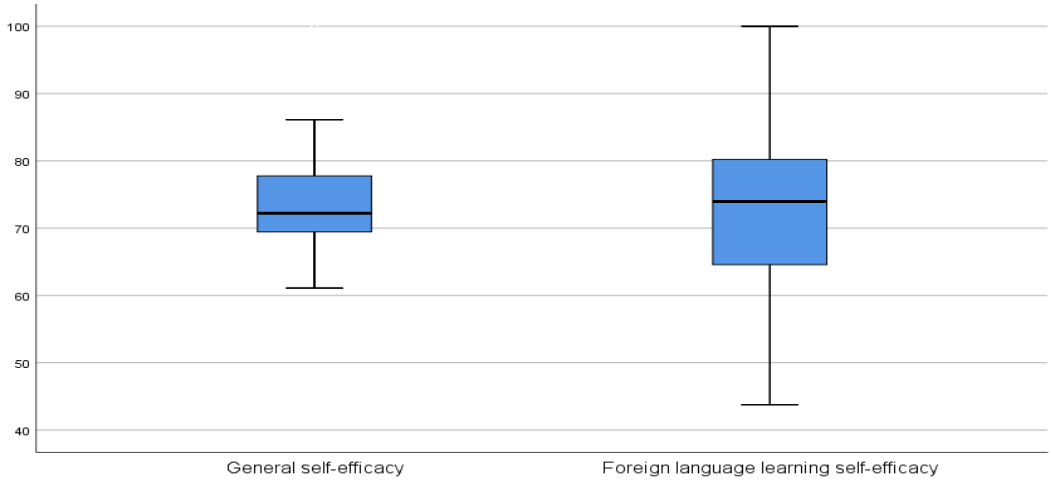

Figure 1. *Presentation of general self-efficacy and FL learning self-efficacy among students of the Faculty of Health Studies (N = 53)*

The results also reveal no significant correlation between the level of general self-efficacy and FL learning self-efficacy (Table 3). Students who report higher levels of general self-efficacy, on average do have to have higher levels of FL learning self-efficacy. The results on the subscales for FL learning self-efficacy are, as expected, related to the results on individual subscales, and the specified type of self-efficacy is statistically significantly and most closely related to language skills. The results on certain subscales for FL learning self-efficacy are also significantly positively correlated, and the subscales for language skills and learning confidence show the greatest correlation. Students who scored higher for language skills and performance in learning a foreign language also report greater language confidence when learning German or English and vice versa.

Table 3. *Correlation between general self-efficacy and FL learning self-efficacy among students of the Faculty of Health Studies*

	Foreign language learning self-efficacy	General self-efficacy	Language skills	Language learning performance	Language learning confidence
Foreign language learning self-efficacy	-	0.241	0.906**	0.777**	0.88*
General self-efficacy		-	0.146	0.13	0.33*
Subscale: language skills			-	.571**	.728**
Subscale: language learning performance				-	.489**
Subscale: Language learning confidence					-

*p < 0.05

The results of the FL learning self-efficacy subscales reveal that the students achieve statistically significantly higher results on the subscale for language performance than language skills (t = -4.92, df = 52, p < 0.001) and confidence when learning German or English (t = -2.853, df = 52, p = 0.006) and they have significantly higher language confidence when learning a foreign language as opposed to self-efficacy on the subscale for language skills (t = - 5.399, df = 52, p < 0.001, Figure 3).

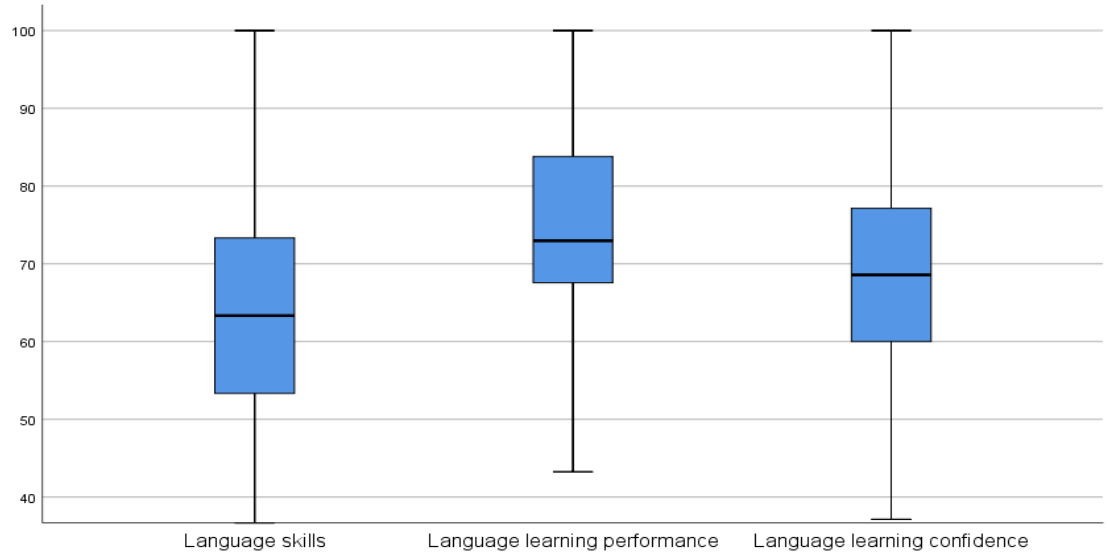

Figure 3. *Results of the subscales for language skills, language performance and language learning confidence*

In the analysis of the overall degree of general self-efficacy among students of The Faculty of Health Studies we took into account the histogram of the obtained results, measures of normality, dispersion and curvature of the distribution of the results and the frequency of individual answers and came to a conclusion that the distribution of the results of general self-efficacy follows the curve of normal distribution and that the parameters for asymmetry and flattening are as expected (20). This indicates that the majority of study participants scored moderate results on the general self-efficacy scale. The results do not indicate an extremely high or an extremely low perception of general self-efficacy, but average (Figure 4).

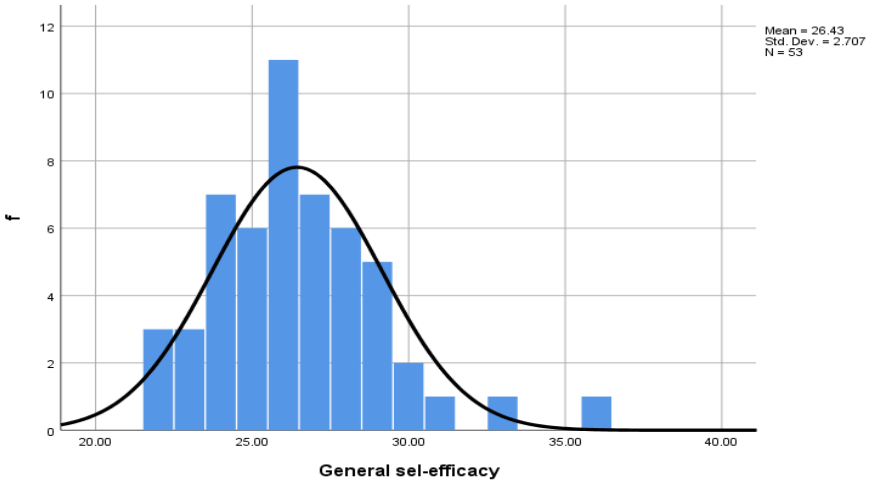

Figure 4. *Distribution of general self-efficacy results among students of the Faculty of Health Studies*

In analyzing the tendencies of answers to individual statements and their differences, it was determined that the participants mostly do not answer with ``strongly disagree'' to most of the statements, with the exception of the third statement (*I easily achieve my goals and achieve my intentions*) where two or 3.8% of students strongly disagrees with statement. Students mostly answered with "disagree" or "agree" to the majority of statement that is they chose moderate values in relation to strongly disagreeing or strongly agreeing, which confirms the aforementioned finding that overall, they show moderate levels of general self-efficacy. There was no statistically significant difference in the levels of general self-efficacy between German and English language students at the Faculty of Health Studies (Table 4), which points to the conclusion that students show equal levels of general self-efficacy regardless of the foreign language they learn.

Table 4. *Difference in general self-efficacy among students of German or English at the Faculty of Health Studies*

		M	Sd	t	df	p
Foreign language	English	26.148	1.916	- 0.78	51	0.439
	German	26.731	3.353			

There were also no statistically significant differences in the perception of self-efficacy when learning German or English among undergraduate students of the Faculty of Health Studies, nor differences in the perception of language skills, language learning performance and language learning confidence (and to answers on individual statements on the scale, $p > 0.05$) when learning English /German language with regard to the study major (nursing, physiotherapy, radiologic technology, sanitary engineering, midwifery) (Table 5). The correlations between the two scales show that self-efficacy is linked to students' self-perceived effort to engage with language learning. The findings therefore tie in with

a substantial body of evidence obtained in mainstream motivational research showing a link between self-efficacy beliefs and learning behavior (18).

Accordingly, the analysis did not reveal any statistically significant differences ($p > 0.05$), except on subscale for language learning confidence, statement 7 (*I can learn German/English on my own without the need for a special course)*, where participants studying English scored significantly higher. This leads to a conclusion that students learning German are less likely to perceive they have the ability to learn the foreign language without additional support.

Table 5. *Differences in language learning self-efficacy according to foreign language (German or English)*

	Foreign language at the Faculty of Health Studies	M	Sd	T	df	p
Foreign language learning self-efficacy (overall results)	English	71.407	11.355	0.686	51	0.496
	German	69.154	12.547			
Subscale: language skills	English	20.111	4.509	1.272	51	0.209
	German	18.423	5.139			
Subscale: language learning performance	English	27.333	3.873	0.965	51	0.716
	German	26.923	4.288			
Subscale: language learning confidence	English	23.963	4.743	0.113	51	0.91
	German	23.801	5.239			

DISCUSSION

This study's primary objective was the exploration of general and foreign language learning beliefs among German and English language learners at the Faculty of Health Studies University of Mostar. Sefl-efficacy beliefs are an important factor since stronger self-efficacy enhances the language learning process and learners' ability in task performance.

On the basis of the retained results, we can conclude that the students of the Faculty of Health Studies have moderate levels of general and foreign language learning self-efficacy. These findings indicate that students regardless of the foreign language they study at the Faculty of Health Studies need to foster their abilities and perceptions in foreign language learning. According to Gahungu, students with high and very high levels of self-efficacy are more likely to engage with language tasks and manage any difficulty found in the language learning process (21).

The largest difference between German and English foreign language learners was on the language skills subscale, where German learners believed they need more support in developing language skills than their English counterparts. These findings could be related to the length of studying the foreign language and therefore subject of further research in this field.

The results also reveal that students scored significantly higher results on the subscales for language learning performance than on those for language skills or language learning confidence, where language skills had the lowest results, suggesting more attention should be given to the development of these skills in the classroom. There were no significant differences among study majors in regards to FL learning self-efficacy beliefs. This opposes previous literature data which suggest learners with different goal orientations also differ in their self-efficacy beliefs (22).

Our results suggest that there is need of finding ways of increasing students' self-efficacy beliefs. More attention has to be paid to the particular needs of university students. One may for example think of ways of stimulating students' visions of becoming multilingual European citizen. Given the recent surge of interest in the development of a European identity (European Commission, 2012), this is a timely approach, which could be complemented by raising first-year students' awareness of different career paths that involve foreign language skills. The stable relationship found between instrumental orientation and self-perceived effort suggests that such an approach could be promising (16). Previous studies on foreign language learning motivation at the Faculty of Health Studies University of Mostar suggest that students have high levels of internal motivation when it comes to language learning, with English FL students being more motivated than German FL students (23, 24).

One of the restrictions of the study was the study sample, where we had a significantly higher number of female students as opposed to male students. This could be due to the fact that the majority of respondents were form the nursing study, which is mainly a female dominated profession in Bosnia and Herzegovina. Naturally, the small scale and exploratory nature of the present study poses strong limitations, therefore in future studies it is important to find ways to motivate students to participate in scientific research. Finally, the present study found a significant relationship between self-efficacy and beliefs in foreign language learning. Although the findings in the study are based on self-reported data, which implies certain built-in limitations, they do provide a foundation for further research about language learners' German and English self-efficacy and their beliefs on language learning.

CONCLUSIONS

According to the findings, some suggestions for future studies can be made. Firstly, taking into consideration the complexity of beliefs about language learning, the combination of multiple sources of data might be employed in studies on German and English self-efficacy and beliefs in language learning. It might also be recommended that researchers for the future studies should try investigating the ways to enhance self-

efficacy of language learners and help them develop positive beliefs in foreign language learning. Further research might evaluate the relationships among students' foreign language self-efficacy and beliefs about language learning in different cultures and with the participants from different educational background and experiences. Lastly, future research will have to explore how teaching techniques can best be combined to stimulate self-efficacy beliefs.

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SAMOUČINKOVITOST PRI UČENJU NJEMAČKOG I ENGLESKOG KAO STRANOG JEZIKA

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SAŽETAK

Usvajanje stranog jezika složen je proces u kojem akademski uspjeh studenata oblikuju različiti unutarnji i vanjski čimbenici. U kontekstu učenja stranog jezika, samoučinkovitost se definira kao percepcija vlastite kompetencije, a ne stvarna razina kompetencije, jer samopouzdanje igra ključnu ulogu u tom procesu. Student s visokom razinom samoučinkovitosti sklon je ulagati više truda u svoje učenje, ima veću razinu samopouzdanja i optimizma u suočavanju s neuspjesima te je sposobniji odgovoriti na izazove, što u konačnici dovodi do poboljšanja u učenju stranog jezika. Cilj ovog istraživanja je istaknuti odnos između učenja stranog jezika (njemačkog i engleskog) i samoučinkovitosti među studentima preddiplomskih studija sestrinstva, fizioterapije, primaljstva, radiološke tehnologije i sanitarnog inženjerstva na Fakultetu zdravstvenih studija Sveučilišta u Mostaru te utvrditi postoje li razlike u načinu na koji studenti koji uče njemački i engleski jezik percipiraju svoju opću i specifičnu samoučinkovitost u učenju stranog jezika. U istraživanju su sudjelovala 53 studenta preddiplomskog studija na pet smjerova Fakulteta zdravstvenih studija u Mostaru. Primijenjene su dvije ljestvice: Konačna verzija ljestvice Stavova o samoučinkovitosti pri učenju njemačkog jezika te Opća ljestvica za mjerenje samoučinkovitosti. Rezultati nisu pokazali značajne razlike u razinama opće samoučinkovitosti i samoučinkovitosti pri učenju stranog jezika. Studenti Fakulteta zdravstvenih studija pokazuju umjerene razine opće samoučinkovitosti i samoučinkovitosti pri učenju stranog jezika. Rezultati upućuju na potrebu pronalaženja načina za povećanje uvjerenja o samoučinkovitosti kod studenata, pokazujući da oni, neovisno o jeziku koji uče, trebaju poticati svoje sposobnosti i percepciju u učenju stranog jezika.

Ključne riječi: samoučinkovitost, učenje stranih jezika, njemački, engleski

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HEALTH LITERACY OF MIGRANTS AND REFUGEES IN TRANSITION COUNTRIES - BOSNIA AND HERZEGOVINA

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ABSTRACT

Introduction: Bosnia and Herzegovina is a country in the western part of the Balkan Peninsula. It borders Croatia to the north, south, and west and Serbia and Montenegro to the east. The research was conducted in Bosnia and Herzegovina, specifically in the Una-Sana Canton within the camps.

Objective: The main objective of the research was to investigate the level of health literacy of migrants and refugees in transition countries with a focus on Bosnia and Herzegovina.

Subjects and methods: The research was conducted among migrants and refugees in Bosnia and Herzegovina, within the Borići and Lipa temporary reception centers in the Una-Sana Canton during June 2022. Inclusion criteria are migrant or refugee status at the time of the research. As a research instrument, a questionnaire prepared based on literature and available questionnaires dealing with similar topics was used. The research was conducted in Bosnia and Herzegovina among 120 adult refugees and migrants who speak Arabic, Farsi, Bosnian, English and Urdu, and the questionnaire was translated into these languages.

Results: This research shows that the level of health literacy among migrants and refugees does not depend on the level of education. Furthermore, there is no significant difference between the more and less educated in understanding the doctor's instructions. The data we obtained through the obtained results do not prove that health literacy varies from the country of origin to the country of transition. This study has a limited sample size so reading the findings of this sample should be approached with caution.

Conclusion: There is no statistically significant difference between these two groups, which gives us the conclusion that the level of health literacy does not change on the way from the country of origin to the country of transit. This research is of great importance both for the countries of destination of the respondents and for the countries of transit, since migrants and refugees are part of the public health of the country in which they are located. In accordance with the changes within the transition countries from which refugees and migrants come,

more similar studies need to be conducted in order to obtain a comprehensive picture of health literacy.

Keywords: health literacy, migrants, refugees, transition countries, Bosnia and Herzegovina

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INTRODUCTION

International migration is a complex phenomenon of increasing importance in the era of growing globalization, because, more than ever before, international migration touches all countries and affects all areas of everyday life. According to the United Nations High Commissioner for Refugees (UNHCR) and Convention on the Status of Refugees from 1951, refugees are considered to be persons who have left their country of origin due to a well-founded fear of persecution, conflict, general violence, because of their race, religion, nationality, belonging to a certain social group or political opinion or other circumstances that have seriously disturbed public order and which, as a result, require international protection (1). UNHCR also defines the following basic terms of migration: immigrant, economic migrant, asylum seeker, internally displaced persons, stateless persons. Immigrant is someone who obtains permanent residence in a country other than his original homeland; an economic migrant is a person who leaves his country of origin for financial reasons, not for refugee reasons (2). Persons without citizenship or apatris (according to the Greek word *patris* - homeland), are defined as those persons "who are not considered citizens of any country according to the laws"(3).

The definition of "migrant" does not exist in international law, however, according to the International Organization for Migration (IOM), a migrant is considered a person who moves away from his usual place of residence, either within the country or across an international border, temporarily or permanently, and for several reasons (4). According to recent research, it is estimated that every day 37,000 people leave their homes and join 258 million migrants (5) who live in a different country than the one in which they were born. (6) The number of people forcibly displaced globally has increased by 167.6%, from 41.1 million in 2010 to 110 million in mid-2023 (7). Vos et al. introduced the comprehensive category of "crisis migration" - which is more expansive and comprehensive than the categories of refugees and asylum seekers. (8) In particular, crisis migrants are fleeing civil wars, natural disasters, dictatorial or repressive governments and other emergencies and seek refuge in all countries willing to accept them. In many cases, crisis migration involves long journeys through dangerous areas or crossing large or dangerous bodies of water. (9) Bosnia and Herzegovina, as a country of transition and at the same time a transit country for migrants and refugees, periodically since the beginning of the migrant crisis in Europe in 2015 faces various difficulties in accessing the migrant and refugee population, and therefore it is necessary to work on improving the health literacy of migrants and refugees, which would improve their communication with health professionals and enable access to the necessary resources to support their health, which

would have implications for their psychological and mental well-being.

Health literacy, according to Sørensen, is a concept closely related to literacy, which includes the knowledge, motivation and competence to access, understand, evaluate and apply health information to make decisions regarding health care, disease prevention and the promotion of maintaining quality of life throughout life (10) and is usually defined as "the degree to which individuals have the ability to acquire, process, and understand basic health information and services necessary to make appropriate health decisions" (11). According to research, improving the health literacy of asylum seekers and refugees can improve their communication with health professionals and enable them to access the necessary resources (e.g. financial resources) to support their health, all of which have implications for their psychological and mental well-being. (12, 13) Previous research confirms that there is a lack of knowledge about refugees' access to health care and the health system. (13, 14) According to the "Healthy People" research conducted in 2010, low health education is closely related to low health and early death. (15) Also, recent research confirms that the level of health literacy is related to factors such as poor health, language barriers, misunderstanding of health insurance schemes and refraining from seeking health care, namely in Sweden (16), the Netherlands (14), Germany (17), Spain (18) and Canada (19). Correlations between health literacy and the length of stay in a certain area have also been observed (18, 20) and studies conducted after programs aimed at promoting health literacy report improvements in health literacy. (19, 21) It is also important to mention how targeted interventions can improve health literacy, behaviors and clinical outcomes in various health problems and migrant populations. (22) In order to understand, evaluate and access health information, it is necessary to examine the level of health literacy among several groups of migrants. This research aimed to examine the understanding of the concept of health literacy among migrants and refugees in Bosnia and Herzegovina. Migrants and asylum seekers are often grouped together within each country they migrate to, even though their cultures and countries are unfamiliar to each other. The main goal of the research was to investigate the level of health literacy of migrants and refugees in transition countries with focus on Bosnia and Herzegovina.

RESEARCH METHODS

The research was conducted among migrants and refugees in the transition country Bosnia and Herzegovina, within reception centers during June 2022. The sample consists of people on the move who are currently in one of the transition countries. Inclusion criteria are migrant or refugee status at the time of the research. A questionnaire prepared based on literature and available questionnaires dealing with similar topics was used as a research instrument. To reach a larger number of respondents, the questionnaire was translated into languages that this population understands: Bosnian, English, Farsi, Urdu and Arabic. The research was conducted in Bosnia and Herzegovina among 120 adult refugees and migrants who speak Arabic, Farsi, English and Urdu.

During the survey, the respondents were in one of the camps on the territory of the Una-Sana Canton in Bosnia and Herzegovina. The research was conducted in two camps in the area of USC: Transition Center Borići and Transition Center Lipa (TRC Borići and Lipa). The level of health literacy was measured using the aforementioned questionnaire. All respondents were given the questionnaire in a language they understood.

Education in Afghanistan and Iran takes place in two parts: primary education and secondary education. Within that, we include two cycles of basic education from the first to the sixth class, and from the sixth to the ninth class. Secondary education takes place in one cycle from the tenth to the twelfth class (22). After reviewing the level of education of the respondents, we can separate two groups within this data. The lower educated, those who had education up to the 7th class of primary school, accounted for 19.2% of the total number of respondents. Within the group of those who are considered to be more educated, there are respondents who completed more than 7 classes of primary school and they make up to 80.8%.

In order to better understand the respondents' perception of the definition of health literacy, two quotes will be presented: "Everyone needs to know what they can about health and how to improve it" U15, "Health is wealth", and "Health literacy means being doctor" F 27. These two completely opposite opinions serve as proof of the diversity of attitudes, knowledge and understanding of what the concept of health literacy represents for the participants.

Respondents who met the eligibility criteria were invited to answer the questionnaire during their stay in one of the transit reception centers in Bosnia and Herzegovina. The survey questionnaire, which is divided into several parts, has been translated into languages that the respondents understand. While conducting the survey, the respondents were supported by a translator to clarify possible ambiguities.

Statistical data processing

Statistical data processing was carried out in the Microsoft Excel program (Office 2016 version) and the statistical program SPSS. The results are presented in tables and suitable graphs (vertical single and multiple columns). The results of the nominal features of the statement by absolute (f) and relative (%) frequencies.

RESEARCH RESULTS

Analysis of research samples

In the survey, which was conducted on the territory of Bosnia and Herzegovina in several camps, among the countries of origin of refugees and migrants, the countries of the Middle East and Africa stand out. During the months of July and August, the respondents were in the territory of the transit country BiH.

Countries represented include: Afghanistan, Iran, Pakistan, India, Bangladesh, Burundi, Cameroon, Sri Lanka, Ivory Coast, Congo, Mali, Guinea, Iraq, Syria and Egypt. The respondents were divided into four groups, according to linguistic and cultural affiliation. The first group includes Afghanistan and Iran (Farsi), the second group consists of Bangladesh, India and Pakistan (Urdu), the third Burundi, Cameroon, Sri Lanka, Ivory Coast, Congo, Mali and Guinea (English) and the fourth Iraq, Syria and Egypt

(Arabic). 120 respondents participated in the research.

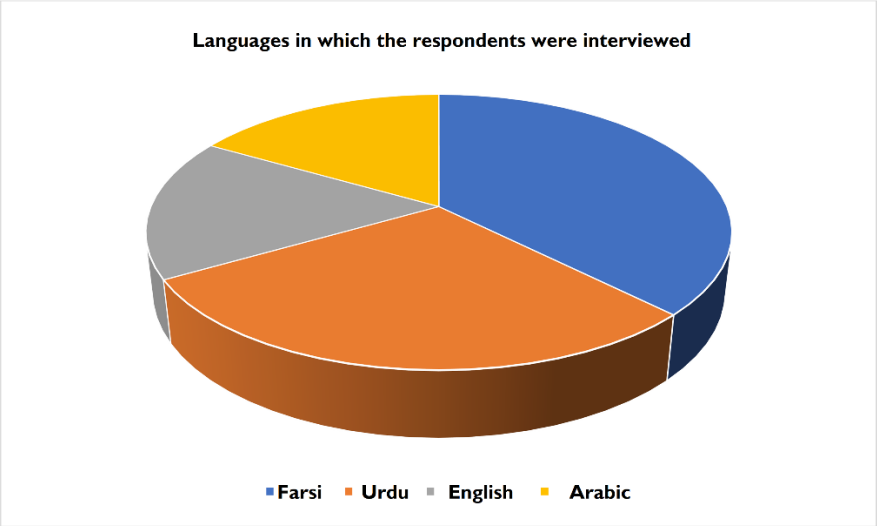

Figure 1. *Graphic representation of the language in which respondents were interviewed*

The research was conducted in two transit reception centers, one of which was for families and the other for singles. Regarding the country of origin, the most represented country was Afghanistan (24.2% of respondents), followed by Pakistan (20.8%), Iran (13.4%), India (6.7%) and Burundi (6.7%). In addition to the mentioned groups, the research was also carried out on the countries that were part of the groups of Arabic, Urdu and English-speaking areas.

The countries of the Middle East, which represents the political-geographical name for the area of Northeast Africa and Southwest Asia, include Turkey, Syria, Lebanon, Cyprus, Israel, Jordan, Egypt, Iraq and all the countries of the Arabian Peninsula, as well as Iran and Afghanistan (24).

Table 1. *Sociodemographic characteristics*
Research results

Variable (n=120)	**All**	**Urdu**	**Farsi**	**English**	**Arabic**
	N (%)	35 (29,2 %)	45 (37.5%)	20 (16,6%)	20 (16,6%)
Gender					
Male	83 (69%)	27 (22,5 %)	32 (26,6%)	12 (10%)	12 (10%)
Female	37 (31%)	8 (6,6%)	13 (10,9%)	8 (6,7%)	8 (6,7%)
Age					
18-23	38 (31,6%)	12 (10%)	17 (14,1 %)	7 (5,8%)	2 (1,5%)
24-38	54 (45%)	16 (13,5%)	17 (14,1 %)	12 (10%)	9 (7.5%)
38-58	28 (23,4%)	7 (5,8%)	11 (9,2%)	1 (0,8%)	9 (7.5%)
Education					
None	6 (5%)	3 (2.5%)	2 (1,5%)	0 (0%)	1 (0,8%)
1-6 classes	20 (16,6%)	6 (5%)	5 (4,1%)	2 (1,5%)	6 (5%)
7-12 classes	76 (63,3%)	22 (18,3%)	33 (27.5%)	14 (11,6%)	7 (5,8%)
More than 12 classes	19 (15,8%)	4 (3,3%)	7 (5,8%)	2 (1,5%)	6 (5%)
Length of their migration					
Less than 1 year	40 (34,8%)	12 (10,5%)	22 (19,1%)	5 (4,4%)	1 (0,9%)
1-3 years	42 (36,5%)	9 (7,8%)	13 (11,3%)	10 (8,7%)	10 (8,7%)
More than 3 years	33 (28,7%)	13 (11,3%)	10 (8,7%)	1 (0,9%)	9 (7,8%)
Clarity of doctor's instructions within the country of origin					
Yes	88 (73,3%)	24 (20%)	32 (26,6%)	13 (10,9%)	19 (15,8%)
No	32 (26,7%)	11 (9,1%)	13 (10,9%)	7 (5,8%)	1 (0,8%)
Clarity of doctor's instructions within the country of transit					
Yes	85 (70,8%)	25 (20,8%)	34 (28,3%)	13 (10,9%)	13 (10,9%)
No	35 (29,2%)	10 (8,4%)	11 (9,2%)	7 (5,8%)	7 (5,8%)

Assessment of own physical health	**All**	**Urdu**	**Farsi**	**English**	**Arabic**
Very bad	21 (17.5%)	5 (4,1%)	6 (5%)	8 (6,7%)	2 (1,5%)
Bad	22 (18,3%)	8 (6,6%)	5 (4,1%)	5 (4,1%)	4 (3,4%)
Good	49 (40,8%)	10 (8,4%)	23 (19,1%)	6 (5%)	10 (8,7%)
Very good	26 (21,7%)	12 (10%)	11 (9,2%)	1 (0,8%)	4 (3,4%)
Assessment of own mental health					
Very bad	26 (21,7%)	6 (5%)	8 (6,6%)	11 (9,1%)	1 (0,8%)
Bad	22 (18,3%)	7 (5,8%)	9 (7,5%)	3 (2,5%)	3 (2,5%)
Good	42 (36,5%)	8 (6,6%)	20 (16,6%)	2 (1,5%)	12 (10%)
Very good	30 (25%)	14 (11,6%)	8 (6,6%)	4 (3,3%)	4 (3,3%)

The most represented age group of respondents was the age of 24 to 38 years, which makes up 45% of the total number of respondents, as many as 31.6% of respondents belonged to the group of 18 to 23 years, while older respondents who belonged to the group of 38 to 58 made up 23.4%. We found that migrants and refugees passing through the transit route at the given moment of conducting the research are mostly a younger age group. The total sample consisted of 69% men and 31% women. As for the level of education, respondents, 5% of the total number, did not go to school, and the skills of writing and reading were mastered along the way, as they state. 16.6% of respondents had lower primary education, which means primary school from 1st to 6th class. The most represented educational group of respondents was 63.3%, under which we include upper primary education from 7th to 12th class, while 15.8% had more than twelve classes.

Respondents from the Arabic-speaking area spend the longest time on the road, according to percentages, of the 100% who participated in the research, 50% are on the road from 1 to 3 years, while 45% of them are on the road for more than 3 years year. Furthermore, the respondents declared that they had no difficulties in communicating with healthcare workers both in the country of origin and in the country of transition. Percentage-wise, 70.8% of the respondents claim to understand the instructions of the doctor in the country of transition, while 73.3% of the respondents claim to understand the instructions of the doctor within their country of origin. This can confirm the fact that knowledge of the language is not a necessary criterion in understanding health instructions. In this statistic, it is important to note that within the Arabic-speaking group, 95% of respondents indicated that they clearly understood the instructions of the doctor in their country of origin. Questions about

self-assessment of physical health yielded the following results: 17.5% of respondents rate their health as very bad, 18.3% of them rate their health as bad, the largest percentage of respondents, 40.8%, see their physical health as good, while 21.7% see their health as very good. In comparison with the results of the self-assessment of mental health, the respondents indicated that 21.7% rated them as very bad, while 18.3% considered their mental health to be bad, and the largest percentage of participants stated that they see their mental health as good, while 25% of the respondents stated that their mental health is very good.

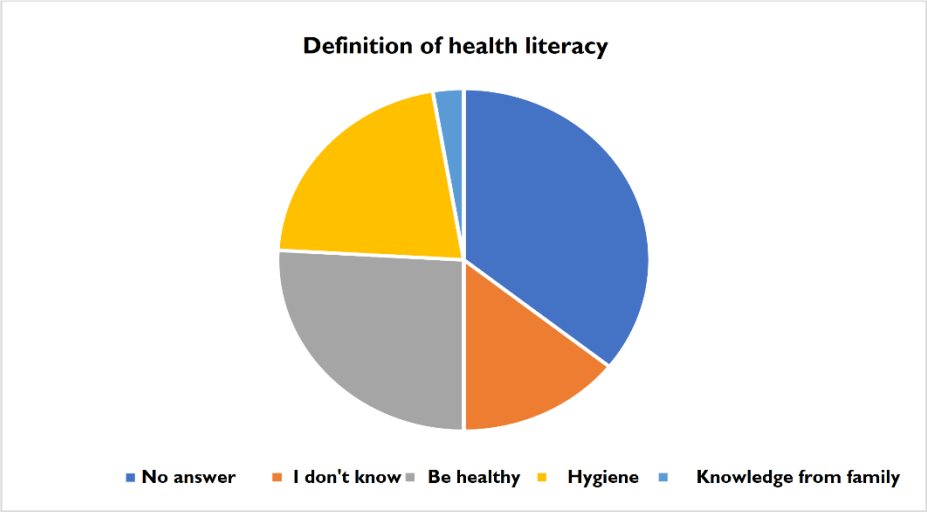

Figure 2. *Respondents' answers to the question about definition of health literacy*

Since the concept of health literacy is a relatively new concept, as many as 33.4% of respondents did not have an answer to the question about what health literacy is, 13.3% stated that they did not know the answer to that question, 24.2% stated that for them, the concept of health literacy means being healthy, 20% of respondents state that it is hygiene, under which they include both personal and general hygiene, and 2.5% of respondents stated that for them it represents knowledge learned from family. It is interesting that within each language group they state that health literacy represents hygiene for them.

Taking into account the fact that within the countries of transition, migrants and refugees use the services of translators, and there is no need for it in the home country, it is interesting that no significant differences were recognized in the understanding of the doctor's instructions regardless of where they were located.

Table 2. *Sociodemographic data*

Varijabla (n=120)	All	Urdu	Farsi	English	Arapski
	N (%)	35 (29,2%)	45 (27,5%)	20 (16,6%)	20 (16,6%)
Clarity of doctor's instructions in the country of origin					
Yes	88 (73,3%)	24 (20%)	32 (26,6%)	13 (10,9%)	19 (15,8%)
No	32 (26,7%)	11 (9,1%)	13 (10,9%)	7 (5,8%)	1 (0,8%)
Clarity of doctor's instructions within the country of transit					
Yes	85 (70,8%)	25 (20,8%)	34 (28,3%)	13 (10,9%)	13 (10,9%)
No	35 (29,2%)	10 (8,4%)	11 (9,2%)	7 (5,8%)	7 (5,8%)
Accessibility of health care in the relationship between the country of origin and the country of transit					
Yes	78 (65%)	21 (17,5%)	33 (27,5%)	17 (14,2%)	7 (5,8%)
It's the same approach	24 (20%)	10 (8,4%)	3 (2,5%)	2 (1,7%)	9 (7,5%)
No	18 (15%)	4 (3,4 %)	9 (7,5%)	1 (0,8%)	4 (3,4%)
Do you provide truthful information about your health history to the doctor					
Yes	91 (75,8%)	26 (21,7%)	40 (33,4%)	11 (9,2%)	14 (11,6%)
Sometimes	19 (15,8%)	4 (3,4 %)	4 (3,4%)	5 (4,2%)	6 (5%)
No	10 (8,4%)	5 (4,2%)	1 (0,8%)	4 (3,4%)	0 (0%)

It can be pointed to the fact that the level of health literacy did not change significantly along the route, since according to the above table 73.3% of the respondents state that they clearly understand the instructions of the doctor within the country of origin, while on the other hand 70.8% state that they understand the instructions of the doctor within transit countries in this case Bosnia and Herzegovina. The interesting data we received is that 95% of respondents within the Arabic-speaking group stated that they clearly understood the instructions of the doctor in their country of origin. 65% of the respondents indicated that their access to health care is more affordable compared to their country of origin, and 20% of the respondents indicated that their access to health care is the same as in their countries of origin. An interesting fact is that respondents from the Arabic-speaking area stated that their access to health care is the same in the largest number. 15% of respondents stated that it is not easier for them to get health care in the country of transit compared to the country of origin. An encouraging result is that 75.8% of

respondents state that they provide true information about their health history to the doctor. 15.8% declare that they sometimes do this depending on the doctor, and 8.4% of respondents state that they do not provide true information. Within the language groups, it is interesting that all respondents from Iran state that they always give truthful information to the doctor.

What this survey shows is that respondents who rate their mental health as better also rate their physical health as better. This was determined by correlation analysis, where the indicators indicate a significant moderate connection between the assessment of the mental and physical health of the respondents ($r=0.615$, $p<0.01$). Although the respondents are often in inadequate and extreme conditions on their journey, an interesting piece of information we received is that 50% of the total number of respondents stated that they developed some diseases on the journey that they did not have in their country of origin. The most common were skin, mental and heart diseases. One of the interviewees stated that he experienced as many as four heart attacks in the country of transit, due to the stress and extreme living conditions he encountered.

Table 3. *Level of education of all respondents*

Level of education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	10 classes of primary school.	10	8,3	8,3	8,3
	11 classes of PS	6	5,0	5,0	13,3
	2 classes of PS	1	,8	,8	14,2
	3 classes of PS	1	,8	,8	15,0
	4 classes of PS	5	4,2	4,2	19,2
	5 classes of PS	4	3,3	3,3	22,5
	6 classes of PS	7	5,8	5,8	28,3
	7 classes of PS	4	3,3	3,3	31,7
	8 classes of PS	21	17,5	17,5	49,2
	9 classes of PS	1	,8	,8	50,0
	Bachelor’s Degree	18	15,0	15,0	65,0
	Gymnasium	36	30,0	30,0	95,0
	Master’s Degree	1	,8	,8	95,8
	No answer	2	1,7	1,7	97,5
	Only literate	3	2,5	2,5	100,0
	Total	120	100,0	100,0	

According to the obtained results, 65.2% of those with lower education understand the instructions of doctors in their country of origin, while 34.8% of them do not. Compared to the more educated, 74.2% of them understand the instructions, while 25.8% of them do not. After conducting a t-test for independent groups, it was not possible to find significant differences in the understanding of the doctor's instructions by those with higher and lower education ($p>0.05$). Considering that the respondents are currently in countries where they do not understand the language, and need the services of a translator, it is interesting that there was no significant difference in understanding the doctor's instructions ($p>0.05$), even in another language. In the group with lower education, 56.5% of them understand the instructions of the doctor in the country of transition, while 43.5% do not understand the instructions of the doctor. Among those who are more educated, 73.2% understand, while 26.8% do not understand medical instructions. Considering the factor of misunderstanding of the language and the health system within the country of transition, there is a significant difference in the understanding of the instructions between those who are more and less educated.

Table 4. *Length of the refugee journey*

Length of the refugee journey

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	,00	48	40,0	40,0	40,0
	1,00	18	15,0	15,0	55,0
	1,50	2	1,7	1,7	56,7
	2,00	18	15,0	15,0	71,7
	2,50	2	1,7	1,7	73,3
	3,00	10	8,3	8,3	81,7
	4,00	9	7,5	7,5	89,2
	5,00	5	4,2	4,2	93,3
	6,00	4	3,3	3,3	96,7
	7,00	2	1,7	1,7	98,3
	8,00	1	,8	,8	99,2
	17,00	1	,8	,8	100,0
	Total	120	100,0	100,0	

According to the data from the questionnaire, when asked about the time duration of the journey from the countries of origin to the current country of the site, which is also the transit country, we noticed that the respondents, 81.7% of them, have been on the journey for less than three years, while 18.3% of respondents have been on the same journey for more than three years. Those who have been on the journey for more than 3 years understand the instructions of the doctor in the country of origin, 81.3%, while 18.2% do not understand the instructions. Of those who have been traveling for less than three years, 70.4% understand the instructions, while 29.6% do not understand the instructions within the country of origin. When asked about understanding the doctor's instructions in the transition country, 68.2% of those who have been on the journey for more than 3 years understand the doctor's instructions, while 31.8% of them do not understand the instructions. Of those who have been on the journey for less than 3 years, 70.4% understand the instructions while 29.6% do not. When it comes to the accessibility of health care in the country of origin and the country of transition, 63% of respondents who have been on their journey for more than one year state that it is easier to get health care in the country of transition. 20.3% of respondents stated that their access was the same, and 16.7% stated that they had easier access to health care within their own country.

DISCUSSION

With this research, we investigated the level of health literacy of migrants and refugees in Bosnia and Herzegovina. The research shows that low health literacy is present among migrants, which should be the basis for the development of interventions aimed at improving health literacy. Notable is the ignorance of the very term "health literacy", but also positive responses in terms of self-assessment of the understanding of health instructions.

What is noticeable is that 34.8% of the respondents spend less than a year on the trip, 36.5% are on the trip for one to three years, while 28.7% end their trip after three years. It's a fascinating claim by one interviewee who stated that even after 17 years, he still hasn't finished his journey.

According to a study conducted in Sweden (25), out of a total of 455 migrants and refugees, 12.5% of respondents did not attend primary school education, while 22.9% belonged to the group that completed classes 1 to 6, 33.2% declared that they finished from 7th to 12th class, while within the last group, which includes respondents who have more than twelve classes, there were 32.4% of the respondents, which is similar to our sample of respondents. The results of our research showed that 5% of the respondents out of the total number of 120 migrants and refugees did not have primary education, while 16.6% of the respondents indicated that they had graduated from 1st up to 6th class, 63.3% stated that they had completed 7th to 12th class, while 15.8% of respondents had more than 12th class. It is interesting that within each language group, migrants state that health literacy represents hygiene for them.

In a survey conducted in Lebanon, out of a total of 263 migrants and refugees, 11.8% said they were illiterate, 79.1% said they had finished school, while 9.1% said they had finished college. 35.7% stated

that they were insufficiently health literate, 45.6% were "problematically" health literate, and 18.6% were sufficiently health literate. (20). The low level of health literacy in our study is consistent with similar studies in countries in Asia and Europe (16, 26–28). In a study conducted in southern Spain, 65.1% of surveyed migrants showed an inadequate or problematic level of health literacy. Factors such as shorter stay in the host country and lower education are associated with these low levels of literacy (18).

The results within the research groups show that the difference is visible only within the group from 7th to 12th class and within the group of more than twelve classes. What we found with this research is that migrants and refugees who rate their mental condition as better also rate their physical condition as better. Respondents assess their mental state as very bad 21.7%, bad 18.3%, good 36% and very good 25%. Previous research points to the fact that migrants and refugees have higher rates of mental health problems compared to the host population. (29, 30).

Studies show that migrants with a shorter duration of stay in the host country often show a lower level of health literacy (28), which is in line with our results. Those who have been on the journey for more than 3 years understand the instructions of the doctor in the country of origin, 81.3%, while 18.2% do not understand the instructions. Of those who have been traveling for less than three years, 70.4% understand the instructions, while 29.6% do not understand the instructions within the country of origin.

Targeted interventions such as culturally appropriate education are crucial to address health literacy gaps among migrant communities, as health education programs need to be culturally sensitive. This includes using appropriate languages and considering cultural contexts in communication strategies. Policymakers should focus on integrating health literacy into public health strategies targeting migrants, ensuring equitable access to health services and resources (31).

The shortcoming of this research could be a relatively small sample, and further research should include qualitative research methods such as interviews. Additional support is provided through translators and cultural mediators who enable quality and reliable transmission of information and services. It is necessary to conduct more studies in order to better understand the level of health literacy of migrants and refugees in order to provide the best possible health care for all users.

The ability to understand and effectively use health information to make informed health decisions is very important for migrants because they face unique challenges. With this research, we pointed out the problem of low health literacy of migrants in Bosnia and Herzegovina and the need to adopt measures for interventions that should focus on improving health literacy, specially adapted to the needs of different groups of migrants depending on the language they speak and the region they come from.

CONCLUSION

Limited health literacy is increasingly recognized as a public health problem. The growing recognition of problems and the need for solutions creates an imperative for the field of health literacy research to identify effective interventions.

This research is of great importance both for the countries of destination of the respondents and for the countries of transit, since migrants and refugees are part of the public health of the country in which they are located. In accordance with the changes within the transition countries from which refugees and migrants come, it is necessary to conduct more similar studies to obtain a comprehensive picture of health literacy.

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ZDRAVSTVENA PISMENOST MIGRANATA I IZBJEGLICA U ZEMLJAMA TRANZICIJE – BOSNA I HERCEGOVINA

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SAŽETAK

Uvod: Bosna i Hercegovina je zemlja koja leži u zapadnom dijelu Balkanskog poluotoka. Graniči s Hrvatskom na sjeveru, jugu i zapadu, te Srbijom i Crnom Gorom na istoku. Provedeno je istraživanje u BiH, točnije na području Unsko-sanske županije unutar kampova.

Cilj: glavni cilj istraživanja bio je istražiti razinu zdravstvene pismenosti migranata i izbjeglica u zemljama tranzicije s osvrtom na Bosnu i Hercegovinu.

Ispitanici i metode: Istraživanje se provelo među migrantima i izbjeglicama u BiH, unutar prihvatnih centara Borići i Lipa na području Unsko-sanske županije tijekom lipnja 2022. godine. Kriteriji uključenja su status migranta ili izbjeglice u trenutku provedbe istraživanja. Kao instrument istraživanja je korišten anketni upitnik pripremljen na temelju literature te dostupni upitnici kojima se obrađuje slična tematika. Istraživanje je provedeno u BiH među 120 odraslih izbjeglica i migranata koji govore arapski, farsi, bosanski, engleski i urdu jezik, a na navedene jezike je preveden anketni upitnik.

Rezultati: Ovo istraživanje pokazuje da razina zdravstvene pismenosti kod migranata i izbjeglica ne ovisi o razini obrazovanja. Nadalje, ne postoji značajna razlika između više i niže obrazovanih u razumijevanju uputa liječnika. Podatci do kojih smo došli kroz dobivene rezultate ne dokazuju da zdravstvena pismenost varira od zemlje porijekla do zemlje tranzicije. Ovo istraživanje ima ograničen broj uzorka tako da se čitanje nalaza ovog uzorka treba pažljivo pristupiti.

Zaključak: Statistički nema značajne razlike između ove dvije skupine, što nam daje zaključak da se razina zdravstvene pismenosti ne mijenja na putu od zemlje porijekla do zemlje tranzita. Ovo istraživanje ima veliki značaj kako za zemlje odredišta ispitanika, tako i za zemlje tranzita, budući da su migranti i izbjeglice dio javnog zdravstva države u kojoj se nalaze. Sukladno promjenama unutar zemalja tranzicije iz kojih dolaze izbjeglice i migranti, potrebno je provesti više sličnih studija kako bi se dobila sveobuhvatna slika zdravstvene pismenosti.

Ključne riječi: zdravstvena pismenost, migranti, izbjeglice, zemlje tranzicije, Bosna i Hercegovina

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INCIDENCE OF PULMONARY THROMBOEMBOLISM IN PATIENTS SUBJECTED TO COMPUTERIZED TOMOGRAPHY AND PULMONARY ANGIOGRAPHY AT THE UNIVERSITY CLINICAL HOSPITAL MOSTAR

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ABSTRACT

Introduction: Pulmonary embolism is a serious medical problem with high mortality if not recognized in time. CT pulmonary angiography is a key method for diagnosing pulmonary embolism in patients with nonspecific symptoms such as shortness of breath, chest pain, and elevated D-dimer values.

Objective: To determine the incidence of pulmonary embolism in patients undergoing CT pulmonary angiography at the University Clinical Hospital Mostar.

Subjects and methods: A retrospective study included 300 patients with suspected pulmonary embolism who underwent CT pulmonary angiography. Technical imaging parameters included a low-dose protocol with intravenous iodine contrast. The results were analyzed by descriptive statistics, with an assessment of the frequency of pulmonary embolism, thrombus localization and incidental findings.

Results: Pulmonary embolism was diagnosed in 27% of patients, with the most frequent involvement of the lobar arteries (43%). Massive emboli were recorded in 33% of cases. The average age of the respondents was 64 years, with an almost equal gender distribution. Elevated D-dimers were not sufficient to confirm the diagnosis in most patients. Incidental findings included pleural effusions, pneumonia, and tumors.

Conclusion: CT pulmonary angiography is necessary for accurate diagnosis of pulmonary embolism, especially in patients with nonspecific symptoms. The results highlight the need to combine clinical and imaging methods, as well as adapt diagnostic protocols to reduce radiation exposure and optimize treatment outcomes. In the local context, these guidelines can improve diagnosis and treatment.

Keywords: Pulmonary thromboembolism, incidence, computed tomography, pulmonary angiography, clinical diagnostics

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INTRODUCTION

Pulmonary embolism (PE) represents a serious medical problem and is one of the most common causes of cardiovascular death after myocardial infarction and stroke (1, 2). This potentially fatal complication occurs when a blood clot, usually from the lower extremities, breaks off and travels through the bloodstream to the pulmonary arteries, where it can partially or completely block blood flow. The most common cause of pulmonary embolism is deep vein thrombosis (DVT), where thrombi form in the deep veins of the lower extremities or pelvis (3). According to estimates, pulmonary embolism is responsible for a significant number of hospitalizations, and without timely diagnosis and treatment can lead to serious consequences, including death (4).

The clinical picture of PE is diverse and can vary from asymptomatic cases to acute respiratory failure and cardiovascular collapse (5). Because of the non-specific symptoms, the diagnosis of PE is often challenging (6). Symptoms such as sudden shortness of breath, chest pain, rapid breathing and tachycardia, which are the most common signs, also occur in other conditions such as myocardial infarction or pneumonia (7). For this reason, the application of modern diagnostic tools that enable timely and accurate identification of pulmonary embolism is of crucial importance (8).

CT pulmonary angiography (CTPA) is today the gold standard for non-invasive diagnosis of pulmonary embolism (9). This method uses computed tomography and intravenous contrast medium to visualize the pulmonary arteries and allow precise localization and estimation of embolus size (10). Due to its high diagnostic accuracy, CTPA has gradually replaced previously used methods, such as ventilation-perfusion lung scintigraphy (V/Q scintigraphy) (11). In addition to diagnosing pulmonary embolism, CTPA provides information on potential comorbidities and abnormal findings, such as lung tumors, pleural effusions, and other pathological processes (12).

The importance of a timely diagnosis of PE is great because it enables the rapid initiation of appropriate therapy, which reduces mortality and improves the long-term prognosis of patients (13). Standard therapeutic approaches include the use of anticoagulants, thrombolytic therapy and, in severe cases, surgical intervention (14). Research shows that timely diagnosis of pulmonary embolism is essential to reduce the risk of recurrent thromboembolism and long-term consequences such as chronic thromboembolic pulmonary hypertension (15).

This retrospective study was conducted at the University Clinical Hospital Mostar, with the aim of determining the incidence of pulmonary embolism in patients undergoing CTPA, and analyzing the demographic and clinical characteristics of these patients (16). Also, the research includes the evaluation of additional findings, such as pleural effusions, malignant and inflammatory processes, which were observed during CTPA (17). The results of this research can contribute to a better understanding of the clinical profiles of patients with PE and to the improvement of diagnostic protocols for the early recognition and treatment of

pulmonary embolism (18).

OBJECTIVE OF THE RESEARCH

To determine the incidence of pulmonary embolism (PE) in patients undergoing CT pulmonary angiography (CTPA).

RESPONDENTS AND METHODS OF WORK

300 patients with symptoms such as shortness of breath, elevated D-dimer test (>0.55 mg/L) and clinical suspicion of PE were included in the study. Patients with known causes of dyspnea (eg, asthma, COPD) or contraindications for CTPA were excluded (allergic reaction to contrast media, generalized severe renal impairment).

The research was conducted at the Clinical Institute of Radiology of the University Clinical Hospital Mostar in the period from June 1 - October 1, 2024.

Recording procedure

CT pulmonary angiography was performed using CT GE Revolution Evo 256, with the use of Ultravist 370 contrast medium (40 ml) at a flow rate of 4 ml/sec. Technical aspects: 100kV / 50-680mA SmartmA / noise index 20. Pitch: 0.992:1. Rotation time: 0.35. Start/end of recording: top of lung/ costophrenic sinus. The patient is in a supine position, with his feet facing the gentry of the device, his hands are above his head. IV placed right-sided cannula with a diameter of 18/20G.

CTPA imaging is performed by a bachelor's/master's degree in radiological technology, and the findings are interpreted by a doctor of medicine, a specialist in radiology.

Statistical analysis

Data were analyzed using descriptive statistics (mean, median), and the incidence of PE was evaluated based on demographic data such as age and gender. The location, size, and severity of emboli were classified, and incidental findings such as pleural effusions, pneumonia, and pulmonary nodules were also recorded.

Table 1. *Technical parameters for acquisition of CT pulmonary angiography, CT GE Revolution Evo 256, SKB Mostar*

GE Revolution 256 slice	
Pulmonary Angiogram	
Patient Position / Orientation	Supine, Feet First
Anatomical Reference	SN
Scan Type	Helical
Rotation Time (sec)	0.35
Detector Coverage (mm)	80
Pitch	0.992:1
Coverage Speed (mm/s)	158.75
Kilovoltage (kV)	100
Tube Current (mA)	50-680 SmartmA
Noise Index	20
ASIR-V	50%
Reconstructed Slice Thickness/ Spacing (mm)	1.25
Start of Scan	Apices
End of Scan	Costophrenic Angles
SFOV **DFOV (cm)**	Large Body 35
Breathing Instruction	Suspend Respiration
IV Contrast Volume (ml) / Rate (ml/s)	40ml at 4ml/s
Scan Delay (sec)	SmartPrep
SmartPrep Monitor Location **Enhancement Threshold (HU)**	Pulmomnary Arteries 100
Recon Type	Stnd
WW / WL	400/40
Post Processing	

RESULTS

Out of a total of 300 patients, 81 (27%) had a positive finding of PE. Of these, 52% of patients were male (42), and 48% were female (39), with an average age of 64 years. The youngest male person with a positive finding of PE was 21, and the oldest 82. Among women, the youngest person was 31, and the oldest 92.

Anatomically, PE was most often detected bilaterally (52%), in lobar arteries (43%) and segmental arteries (38%). Most emboli were not massive (59%), while 33% of cases were recorded as massive. Elevated D-dimer values correlated with the diagnosis of PE in 27% of patients, which emphasizes the need for combined clinical and imaging evaluations. Incidental findings such as pleural effusion, pneumonia, lung cancer, and pneumothorax were reported in several cases, highlighting the broader diagnostic value of CTPA.

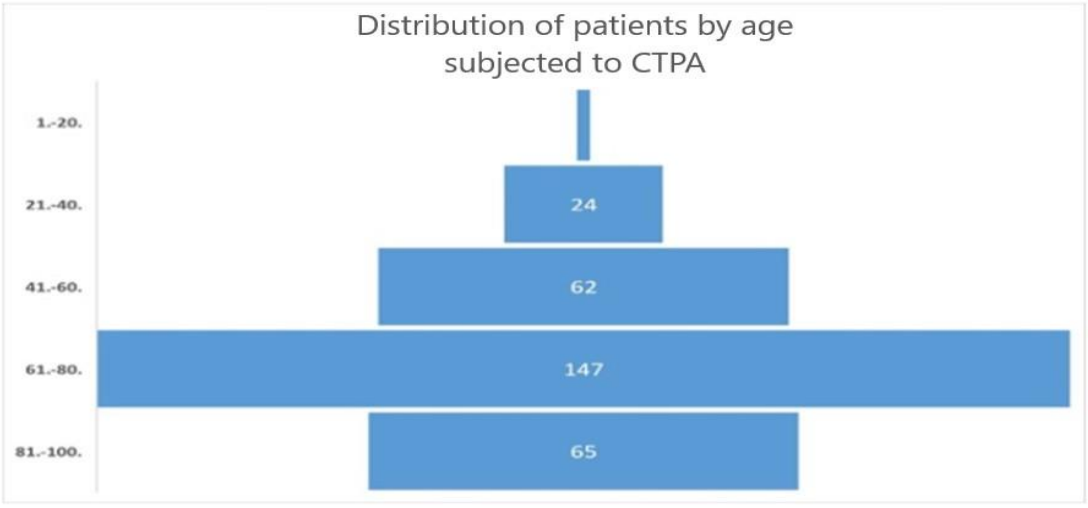

Figure 1. *Distribution of patients by age undergoing CTPA*

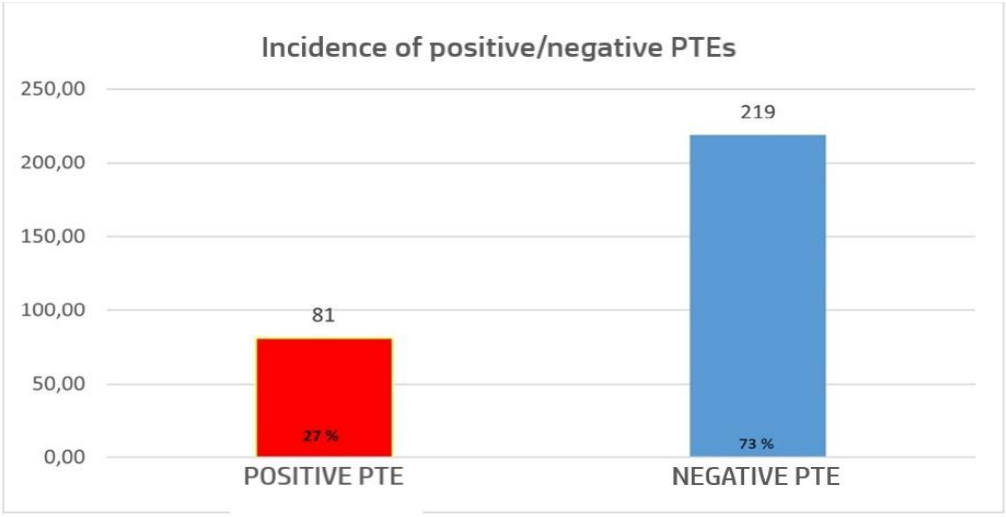

Figure 2. *Incidence of positive/negative PTE findings*

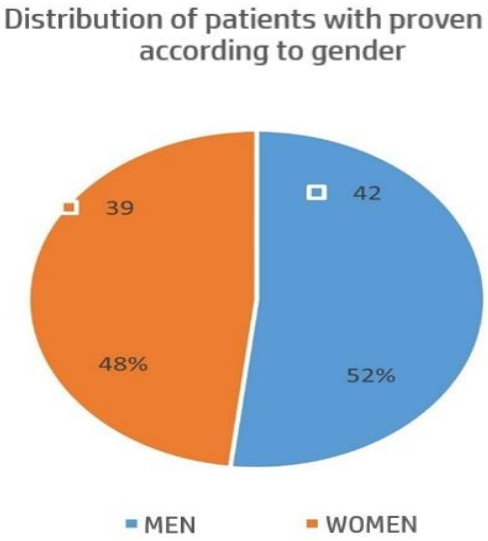

Figure 3. *Distribution of patients with proven PTE according to gender*

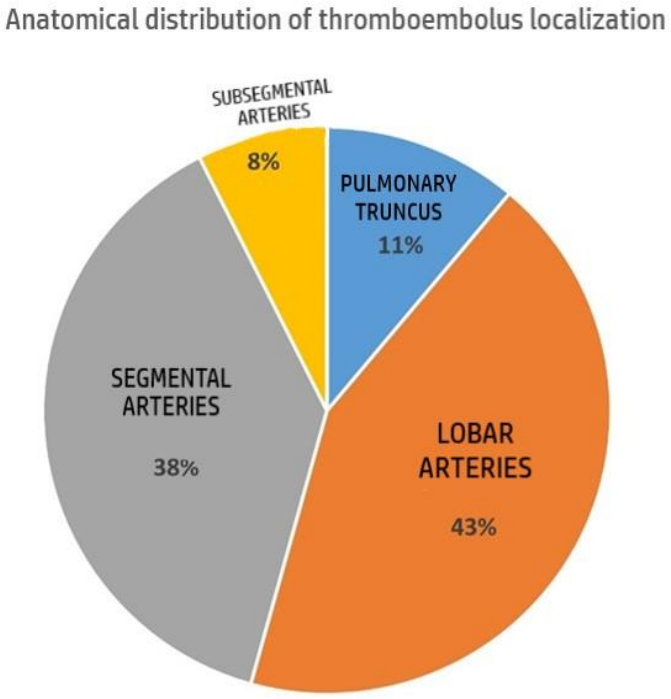

Figure 4. *Anatomical distribution of thromboembolus localization*

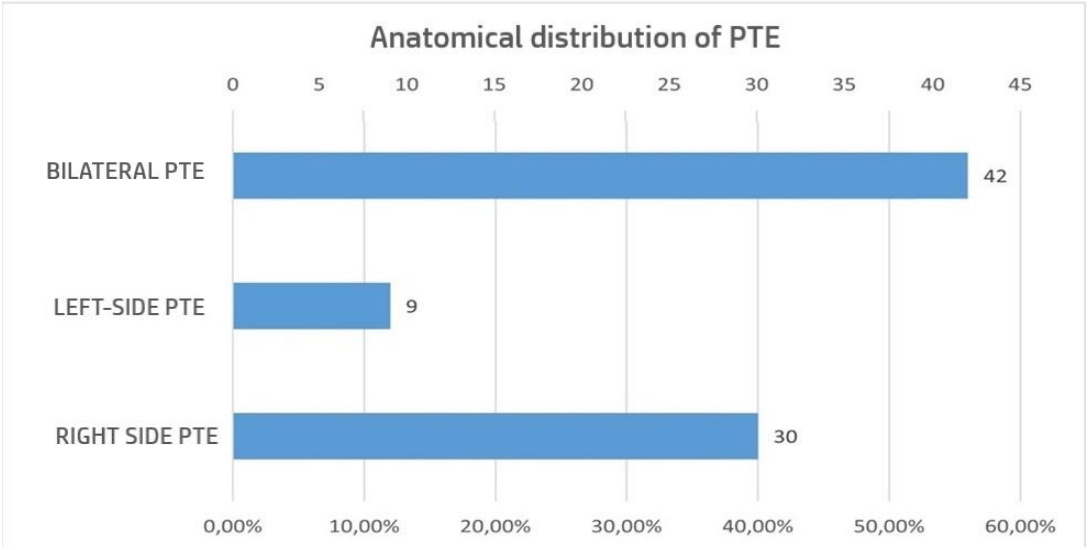

Figure 5. *Anatomical distribution of pulmonary thromboembolism (PTE)*

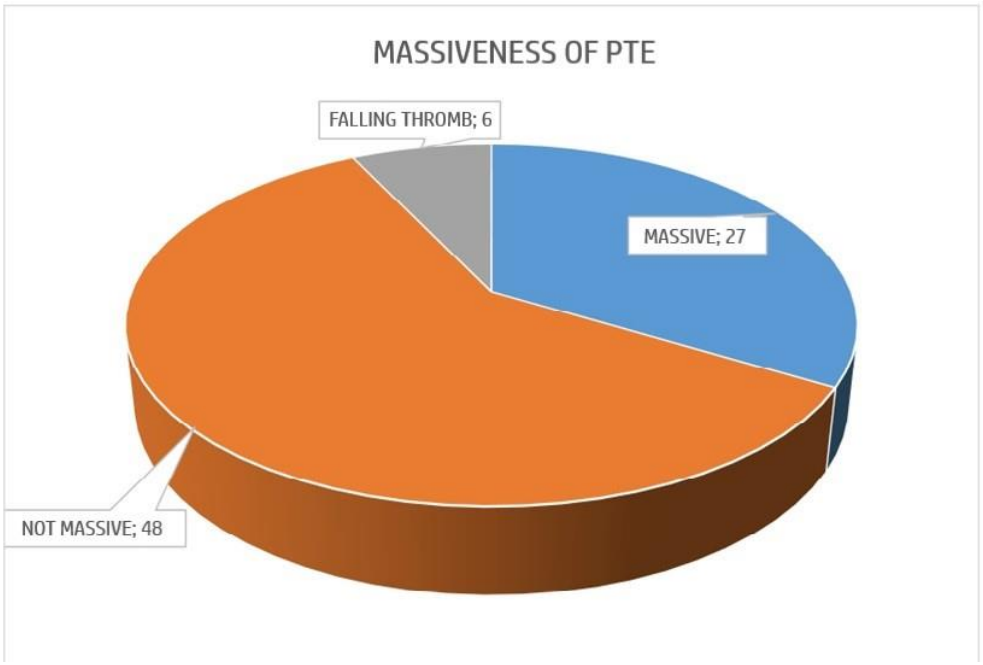

Figure 6. *Pulmonary thromboembolism massiveness*

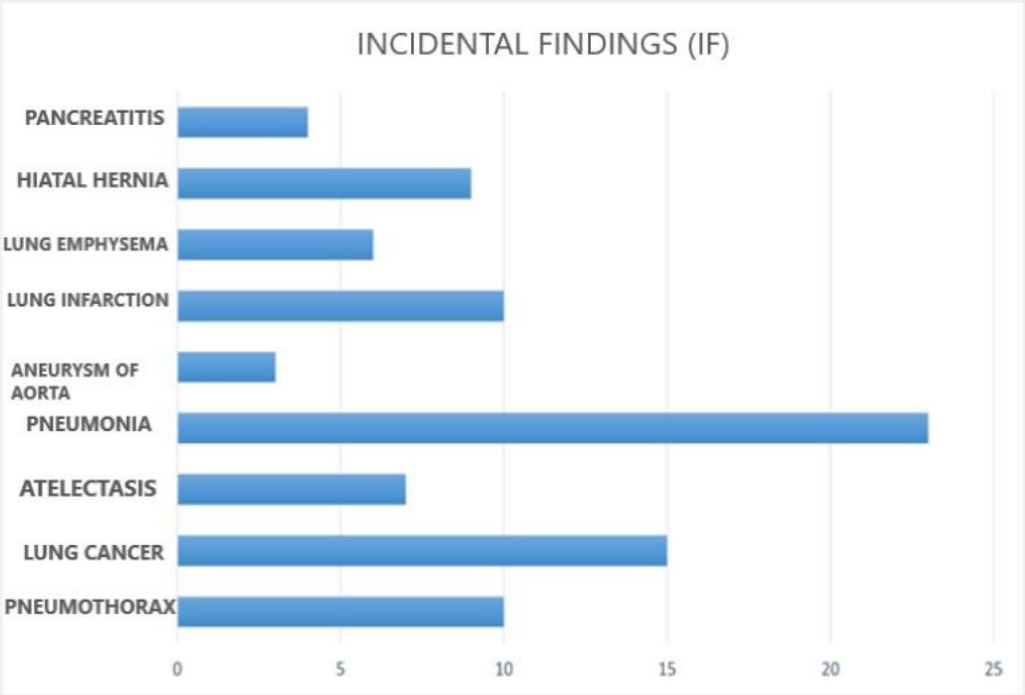

Figure 7. *Results of incidental findings*

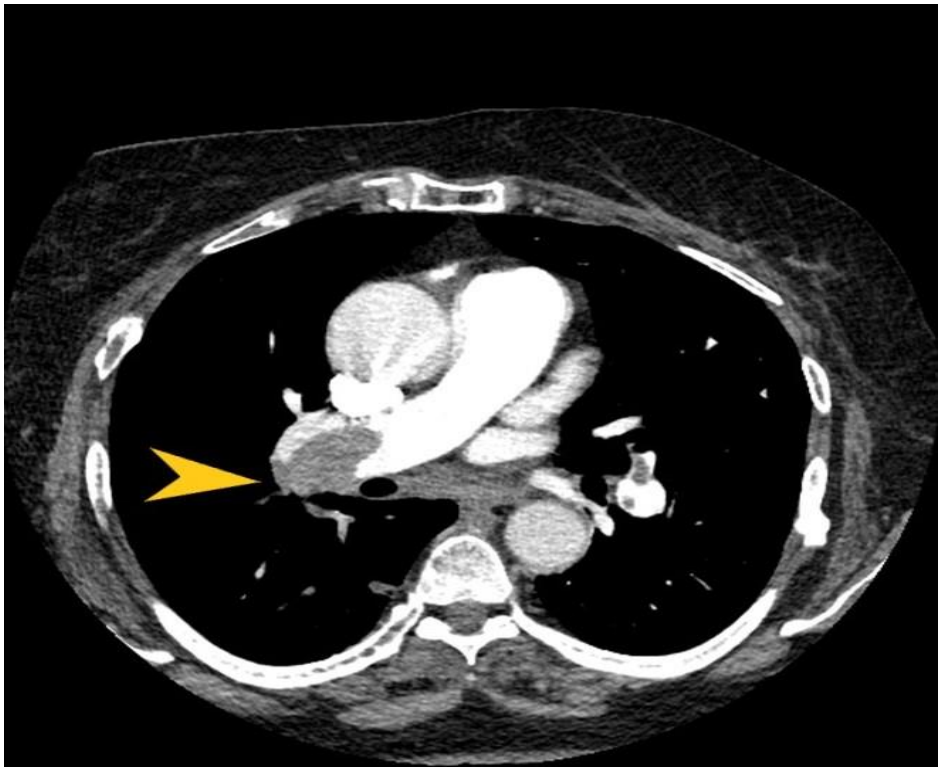

Figure 8. *Thromboembolus in the right main pulmonary artery*

DISCUSSION

The results of this study show that pulmonary embolism (PE) was diagnosed in 27% of patients undergoing CT pulmonary angiography (CTPA), which is a slightly higher percentage than in some previous studies evaluating the incidence of PE in the population of patients suspected of this condition (1). In a study conducted in Western European centers, the incidence of PE in patients undergoing CTPA was 23%, which is slightly lower than in our sample (2). This may reflect the specific patient population in SKB Mostar, with a potentially higher prevalence of risk factors for thromboembolism, such as older age, immobilization, comorbidities such as malignant diseases, as well as the possible lifestyle of patients (3).

Demographic analysis showed an almost even distribution between men (52%) and women (48%) with a positive PE test. However, a slightly higher average age was noted among women (70 years) compared to men (59 years), which may suggest that older women constitute a more vulnerable group in terms of developing PE (4). This is in accordance with the literature, which points out that older age and the postmenopausal period in women represent a significant risk factor for thromboembolic events (5). Older age also suggests the need for preventive strategies in this population, including thromboembolic risk assessment prior to HRT and increased awareness of risk factors.

Analysis of thrombus localization showed that emboli were most often detected in lobar arteries (43%), with bilateral distribution in 52% of cases, which suggests that patients with PE in this sample often had more complex and difficult clinical pictures (6). Massive emboli, which were recorded in 33% of patients, represent a serious clinical entity associated with high mortality, although their incidence follows the findings of earlier studies (7). In contrast, the majority of patients had nonmassive emboli (59%), which is encouraging because such cases are associated with a better prognosis and a lower risk of mortality (8). This suggests the need for greater focus on early recognition of PE symptoms in low- to intermediate-risk patients.

Special emphasis should be placed on the role of D-dimer in the diagnosis of PE. Although elevated D-dimers in the blood are often the first sign of possible thromboembolism, the results show that only 27% of patients with elevated D-dimers actually had confirmed PE. These data confirm the high sensitivity but low specificity of D-dimer, since many other factors can lead to false positive results, including infections, inflammation, trauma or postoperative conditions (9). Therefore, although D-dimers remain an important tool in initial screening, the definitive diagnosis of PE must be based on imaging methods such as CTPA (10). The use of USV color Doppler arteries as an alternative method for initial assessment in younger patients or pregnant women can further reduce unnecessary exposure to ionizing radiation (11).

One of the significant aspects of this research is the identification of nus findings (incidentalomas) during CTPA, which included pleural effusions, pneumonia and even tumors (12).

Identifying nus findings has significant clinical implications, as it enables early detection of serious conditions such as tumors or infections. This emphasizes the importance of a comprehensive analysis of the images obtained and the potential role of the radiologist in the wider diagnostic process (13).

Application of optimized protocols for CTPA, including radiation dose reduction and use of advanced software algorithms for image reconstruction, may further reduce patient risk, particularly in the younger population (14). The development of AI algorithms for the analysis of CTPA images can significantly speed up and improve the diagnostic process, especially in institutions with a limited number of experienced radiologists (15).

Future research should address long-term outcomes in patients with different types of emboli, including mortality, development of pulmonary hypertension, and quality of life. Also, a comparative analysis of the diagnostic efficiency of different methods, including USG and laboratory tests, can help to optimize the diagnostic algorithm for PE (16).

CONCLUSION

CT pulmonary angiography (CTPA) is confirmed as a key method for diagnosing pulmonary embolism (PE), allowing precise localization and assessment of the severity of the condition. In this study, 27% of patients undergoing CTPA had a positive finding of PE, which is above the average in some previous studies and indicates specific risk factors present in the local population.

Age and gender analysis showed an almost equal distribution among men and women, with a pronounced risk for older women. Massive PEs identified in 33% of patients indicate the need for urgent diagnosis and treatment to reduce the high risk of mortality. At the same time, most patients with non-massive PE had a more favorable prognosis.

Additional incidental findings, including pleural effusions, malignancies, and inflammatory processes, highlight the importance of CTPA not only for diagnosing PE but also for detecting other potentially serious conditions. Although elevated D-dimers are useful for initial screening, their low specificity confirms the need for definitive diagnosis through imaging methods.

Future research should focus on the analysis of specific risk factors in our population and on the improvement of diagnostic protocols, including the optimization of criteria for the use of CTPA, especially in vulnerable groups such as elderly patients.

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INCIDENCIJA PLUĆNE TROMBOEMBOLIJE U BOLESNIKA PODVRGNUTIH KOMPJUTORIZIRANOJ TOMOGRAFIJI PULMONALNOJ ANGIOGRAFIJI U SVEUČILIŠNOJ KLINIČKOJ BOLNICI MOSTAR

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SAŽETAK

Uvod: Plućna embolija predstavlja ozbiljan medicinski problem s visokom smrtnošću ako se ne prepozna pravodobno. CT pulmonalna angiografija ključna je metoda za dijagnostiku plućne embolije kod pacijenata s nespecifičnim simptomima poput zaduhe, bolova u prsima i povišenih vrijednosti D-dimera.

Cilj: Utvrditi incidenciju plućne embolije kod pacijenata podvrgnutih CT pulmonalnoj angiografiji u Sveučilišnoj kliničkoj bolnici Mostar.

Ispitanici i metode: Retrospektivno istraživanje obuhvatilo je 300 pacijenata sa sumnjom na plućnu emboliju koji su podvrgnuti CT pulmonalnoj angiografiji. Tehnički parametri snimanja uključivali su niskodozni protokol s intravenskim jodnim kontrastom. Rezultati su analizirani deskriptivnom statistikom, uz procjenu učestalosti plućne embolije, lokalizacije tromba i incidentalnih nalaza.

Rezultati: Plućna embolija je dijagnosticirana kod 27% pacijenata, s najčešćim zahvaćanjem lobarnih arterija (43%). Masivne embolije zabilježene su u 33% slučajeva. Prosječna dob ispitanika bila je 64 godine, s gotovo jednakom spolnom raspodjelom. Povišeni D-dimeri nisu bili dostatni za potvrdu dijagnoze u većine pacijenata. Incidentalni nalazi uključivali su pleuralne izljeve, upale pluća i tumore.

Zaključak: CT pulmonalna angiografija neophodna je za preciznu dijagnostiku plućne embolije, posebno kod pacijenata s nespecifičnim simptomima. Rezultati naglašavaju potrebu za kombiniranjem kliničkih i slikovnih metoda, kao i prilagodbom dijagnostičkih protokola kako bi se smanjila izloženost zračenju i optimizirali ishodi liječenja. U lokalnom kontekstu, ove smjernice mogu unaprijediti dijagnostiku i liječenje.

Ključne riječi: Plućna tromboembolija, incidencija, kompjutorizirana tomografija, pulmonalna angiografija, klinička dijagnostika

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KNOWLEDGE OF BLOOD TRANSFUSION AMONG NURSES AND MEDICAL TECHNICIANS

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ABSTRACT

Introduction: In blood transfusion, nurses and medical technicians play a key role in ensuring patient safety by performing identification, compatibility and vital parameter monitoring procedures as well as providing support and education to patients. Their contribution is crucial for achieving high standards of medical care and improving medical treatment outcomes.

Objective: To assess the level of knowledge amongst nurses and medical technicians with regards to safe and proper application of transfusion therapy.

Participants and Methods: This research was conducted as a cross-section descriptive-analytical study with the aim of assessing knowledge of routine blood transfusion among three groups of nurses and medical technicians, and analyzing differences in their results. The sample consisted of three target groups of nurses and medical technicians studying at the Faculty of Health Studies (of the University Clinical Hospital Mostar, the Cantonal Hospital Dr. "Safet Mujić" Mostar and the County Hospital "Dr. fra Mihovil Sučić" Livno). A modified version of the RBTKQ questionnaire was used for the research. The questionnaire consists of 6 sections and 49 items. Descriptive and inferential statistical measures were used, including frequencies and percentages, normality distribution tests, as well as the Mann Whitney U test and Kruskal-Wallis test, with results evaluated at both levels of significance.

Results: The analysis of nurses' and medical technicians knowledge on blood transfusion indicates an average level of 77.4%, with notable variation among participants. These findings underscored the need for more intensive education particularly in recognizing symptoms and responding to serious complications. Additionally, statistically significant differences between male and female participants, as well as participants from different institutions and qualifications, highlight specific areas where overall improvement of nurses' and medical technicians knowledge in these domains require focus. Conclusion: Lack of knowledge in recognizing the causes of fatal transfusion reactions, especially patient identification errors, compromises patient safety during transfusions,

emphasizing the urgent need to improve education of nurses and medical technicians in this area**.**

Keywords: blood transfusion, nurses and medical technicians, knowledge, patient safety, education

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INTRODUCTION

The role of nurses and technicians in blood transfusion is key to ensuring patient safety. Their responsibilities include patient identification, blood compatibility verification, establishing intravenous access and monitoring vital parameters during transfusion. Expertise in proper procedures, including handling and managing blood components, minimizes the risk of adverse reactions (1,2). Nurses are primarily responsible for administering blood transfusions, and the safety and efficiency of the transfusion process depend significantly on their skills and knowledge (3,1).

In addition, nurses play a vital role in educating patients about the procedure, potential complications and alternative therapies hence offering information that empowers patients to make informed decisions and provides a sense of security during the transfusion (4,5). By providing support to patients, informing them about possible side effects and addressing their concerns, nurses establish essential communication during this process (6).

The Council of Europe recommends that "all nurses should undergo training in blood transfusion," while the development of quality assurance programs in healthcare services is a focal point for both the Council of Europe and the World Health Organization (WHO) (7,8).

As integral members of the multidisciplinary team, nurses collaborate with physicians, pharmacists and other healthcare professionals to ensure safe transfusion therapy. Their continuous education, adherence to guidelines, and engagement with transfusion medicine research contribute to improving the quality of patient care (9). Nurses also play a crucial role in education about the use of blood and blood components, providing information on patient identification and other critical factors that ensure the safe administration of blood products (10). Research conducted in Abu Dhabi highlights the need for further training and education in transfusion medicine (11).

The aim of this study is to assess the knowledge of nurses and technicians regarding the administration of blood and blood components and emphasize the importance of adhering to Standard Operating Protocols (SOPs) to protect patients from potentially fatal errors.

PARTICIPANTS AND METHODS

Participants

The study sample comprised several targeted groups of participants: employed nurses at the University Clinical Hospital Mostar (80.3%), the Cantonal Hospital "Dr. Safet Mujić" Mostar (14.9%), and the County Hospital "Dr. fra

Mihovil Sučić" Livno (4.8%). The participants were nurses and technicians studying at the Faculty of Health Studies, University of Mostar and working in these institutions. The research was conducted in the period from February 2023 to December 2023.

Methods

A modified version of the RBTKQ questionnaire on routine blood transfusion knowledge, consisting of six sections (49 items), was used (3). Eight items (Section A) pertained to sociodemographic information and educational background of nurses/technicians. Sections B through E contained 39 items assessing knowledge on blood collection from the blood bank, patient preparation, nurses' responsibilities before and after transfusion, and complications associated with blood transfusion. The final section, F, included two items evaluating knowledge of blood transfusion policies and procedures within institutions. The maximum possible score on the RBTKQ in this study was 62 points. The total score was converted into a percentage and categorized as follows: <50% (low knowledge), 50–74% (moderate knowledge), or ≥75% (high knowledge).

Researchers distributed paper-based questionnaires accompanied by an informational letter and a consent form. Nurses and technicians willing to participate were required to sign the informed consent form.

Statistical Data Analysis

Descriptive and inferential statistical measures were used, and data analysis was performed using IBM SPSS Statistics (version 24). Frequencies and percentages were employed to describe sociodemographic characteristics and knowledge items, while measures of central tendency and dispersion were used for knowledge scores. For most items, a score of 1 was assigned for a correct answer and 0 for each incorrect answer. Based on the assessment of normality in score distribution, non-parametric statistical methods were applied. Differences in blood transfusion knowledge between male and female participants were evaluated using the Mann-Whitney U test, while differences based on workplace, qualifications, and age were assessed using the Kruskal-Wallis test. The results of these tests were evaluated at significance levels of $p = 0.01$ and $p = 0.05$.

RESULTS

Sociodemographic Characteristics of Participants

The study included a sample of 208 participants. Most of the participants (68.3%) had completed undergraduate studies, with 5–12 years of work experience (51.4%), an average age between 26–35 years (31.7%), and were predominantly female (87.5%). Majority of participants were employed at the University Clinical Hospital Mostar (80.3%).

Most participants (85.1%) had never attended a professional development program related to blood and blood component therapy, while 28.8% had not administered blood or blood products in the past six months. Additionally, 18.8% expressed a desire for further education on adverse reactions and serious risks associated with transfusion therapy. Adequate guidelines for blood

administration were confirmed to exist in their departments by 63.9% of participants, and 63.5% reported having read these guidelines.

Overall Knowledge of Blood Transfusion

The knowledge results, presented in Table 1, show an average knowledge level of 77.4% across the sample. Based on mean values, participants from the County Hospital "Dr. fra Mihovil Sučić" demonstrated a knowledge level of M = 42.90. None of the nurses answered all the questionnaire items correctly.

Table 1. *Descriptive Values of Overall Knowledge Scores on Blood Transfusion Among Participants from Different Healthcare Institutions*

	N	Min	Max	M	SD
	208	**29**	**43**	**38,19**	**3,610**
University Clinical Hospital Mostar	167	29	47	37,97	3,399
Regional Medical Center "Dr. Safet Mujić" Mostar	31	31	45	37,53	3,543
County Hospital "Dr. fra Mihovil Sučić" Livno	10	36	48	42,90	3,446

Knowledge on Blood Dose Collection from the Blood Bank and Pre-Transfusion Patient Preparation

Education regarding the collection of blood doses from the Blood Transfusion Center, the mandatory pre-transfusion preparation of patients, and proper identification is crucial to ensure safe blood administration, reduce the risk of complications, and maintain the balance between the supply and demand of blood and blood components.

A total of 93.3% of respondents correctly identified that blood should be transported in thermally stable containers, while 63.0% recognized the importance of verifying identification details on the blood bag and request form to ensure patient safety. However, only 12.5% knew that after the blood is delivered to the department, the availability and patency of the intravenous line must be checked and just 1.4% answered the question regarding the procedure in case of Rh factor mismatch.

Knowledge of Nurse Responsibilities Before Initiating Transfusion

The study on nurses' knowledge of responsibilities prior to administering blood and blood components highlighted the importance of adhering strictly to protocols as this is the only way to prevent errors that could prove fatal. A total of 96.2% of respondents knew that patient information must always be verified before starting a blood transfusion. About 62.5% selected the correct filter size for blood transfusion (170–200 μm). Over half (57.7%) recognized three critical actions before starting a transfusion: patient

identification, documenting vital signs and reviewing the doctor's order with the supervising nurse. Approximately 49.5% of respondents knew the maximum time blood can remain outside the refrigerator before transfusion (30 minutes). However, only 29.3% correctly identified three key pieces of information to convey to the patient before transfusion (reasons, risks, and symptoms of a reaction). A total of 73.1% were aware of the need to wear non-sterile gloves to protect against bloodborne diseases during transfusion administration.

Knowledge of Nurse Responsibilities After Initiating Transfusion

Nurses' knowledge of blood and blood component administration is critical for the prompt recognition and proper management of complications or adverse reactions in patients. A total of 88.0% of respondents recognized that normal saline (0.9%) can safely be used with red blood cell concentrates, while 78.8% knew the correct procedure for administering medication via the transfusion line in cases of pulmonary edema without another access line (stop the transfusion, flush the line with saline, administer the medication, and resume the transfusion). More than half (60.1%) correctly answered that patients need to be closely monitored for the first 15 minutes for possible transfusion reactions. Additionally, 44.7% knew the correct time intervals for recording vital parameters during transfusion.

A total of 42.8% correctly calculated the infusion rate (50 drops per minute). However, only 9.6% knew how to initiate a transfusion at the correct rate of 2.5 ml/min for a 300 ml transfusion over two hours, and just 2.4% identified all categories of patients requiring slow transfusion (cardiac conditions, elderly patients, and severe anemia). The analysis of nurses' knowledge regarding responsibilities during transfusion revealed that 39.9% recognized the need for specific nursing activities throughout the transfusion process.

Knowledge of Complications Related to Blood Transfusion

The knowledge of nurses/medical technicians regarding complications associated with blood transfusion highlights varying levels of awareness. The highest percentage of participants (73.6%) correctly identified patient misidentification as the most common cause of fatal transfusion reactions with an equal percentage aware that wearing non-sterile gloves is essential for protection against bloodborne diseases. More than half of the respondents (67.3%) recognized urticarial rash as the most common symptom of a mild allergic reaction, while 49.5% correctly concluded that transfusion should be stopped if a blood product remains at room temperature for more than 4 hours. However, only 39.9% knew that any remaining blood must be discarded and the physician notified if the transfusion is not completed within the prescribed timeframe. A total of 24.5% identified all bloodborne diseases, while only 5.3% accurately recognized the symptoms of an acute hemolytic transfusion reaction. When asked about emergency interventions for acute reactions, only 2.4% of respondents provided a complete and correct answer.

Relationships Between Sociodemographic Characteristics and Knowledge of Blood Transfusion

To determine statistically significant differences in knowledge about the administration of blood and blood components, the Mann-Whitney U test and Kruskal-Wallis test were used.

Table 2. *Statistical Analysis of Blood Transfusion Knowledge Based on Participants' Sociodemographic Characteristics*

Characteristic	Statistical Test	Statistic	Degrees of Fre	p-value
Gender	Mann Whitney U test	U = 1886.000	208	0.009
Institution	Kruskal-Wallis	$\chi^2 = 14.935$	2	0.001
Qualifications	Kruskal-Wallis	$\chi^2 = 13.986$	3	0.002
Age	Kruskal-Wallis	$\chi^2 = 0.495$	4	0.974

The results of the Mann-Whitney U test showed a statistically significant difference in knowledge of blood transfusion between male and female participants (U = 1886.000, p = 0.009). Male participants had lower ranks, indicating lower knowledge scores compared to female participants.

The results of the Kruskal-Wallis test showed a statistically significant difference in knowledge of blood transfusion among participants from different healthcare institutions (χ^2 = 14.935, df = 2, p = 0.001). Participants working at the County Hospital "Dr. fra Mihovil Sučić" Livno achieved the best results in blood transfusion knowledge compared to participants from other institutions. There was also a statistically significant difference in knowledge of blood transfusion among nurses with different qualifications (χ^2 = 13.986, df = 3, p = 0.002). Nurses with an undergraduate degree achieved the best results in blood transfusion knowledge. However, the analysis of variance (Kruskal-Wallis test) showed no statistically significant difference in blood transfusion knowledge among nurses of different ages (χ^2 = 0.495, df = 4, p = 0.974).

Knowledge Deficits

To highlight the knowledge deficits in certain areas related to blood transfusion, the following questions received the least accurate responses from the nurses. For example, only 1.4% of participants correctly answered the question regarding what to do if there is a discrepancy in the RhD blood factor between the patient and the donor, with the correct procedure being to check details with the doctor and transfusion center and proceed with the administration of erythrocyte concentrate.

9.6% were unable to correctly calculate the transfusion rate of red blood cells for an adult patient according to the guidelines. 2.4% answered correctly the question about when slow blood transfusion is necessary for patients with

certain diseases, while only 3.8% of participants knew which interventions could minimize the risk of acute transfusion reactions. Although the symptoms of acute hemolytic transfusion reactions were recognized by 5.3% of participants, only 2.4% correctly answered what immediate actions should be taken when these symptoms appear. Additionally, only 2.9% of participants knew what action to take first in the case of a mild transfusion reaction.

DISCUSSION

This research highlights the knowledge deficit regarding the use of blood and blood products. Based on the analysis of the results, it is clear that education, continuous learning and staying updated with new findings play a crucial role. The results suggest that nurses are adequately informed about standard operational procedures; however, significant gaps remain in recognizing transfusion reactions and properly identifying patients. These findings align with the research of other authors, such as those conducted by Auerswald and colleagues (12), which also demonstrate similar deficiencies in knowledge regarding blood and blood product management, especially in recognizing transfusion side effects and complications.

Nurses and medical technicians from different institutions showed variations in their knowledge, indicating the need for specific educational approaches tailored to the context of each healthcare facility (12). These findings align with the research of Johnson and colleagues (13), who also pointed out variations in knowledge among nurses with different qualifications and work experience, emphasizing the need for customized educational approaches.

The research revealed that nurses, in general, have a good understanding of the Standard Operational Protocols for handling blood and blood products. Sixty-three percent of participants correctly answered questions about patient identification. Although responses to questions related to patient preparation and blood transport from the bank were highly rated (93.3%), nurses struggled with questions about specific clinical interventions, such as calculating transfusion rates or handling RhD incompatibility (1.4%). Only a small percentage of nurses (5.3%) knew how to recognize symptoms of acute hemolytic reactions, and only 2.4% knew the correct emergency actions to take in such situations. These findings are consistent with those from the studies by Auerswald and colleagues (12) and Smith and colleagues (14), who also found significant knowledge deficits in recognizing transfusion reactions and the proper administration of blood and blood products.

Significant areas where improvement is needed include knowledge of nurses' responsibilities before, during, and after transfusion. For example, the results indicate that nurses are not fully acquainted with all the procedures they must perform before the start of a transfusion, such as documenting vital signs and verifying the doctor's orders. Although most nurses have basic knowledge of these responsibilities, the results suggest that there is a need to further strengthen awareness of the details of these procedures in order to increase patient safety. Additionally, despite a good

understanding of procedures after the transfusion has started, the results show room for improvement regarding the volume of blood transfused, particularly in pediatric cases (8.2%), and transfusion speed (9.6%). These findings align with research by Johnson and colleagues (15), who also identified similar knowledge gaps regarding nurses' responsibilities during transfusion.

A deficit in knowledge about complications related to blood and blood product treatment also represents a concerning indicator. These deficiencies are confirmed by previous research, which also pointed to a significant lack of education among nurses in recognizing and responding to transfusion reactions (16). Only 3.8% of participants in this study could correctly list all preventive measures to reduce the risk of transfusion complications and only 24.5% identified blood-borne diseases (BBVs). Recognizing symptoms of acute hemolytic transfusion reactions was accurate for only 5.3% of respondents, while 2.4% knew the correct emergency measures to take in case of an acute reaction. These data point to a serious knowledge gap that could compromise patient safety, requiring the implementation of targeted educational programs and simulation training, as highlighted in Smith and colleagues' study (17). Similar findings were confirmed in a study by Miller and colleagues (18), who also warned of a severe lack of education in recognizing blood transfusion complications.

In addition to specific technical areas, the research also highlights the need for a broader approach to education, including training on infection prevention and allergic reactions, which are crucial for the successful course of blood transfusion. A lack of awareness in these areas can increase the risk of adverse reactions and serious complications. As emphasized in studies by other authors (19), the lack of specific knowledge regarding transfusion reactions can significantly impact patient safety, underscoring the importance of further investment in educational programs focusing on these critical aspects. The need for sustainable improvements in patient safety and quality of care has never been greater (20), while the workload of healthcare professionals is increasing (21, 22). The quality of healthcare depends on both the education and training of nurses and the implementation of evidence-based practice (23, 24).

One of the main limitations of this study is the restricted sample size, as it was conducted in only a few healthcare institutions, which may reduce the generalizations of the results to a broader population of nurses. Additionally, the use of a self-assessment questionnaire on knowledge could lead to biased responses, as participants may consciously or unconsciously exaggerate their abilities. The study also relied on the current assessment of knowledge without evaluating the long-term application of these skills in real transfusion situations. This approach does not provide insight into nurses' ability to respond in emergency situations or their practice in real-world conditions.

Future research should include a larger number of healthcare institutions, incorporating various types (hospitals, clinics, primary healthcare) to make the results more representative of the broader population. The use of combined methods,

including real-world testing and simulations, is also recommended to provide a more objective insight into nurses' knowledge and abilities. Continuous evaluation of knowledge, along with the development of specific educational programs tailored to sociodemographic characteristics, could improve educational approaches and reduce the risk of transfusion complications, thereby significantly enhancing patient safety.

This study contributes to a greater understanding of the knowledge gaps among nurses regarding blood and blood product administration, highlighting specific guidelines for future educational programs. Improving education, with a particular focus on the technical aspects of the procedure, is crucial for enhancing patient safety during transfusion procedures. Given the identified differences in knowledge, tailored educational approaches, both socio-demographically and according to qualification level, could significantly improve the quality of healthcare in transfusion medicine.

Practical significance of the research

This research highlights the lack of a basic understanding of key aspects of blood and blood product administration among nurses/medical technicians. While the questionnaire used was helpful, it could be improved for continuous assessment of knowledge. Regular evaluations can identify gaps that require education and further training, emphasizing the need for improvement in nurses' knowledge in this area.

CONCLUSION

Based on the findings of the research, we can conclude that there is a need for further education for nurses with regards to key procedures in blood and blood product administration. Special attention should be given to recognizing and responding to complications, accurate patient identification, proper management of blood products and comprehensive patient preparation before transfusion.

The use of simulation methods and targeted educational programs, which take into account specific sociodemographic characteristics, will be crucial for improving nurses' knowledge and practice.

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POZNAVANJE TRANSFUZIJE KRVI MEDICINSKIH SESTARA I TEHNIČARA

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SAŽETAK

Uvod: Medicinske sestre i tehničari imaju ključnu ulogu u transfuziji krvi osiguravajući sigurnost pacijenta, provodeći postupke identifikacije, kompatibilnosti i praćenja vitalnih parametara te pružajući podršku i edukaciju pacijentima. Njihov doprinos ključan je za ostvarenje visokih standarda skrbi i unapređenje rezultata liječenja.
Cilj: Procijeniti nivo znanja medicinskih sestara i tehničara o sigurnoj i pravilnoj primjeni transfuzijske terapije.
Ispitanici i metode: Ovo istraživanje provedeno je kao presječno deskriptivno-analitičko istraživanje s ciljem procjene znanja o rutinskoj transfuziji krvi među trima skupinama medicinskih sestara i tehničara te analize razlika u njihovim rezultatima. Uzorak su činile 3 ciljne skupine medicinskih sestara i tehničara koje studiraju na Fakultetu zdravstvenih studija (iz Sveučilišne kliničke bolnice Mostar, iz Kantonalne bolnice „Dr. Safet Mujić“ Mostar te iz Županijske bolnice „Dr. fra Mihovil Sučić“ Livno). Za istraživanje je primijenjena modificirana verzija RBTKQ upitnika, koji se sastoji od 6 dijelova i 49 stavki. Korištene su mjere deskriptivne i inferencijalne statistike, frekvencije i postoci, test normalnosti raspodjele, te Mann Whitney U test i Kruskal-Wallis test, čiji rezultati su procjenjivani na obje razine značajnosti.
Rezultati: Analiza znanja medicinskih sestara i tehničara o transfuziji krvi ukazuje na prosječnu razinu od 77,4%, s istaknutom varijacijom u različitim segmentima među sudionicima. Ovi nalazi naglašavaju potrebu za intenzivnijom edukacijom, posebno u prepoznavanju simptoma i postupanju kod ozbiljnih komplikacija. Također, statistički značajne razlike između muških i ženskih sudionika, kao i između sudionika iz različitih ustanova i kvalifikacija, ukazuju na specifična područja koja zahtijevaju fokus na generalno unapređenje znanja medicinskih sestara o navedenim područjima.
Zaključak: Nedostatak znanja u prepoznavanju uzroka fatalnih transfuzijskih reakcija, posebno grešaka u identifikaciji pacijenta, ugrožava sigurnost pacijenata tokom transfuzije, što naglašava hitnu potrebu za unaprjeđenjem edukacije medicinskih sestara u ovom području.

Ključne riječi: transfuzija krvi, medicinske sestre,znanje, sigurnost pacijenta, edukacija
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CORRELATION OF SUN PROTECTION FACTOR OF SUNSCREEN WITH ABSORBANCE AND TRANSMITTANCE IN THE ULTRAVIOLET RANGE OF RADIATION

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ABSTRACT

Introduction: Ultraviolet solar radiation (UV) is harmful to people both because of sunburn and because of much more serious health problems, among which skin cancer is one of the most serious consequences of exposure to UVA and UVB radiation. Sunscreens protect the skin from harmful solar radiation, by absorbing or blocking UV radiation. The aim of the paper is to determine the correlation between the sun protection factor (SPF) and the absorbance of UV radiation of a domestic brand of sunscreen, and to compare the effectiveness of the domestic brand of sunscreen with other commercially available brands.

Method: The UV-Vis spectrophotometric method was used to determine the correlation of the sun protection factor (SPF) with the absorbance and transmittance of UVA and UVB radiation.

Results: The results showed a very good correlation and linear dependence of SPF with absorbance in the UVA (R^2 = 0.993) and in the UVB area (R^2 = 0.998). A statistically significant difference ($P < 0.0001$) was observed in the absorbance of UVA and UVB radiation of different brands of sun protection creams with the same protection factor.

Conclusion: This study shows a direct correlation between SPF sunscreen and absorbance, which assesses the effectiveness of sunscreens in blocking UVA and UVB radiation. However, it is important to point out that all the researched creams, although they block different amounts of UV radiation, all absorb both UVA and UVB rays.

Keywords: Ultraviolet radiation, sun protection factor, absorbance, transmittance

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INTRODUCTION

The sun is a necessity for life, but there is more and more scientific evidence about the harmful effect of solar radiation, especially ultraviolet A (UVA) and ultraviolet B (UVB) on the skin, and therefore on overall human health. The ultraviolet (UV) spectrum of solar radiation has a range of wavelengths from 200-400 nm, which is divided into UVC (200-280 nm), UVB (280-315 nm) and (UVA (320-400 nm)) range.

However, since UVC radiation has the shortest wavelength and the highest energy, it is blocked by the ozone layer and cannot reach the Earth, so it does not have any harmful effects on humans. UVA and UVB rays can penetrate through the ozone layer and reach the earth's surface, especially in the last few decades due to damage to the ozone layer, the planet has been even more intensely exposed to UV radiation (1). The extent to which UV radiation would have negative effects on the skin depends on the exposure to UV radiation and the body's tolerance limit (2). Chronic exposure to UV radiation leads to immunosuppression, photoaging, and carcinogenesis. It involves modulation of the immune system, accumulation of genetic changes and ultimately leads to cancer. Research shows that 90 % of all skin cancers are related to exposure to harmful UV radiation from the sun. UVB radiation is more cytotoxic than UVA radiation because it causes direct DNA damage through absorption of photons by cyclobutane pyrimidine dimers that ultimately induce mutagenesis and skin cancer.

It has been described how UV radiation in addition stimulates the synthesis of reactive oxygen species (ROS). These reactive species damage mitochondrial enzymes and plasma membranes, thereby reducing the concentration of antioxidant substances in the skin. Furthermore, oxidative stress, by damaging the macromolecules of the skin, leads to the loss of cellular function. UVA radiation causes increased oxidative stress compared to UVB radiation,due to is deeper penetrating spectral range (3-12). It is particularly important to point out that exposure to UV radiation during childhood and adolescence is the main etiological cause of skin cancer (13).

In order to protect the skin from UV radiation, different formulations were originally developed such as sunscreens, lotions, etc. Later, these formulations were refined to provide protection against other harmful effects of UV radiation (skin aging, pigmentation, loss of collagen, skin cancer) (14,15). The sun protection factor (SPF) labeled on sunscreen products determines the level of protection against erythema caused by UV radiation.

Research shows that the use of sunscreens with a certain SPF has a wide spectrum of protection against UV radiation, such as protection against burns, photoaging, dyspigmentation, DNA damage, prevention of immunosuppression, photocarcinogenesis, and antioxidant protection (16-18). Therefore, sunscreens have become widely used for the prevention of short-term and long-term skin damage, and for this reason consumers are offered a wide selection of cosmetic products with protection against UV radiation.

Although SPF was recognized by the FDA (Food and Drug Administration) as a standard for measuring sun protection as far back as 1978, new research is still

necessary in order to synthesize photoprotective ingredients in sunscreens (19). Understanding the chemical properties and pharmacology of sunscreens is necessary for the development of better formulations of UV protection agents (20,21).

Namely, it is important that photoprotective sunscreens must be photostable, chemically inert, non-irritating and non-toxic, and must also ensure the removal of singlet oxygen and other ROS in order to provide complete protection against solar UV radiation (22-25). Photoprotection provided by topical sunscreen against exposure to solar UV radiation can be determined *in vivo* and/or *in vitro* (26,27).

Although these methods correlate in some cases, it should be noted that for a number of products the SPF determined *in vivo* is much higher than the SPF *in vitro*. (28). However, although the *in vivo* method is useful and precise, it is a time-consuming, complex (exposure of volunteers to UV radiation) and expensive process, especially when information on protection from long wavelengths (UVA) is needed. In vitro methods are faster, more economical and simpler. Therefore, various analytical methods (UV spectroscopy, HPLC methods, etc.) were investigated in order to accurately and precisely determine the protection factor and SPF values. (29-32).

RESEARCH AIM

This preliminary research has two goals. The first is to determine the correlation between the SPF marked on the product and the absorbance/transmittance in the UV area and the second is to determine a statistically significant difference in the absorbance of UV radiation of domestic brand sunscreens and other commercially available sunscreens on the market of Bosnia and Herzegovina. According to the knowledge and the available literature, this is the first research that has been conducted on commercially available sunscreens in Bosnia and Herzegovina, as well as in the region.

MATERIAL AND METHODS

Chemicals and samples

- Ethanol of analytical purity (p.a) - Fluka (96 %).

- Isopropanol of analytical purity (p.a) – Fluka

Domestic brand sun creams with different SPF (6, 15, 30, 50) and creams of different brands with the same SPF (50) were purchased in pharmacies and other stores in the territory of Bosnia and Herzegovina.

Instruments and accessories

- VWR UV-1600 PC (China) spectrophotometer (single beam).Wavelength range 190-1100 nm.

- Hellma Analytics quartz cuvettes 10 mm (6030-UV 6030)

- Ultrasonic water bath (WUC – AO3H) – Witeg (Germany)

- Analytical balance - Adam Equipment PW 184 (accuracy 0.001 g).

Microsoft Excel 2019, Microsoft Office software package (Microsoft, USA) and MedCalc software (MedCalcStatistical Software Version 14.8.1) were used for statistical processing of the obtained results.

Preparation of samples for absorbance measurement

For analysis, 0.02 g of the standard as well as a sample of sunscreen factor 6, 15, 30 and 50 were prepared. All samples were analyzed in triplicate. The prepared samples were dissolved in 100.00 mL of 70% ethanol. In order to improve the dissolution of the samples, the solutions were transferred to an ultrasonic water bath and subjected to ultrasound for the duration of 10 minutes.

The solutions were filtered through quantitative filter paper. The absorption spectrum in the ultra-violet region was measured with the prepared samples within 20 minutes of preparation. 70% ethanol was used as a blank. A blank sample is poured into the quartz cuvette up to the mark, the sample is poured into the second quartz cuvette and the absorbance is measured in the range of wavelengths from 200 to 400 nm with a shift of 5 nm. In this way, λ_{max} is determined, i.e. the wavelength at which a solution of a certain SPF shows maximum absorbance.

The obtained absorbance was recorded and corrected to the same mass of 0.0200 g. The corrected absorbance is calculated according to the formula:

$$A = Measured\ A \cdot \frac{0{,}0200}{sample\ mass}$$

Finally, the mean value of the corrected absorbance of three measurements for each sample is calculated. The transmittance (T) of the sunscreen solution was calculated using the equation: $A = -\log T$. In the same way, 20 sunscreens of the same SP factor (50), but of different brands (B1-B20), were analyzed, and the absorbance at λmax in the UVA and UVB radiation range was determined.

RESULTS

To determine the correlation between absorbance and transmittance depending on the SPF value, sunscreens of the same brand (standard brand) with different SPF values (6, 15, 30 50) were analyzed.

Figure 1. shows the UV absorption spectra of the tested sunscreens in the wavelength range of 220-400 nm. The three creams SPF 15, 30 and 50 have three significantly pronounced peaks in the wavelength range of 220-400 nm, indicating that they absorb UVC, UVB and UVA radiation. However, since UVC radiation does not reach the earth's surface, it was not further.considered. The protection factor six cream has the lowest pronounced peaks in both areas of UV radiation. The first peak of all samples is centered around 240 nm (UVC region). The second peak was centered around 300 nm (UVB region) for SPF 50, 30 and 15 and 310 nm for SPF six. The third peak for all samples is centered around 350 nm (UVA region). The UV spectra of four sun creams of different factors show that all creams absorb both UVB and UVA radiation, but with different intensities. As can be seen from the graph, the cream with protection factor 50 has the highest absorbance.

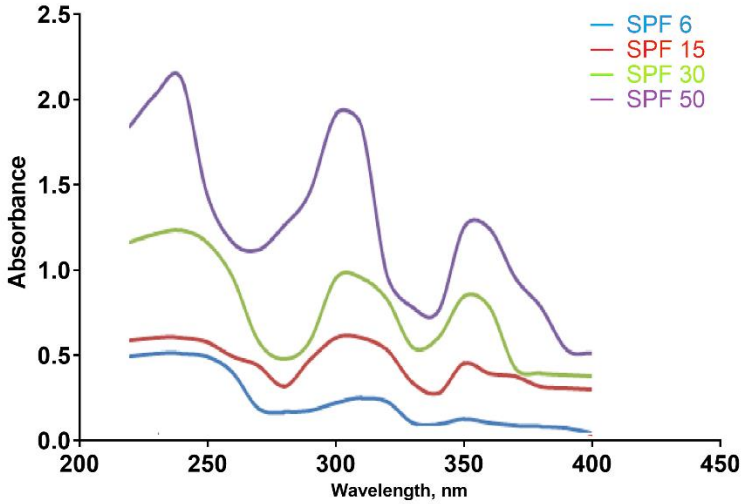

Figure 1. *UV absorption spectrum Absorbance versus wavelength 220-400 nm for SPF 6,15,30 and 50 standard brand (SB) creams*

The results of absorbance dependence on SPF (6, 15, 30 and 50) are shown in Figure 2. and Figure 3. The results show that there is a very good correlation and linear dependence of the absorption of sunscreen and SPF (R^2 = 0.998 and R^2 = 0.993). It is also clear from the graph that the researched standard brand has better absorption in UVB than in the UVA radiation range.

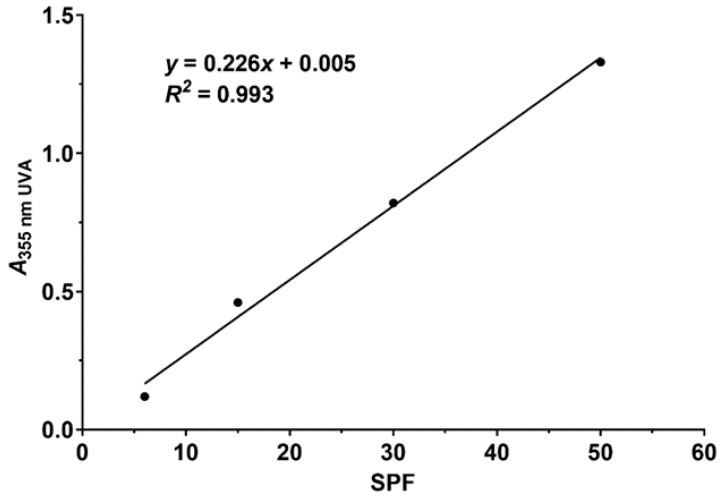

Figure 2. *Dependence of absorbance on SPF at (λ max) in the UVA area*

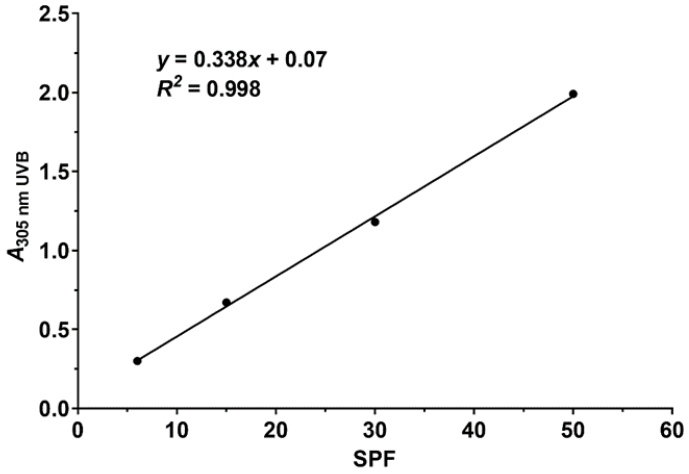

Figure 3. *Dependence of absorbance on SPF at (λ max) in the UVB area*

The transmittance results obtained (shown in Figures 4. and 5.) indicate a good correlation between absorbed and transmitted electromagnetic radiation (EMR). Namely, the higher the absorbance, the greater the protective effect of the sunscreen, which further indicates the fact that the transmittance is lower, that is, that less EMR penetrates the skin. The correlation coefficient obtained from the equation of direction is slightly better (R^2 = 0.9982) in the UVB area compared to the UVA (R^2 = 0.9829) area.
Since absorbance shows a linear dependence on SPF, and transmittance a logarithmic dependence, absorbance is the chosen quantity in evaluating the effectiveness of sunscreen. However, although transmittance is not linearly proportional to SPF, it can provide useful quantitative information as to what percentage of EMR is transmitted by a sunscreen with a specific SPF.

For example, from Figure 5. it can be determined that a cream with a protection factor of 6 transmits as much as 75.8% of UVA radiation, in contrast to a cream with a factor of 50, which transmits only 4.7% of UVA radiation. Or if we compare the same factor with different UV radiation, a cream with a protection factor of 50 only lets in 1% of UVB radiation, while the same cream lets in 4.7% of UVA radiation. These results indicate a good correlation between absorbance and transmittance, and the percentage of absorbed radiation can be unambiguously determined with this method. The higher the percentage of absorbed radiation, the greater the protective effect of the cream. So the SPF 50 cream absorbs as much as 99 % of UVB radiation.

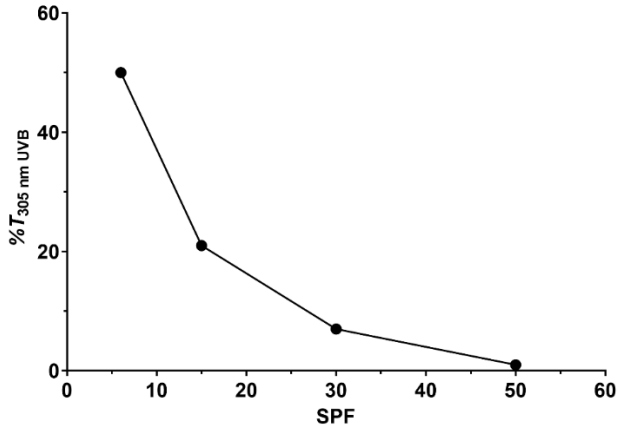

Figure 4. *Transmittance of sunscreens of the same brand at λ_{max} in the UVB region*

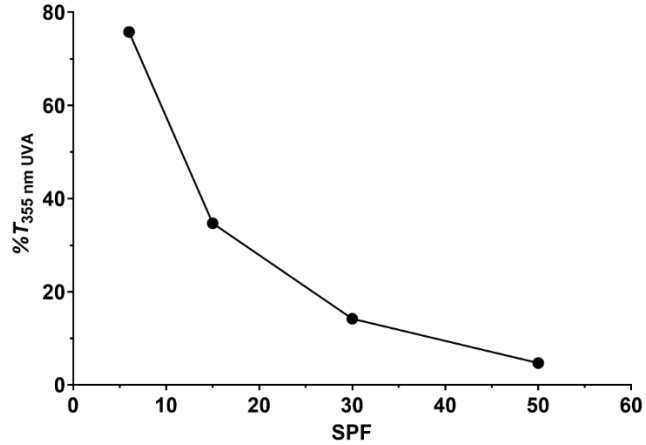

Figure 5. *Transmittance of sunscreens of the same brand at λ_{max} in the UVA range*

Twenty different samples of sun protection creams (B1 to B20) with the same SPF 50 were analyzed using the described procedure, and were compared with the standard sun protection cream, i.e. the standard brand (SB). Figures 6. and 7. show the results of the obtained absorbance values in the UVB and UVA range of samples (B1-B20) SPF 50 compared to SB. The graphs show the mean values of three identical absorbance measurements with the associated standard deviations for different cream brands (SPF 50) in relation to the standard brand.

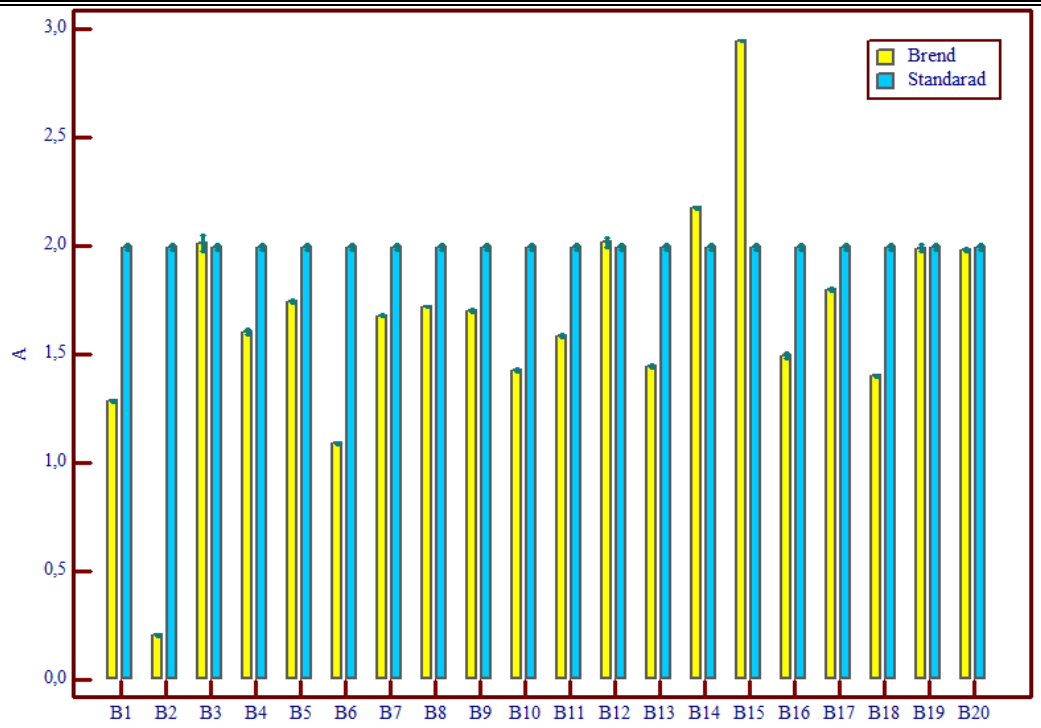

Figure 6. *Absorbance at λ_{max} in the UVB area of different cream brands and SPF 50 standards*

The graph shown indicates the fact that there are evident differences in the absorbance of different samples in comparison with the selected standard in the UVB area. Namely, it can be observed that some standards (brands) have lower absorbances, among which B2 stands out the most, and on the other hand, sample 15 has a significantly higher absorbance in comparison to the standard. The results of the statistical analysis according to the SD (standard deviation) indicate that the measure of dispersion of the results is small, which further indicates the precision of the method. Statistical analysis revealed that four samples, brands (B3, B12, B19 and B20) do not show a statistically significant difference ($P>0.0001$), i.e. the protection in the UVB area of the mentioned brands is comparable to the standard brand, the other samples show statistical significance at level $P<0.0001$.

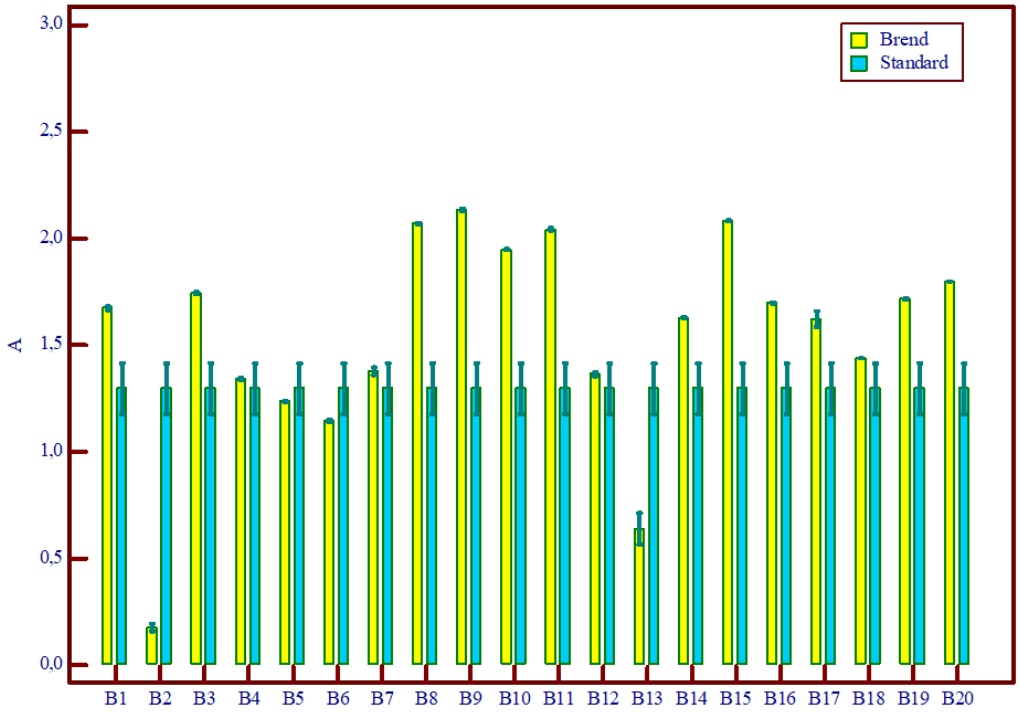

Figure 7. *Absorbance at λ_{max} in the UVA range of different cream brands and SPF 50 standards*

Statistical analysis of 20 brands compared to the standard in the UVA area shows that six brands (B4; B5; B6; B7; B12; B18) do not show a statistically significant difference, i.e. the protection in the UVA area of the brands is comparable to the standard brand. The rest of the samples show statistical significance at the P<0.0001 level, the researched brands have a greater protective effect in the UVA area compared to the standard brand.

DISCUSSION

The results of this research are in accordance with the research of Chou J, et al. (33). who also determined the linear dependence of absorbance and SPF, but the aforementioned authors conducted the research only in the UVB area and the correlation coefficient was R^2 = 0.998, which is in agreement with the results in this paper (R^2 = 0.9987). Furthermore, the difference between these two studies is in the use of different solvents, authors Chou J. et al. used isopropanol in their experiment. In this research, the spectrum was recorded with the solvent isopropanol (results not shown) and ethanol, but since there was no significant difference in absorbance depending on the solvent, ethanol was used in the experiment, because it was also used in other research, and on the other hand, it is financially more favorable. (34,35).

Authors Nalanda BR and Subhadip C. (36). determined the absorbance of sunscreens with different SPF values (15, 20, 24, 30, 50 and 60) using the spectrophotometric method, and also determined the correlation between absorbance and SPF (R^2 = 0.9908), which is slightly worse than that obtained in this research. Also, in the aforementioned research conducted on only six samples (of

different brands) that were compared with a standard sunscreen (Olay), it was determined that only two brands (33%) have similar absorbance to the standard sunscreen. In this work, four brands (20 %) did not have a statistically significant difference in absorbance in the UVB area, while in the UVA area six brands (30 %) did not have a statistically significant difference.

The results of this research show that the domestic brand (standard brand) has better efficiency in UVB compared to the UVA area, while the other investigated samples have better prection in the UVA area. According to the results of Miyamura Y, et al. (37) who found that UVB radiation is more cytotoxic than UVA radiation because it causes direct DNA damage through photon absorption by cyclobutane pyrimidine dimers that ultimately induce mutagenesis and skin cancer, the domestic brand in this research has a better protection effect compared to other commercially available sunscreens.
Observed differences in absorbance in both the UVA and UVB areas between different brands are probably due to the different chemical composition of the analyzed samples. Namely, most sunscreens contain a mixture of several active chemical substances, each of these absorbs light in different parts of UVA or UVB range. (38-41). Although there is a good correlation between SPF and absorbance, shown by the results presented in this paper as well as research by other authors, there may still be deviations from the indicated factor of a specific sample and the actual value.

Namely, the authors Fonseca AP and Rafaela N. (42) made a conclusion based on their research that all tested on their research concluded that all tested samples had a lower actual SPF compared to the indicated SPF values, especially for SPF 50 with a much larger difference, which is comparable to the results obtained in this paper. Namely, it is important to point out that, regardless of the different absorbance values between the domestic brand and other investigated brands, the results showed that only one sample (B2) has significantly lower absorbance in both UVA and UVB areas.

CONCLUSION

This study shows a direct correlation between the absorbance, which evaluates the effectiveness of sun protection in blocking UVA and UVB radiation, and the SPF of the sunscreen. All analyzed creams with the same protection factor (50), even though they block different amounts of UV rays, all protect the skin from the penetration of harmful UVB and UVA rays into the skin. The applied spectrophotometric method is simple, fast, robust, sensitive, cheap and suitable for in vitro determination of the effectiveness of different sunscreens. Therefore, the developed method could provide a quick and useful alternative method for measuring the effectiveness of preparations for protecting the skin from UV radiation.

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KORELACIJA FAKTORA ZAŠTITE OD SUNCA KREME ZA SUNČANJE S APSORPCIJOM I PROPUSNOSTI U ULTRAVIOLETNOM PODRUČJU ZRAČENJA

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SAŽETAK

Uvod: Ultravioletno sunčevo zračenje (UV) je štetno za ljude kako zbog opeklina tako i zbog znatno ozbiljnijih zdravstvenih problema, među kojima je karcinom kože jedan od najozbiljnijih posljedica izlaganja UVA i UVB zračenju. Kreme za sunčanje štite kožu od štetnog sunčevog zračenja, jer apsorbiraju ili blokiraju UV zračenje.

Cilj rada je utvrditi korelaciju između zaštitnog faktora od sunca (SPF) i apsorbancije UV zračenja domaćeg brenda kreme za sunčanje, te usporediti učinkovitost kreme za sunčanje domaćeg brenda s drugim komercijalno dostupnim brendovima.

Metoda: UV-Vis spektrofotometrijska metoda je korištena za određivanje korelacie zaštitnog faktora (SPF) kreme za sunčanje s apsorbancijom i propusnosti UVA i UVB zračenja.

Rezultati: Rezultati su pokazali vrlo dobru korelaciju i linearnu ovisnost SPF s apsorbancijom u UVA (R^2 = 0,993) i u UVB području (R^2 = 0,998). Uočena je statistički značajna razlika (P< 0,0001) u apsorbanciji UVA i UVB zračenja različitih brendova krema za zaštitu od sunca s istim zaštitnim faktorom,

Zaključak: Ova studija pokazuje izravnu korelaciju između SPF kreme za sunčanje i apsorbancije koja procjenjuje učinkovitost krema za sunčanje u blokiranju UVA i UVB zračenja. No, važno je istaći kako sve istraživane kreme iako blokiraju različite količine UV zračenja, sve apsorbiraju i UVA i UVB zrake.

Ključne riječi: Ultra violetno zračenje, zaštitni faktor od sunca, apsorbancija, transmitancija

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THE CHOICE OF ANTIPSYCHOTICS: CONTEMPORARY KNOWLEDGE

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ABSTRACT

Antipsychotics are a group of psychoactive drugs that eliminate delusions and hallucinations, improve the ability to test reality and lead to the reintegration of psychological functions and enable a return to reality. In addition to antipsychotic, they also have sedative, anxiolytic, antidepressant, antimanic stabilizing, anti-suicidal and antiemetic effects, therefore the drugs are used in the treatment of various other non-psychotic disorders. The objective of this paper is to point out the contemporary findings in the best choice of antipsychotics. We live in the period of psychopharmacology's rapid progress and our possibilities in the treatment of psychotic disorders are increasing. In recent decades, treatment with antipsychotics has been significantly improved due to the development of new antipsychotics with better therapeutic effect and safer profile of side effects. The basic mechanism of action of antipsychotics is dopamine receptors, with an effect on the noradrenaline, serotonin, histamine, adrenergic, and cholinergic systems, and indirectly on the gamma-aminobutyric acid and glutamine system. All this makes the mechanism of action of antipsychotics extremely complex. There are several different subdivisions of antipsychotics, and in clinical practice the most common division is the so-called typical and atypical. Typical antipsychotics that achieve their mechanism of action by blocking the D2 receptor show effectiveness in the treatment of positive symptoms of schizophrenia, but have a much lower effect in the treatment of negative, affective and cognitive symptoms. They often have significant side effects. Atypical antipsychotics work on both positive and negative symptoms of psychosis. In severe forms of psychosis, they are often insufficient in the treatment of positive symptoms, so we are forced to use a combination of antipsychotics. Although antipsychotic monotherapy is the ideal therapy, in practice we are often forced to combine two or more antipsychotics, as well as combine antipsychotics with other groups of psychopharmaceuticals. It is not easy to answer whether combinations of antipsychotics are useful or not. The key to success is an individual approach, careful selection of the type and dose of antipsychotics, and the inclusion of psycho and socio-therapeutic methods that are indicated in each case individually.

Keywords: antipsychotics, choice, contemporary knowledge.

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INTRODUCTION

Psychopharmacotherapy is immensely moving forward, and today has specific, selective and planned synthesized drugs and precisely knows their molecular level of function, targeted symptoms and mental disorders. The continuous adoption of new knowledge about psychopharmaceuticals has improved treatment, returned mental patients to their personal milieu, and promoted biological psychiatry as a key branch of psychiatry. The revolutionary contribution of the psychopharmacotherapy era in the treatment of mental patients is the transformation of the atmosphere of mental hospitals into an atmosphere almost identical or even better than the atmosphere on wards for physical diseases. As a results of the general progress of psychiatry, and above all the possibilities of modern psychopharmacotherapy, psychiatrists (in a team with other mental health experts) are now able to make a minor or major recovery in almost all patients, and more often a complete recovery.

Today, the treatment to mental disorders alongside the ever-increasing progress of psychiatry and better understanding of mental disorders is based on two fundamental principles:

1. Multidimensional (several therapeutic procedures are used simultaneously)
2. Integral (the treatment affects both the patient and the environment).

Antipsychotics are a group of psychoactive drugs for the treatment of various forms of psychosis, which eliminate crazy ideas and hallucinations, improve the ability to test reality and lead to the reintegration of psychological functions and enable a return to reality. In addition to antipsychotic, they also have sedative, anxiolytic, antidepressant, antimanic stabilizing, anti-suicidal, and antiemetic effects, so they are used in the treatment of various other non-psychotic disorders. There are several groups of different antipsychotics and they are divided in various ways, and recently the most common division is the so-called typical and atypical (1-3).

In the selection of antipsychotics, it is important to keep in mind that different antipsychotics can cause clinically specific effects in different patients, and these effects are not always well studied in randomized clinical trials. This means that average clinical effects in clinical trials may not be the best indicator of the range of possible clinical responses in individual cases. The recommended optimal doses from clinical trials often do not coincide with the optimal doses used in clinical practice (too high for some drugs, too low for others). Research almost always compares monotherapy and placebo, and in practice many patients use two antipsychotics or antipsychotics and other psychotropic drugs (4). In practice, this means that evidence-based medicine is not always completely feasible and useful for the patient.

CREATIVE PSYCHOPHARMACOTHERAPY

During and after the Decade of the Brain (1990-1999), there was a great expansion of psychopharmacotherapy with the appearance of many different, often

controversial concepts of psychopharmacotherapy paradigms and therapeutic algorithms. The registration of a large number of new psychopharmaceuticals with antipsychotic effects significantly contributed to the emergence of a psychopharmacotherapy renaissance and the overcoming of therapeutic nihilism in the treatment of schizophrenia.

The treatment of schizophrenia must be comprehensive and multidimensional

The clinical complexity of mental disorders requires assessment, understanding and formulation through four fundamental perspectives if we wish to obtain a reliable diagnostic model as well as effective and comprehensive therapy. There are four fundamental perspectives: 1. disease perspective, 2. dimensional perspective of personal vulnerability and resilience; 3. behavioral perspective and 4. narrative perspective. The mentioned perspectives do not exclude one another, but complement each other in the creation of a holistic diagnostic and therapeutic model. At different stages of treatment, one perspective is usually primary, and others are secondary, but also important. Thus, for example, in the acute stage of treatment of schizophrenia or bipolar disorder, the primary perspective of the disease is to determine the appropriate psychopharmacotherapy with the aim of achieving fast and complete remission as soon as possible. In the psychopharmacotherapy phases of maintenance and prevention of a new episode of the disease, the behavioral perspective (behavior change), dimensional (change of mental model) or life story perspective (creation of a new life scenario) are primary, where psychopharmacotherapy is extremely important, but not sufficient. Complete treatment includes all four perspectives in understanding, defining and treating any clinical problem or disease, including schizophrenia.

Creative psychopharmacotherapy of schizophrenia is based on an individualized approach

A whole series of various factors can affect the individually different therapeutic response and treatment outcomes, which should be taken into account when selecting the optimal psychopharmacotherapy for each individual patient. When selecting psychopharmaceuticals, it is important to consider: 1. specifics of the clinical picture and the course of the disease; 2. patient's previous experience with medication; 3. significant comorbid conditions; 4. possible side effects; 5. possible pharmacokinetic variations in patients; 6. possible interactions with other drugs; 7. the experience of close relatives with drugs; 8. individual patient preference; 9. availability of the drug for the patient.

Creative psychopharmacotherapy includes drugs optimally adapted for each stage of treatment

We usually distinguish three phases of schizophrenia treatment: 1st phase of treatment of an acute episode of the disease with the aim of calming down and eliminating symptoms as quickly as possible, 2nd phase of stabilization with the aim of maintaining the achieved results and further improvement of the patient's health, and 3rd phase of maintaining

remission and preventing relapse of the disease, that is, the prevention of the occurrence of a new episode of the disease. At each stage of treatment, it is necessary to choose suitable psychoactive drugs that enable the control and elimination of as many symptoms as possible, that is, therapeutic problems. The drugs that led to the successful treatment of the acute phase of the disease may not always be the optimal choice for maintenance therapy.

Creative psychopharmacotherapy increases benefit and reduces the risk during treatment

A creative approach in psychopharmacotherapy is always aimed at increasing the patient's well-being and reducing the risk of undesirable drug side effects and treatment complications. Despite a large number of new antipsychotics, monotherapy is not successful in a significant number of patients with schizophrenia, and undesirable side effects often compromise treatment. Optimal combinations of psychoactive drugs can achieve desirable therapeutic synergism, but also prevent or eliminate certain side effects, which can significantly contribute to complete remission in a large number of patients with schizophrenia.

Rational choice of antipsychotics

Although still empirical, nowadays we know a lot more about the nature of schizophrenia and the mechanisms of action of antipsychotics. The choice of treatment depends on a whole series of different factors; the clinical picture and severity of symptoms, the availability of antipsychotics, the profile of side effects, possible interactions with other drugs, the presence of other physical and neurological diseases, etc. In the acute phase, an antipsychotic or their combinations should be chosen to cover as many symptoms as possible, and to be tolerable as possible. While combinations of antipsychotics cannot usually be avoided in the acute phase, in maintenance therapy one should always strive for monotherapy including newer antipsychotics with good tolerance taken in a single daily dose (e.g. paliperidone or olanzapine).

Antipsychotics in a sufficient dose and for sustainable period of time

The purpose of treatment is not only to suppress or eliminate the symptoms of schizophrenia, but also to stop the schizophrenic process, to eliminate the causes that can lead to a relapse of the disease, and prevent suicidal and self-destructive behavior, reintegrate the patient into the community as well as possible, enable psychosocial development and the best possible quality of life. Therefore, the optimal choice of antipsychotics is as important as the sufficient dose and duration of therapy. Hypo dosing of antipsychotics causes insufficient therapeutic responses and absence of complete remission, while premature discontinuation and excessive dose reduction are the most common causes of symptom relapse and disease recurrence.

Optimization of treatment by dose adjustment

The optimal dose should be found for each individual patient, which achieves the best therapeutic effect with the least, or, if possible, without significant side effects. If high doses are necessary to achieve therapeutic effects, then they

should be gradually reduced as soon as the therapeutic effect stabilizes (5-8).

CHOICE OF ANTIPSYCHOTICS

Factors influencing the choice of antipsychotics are: severity and type of clinical picture, patient characteristics, presence of comorbidities, experience of the clinician, previous response to treatment, tolerability profile of antipsychotics. The ideal therapy for psychotic disorders would be antipsychotic monotherapy. But, in everyday practice, two or more antipsychotics are often used. Data from the literature show that in Norway this is present in 35.6% (9) and in Spain 55.5% of cases (10).

There is no complete agreement among scientists regarding treatment in the prodromal phase, but most advocate that different psycho and socio-therapeutic methods should be the initial response. Some experts believe that treatment should be started with lower doses of atypical antipsychotics.

In the treatment of the first psychotic episode, it is recommended to introduce an antipsychotic of the second or third generation as the first line of therapy as soon as possible. It is started with a low dose that is carefully titrated until the minimum effective dose of the drug is reached.

In the case of a repeated episode or exacerbation of the disease, it is recommended to increase the dose of the antipsychotic to which the patient previously had a favorable therapeutic response, and if necessary, up to the necessary upper limit of the recommended therapeutic dose.

In maintenance therapy after the first episode, antipsychotics should be prescribed for at least one year, for the second episode for up to five years, and for a repeated psychotic episode for life (11).

Combinations of antipsychotics should be used in psychotic patient with severe symptoms, long duration of illness, therapeutic resistance and long hospitalizations. Combinations are used to improve the effect and/or reduce unwanted reactions (12,13).

The choice of antipsychotics in relation to the unwanted effect is not at all easy and is completely personalized, i.e. custom for each patient. There are studies that indicate that ziprasidone, aripiprazole, risperidone and paliperidone work best in relation to unwanted sedation. In relation to unwanted weight gain, aripiprazole and ziprasidone are the most preferred, and in relation to extrapyramidal symptoms, clozapine, quetipin, ziprasidone, aripiprazole and olanzapine. Due to unwanted sexual disturbances, risperidone and paliperidone should be avoided. Unwanted anticholinergic effects are most often shown by risperidone, ziprasidone, aripiprazole and quetipine (14).

Long-acting antipsychotics

The clinical course of the disease can be divided into presymptomatic, prodromal, psychotic and chronic phases. The aspiration of today's psychiatry is to identify the patient at the earliest stage in order to prevent further progression of the disease with adequate therapy. The goal of schizophrenia treatment is clinical, social and personal remission of the patient and prevention of disease relapse (5). Antipsychotics are administered orally and intramuscularly. Treatment usually commences with one of the second-generation antipsychotics in oral form, since, despite the listed side effects, they greatly contributed to the treatment of

schizophrenia and allow 80% of patients to go into remission after the first psychotic episode. However, 80% of patients treated with oral therapy experience a relapse within five years, and it has been shown that the long-term effectiveness of such treatment is limited due to patient non-cooperation (15). As many as 40-60% of patients treated with oral antipsychotics stop taking their medications as prescribed within two years. There are many reasons for patients not taking their medication. Individuals unintentionally forget to take the medicine, some have a problem with understanding the instructions, while some consciously refuse to take the medicine due to prejudice towards their illness, stigma, fear of dependence and responsibility, occurrence of side effects, lack of information, but also due to mental disorganization and their own ambivalence. Since a positive correlation has been observed between patients' long-term consumption of therapy and a reduced risk of relapse, the fight against refusing therapy of the biggest challenges of psychiatry today (16). For this reason, there was a need to develop a strategy for the long-term treatment of schizophrenia and find a drug that would combine the positive characteristics of oral therapy and provide the possibility of maintaining two continuous drug concentrations in the blood and improve cooperation and thus reduce relapses, which led to the development of long-acting antipsychotics (17). They are administered intramuscularly, every two to four weeks. We have at our availibility: Haldol depot (haloperidol decanoate), Moditen depot (fluphenazine decanoate), Rispolept Consta (risperidone microspheres), and Zypadhera (olanzapine palmoate hydrate). Despite many potential advantages, the use of long-acting antipsychotics is reserved for patients who stop taking therapy, patients with multiple relapses, and for those who request therapy themselves (18), thus they are rarely used in clinical practice. Research shows that in many countries the proportion of patients treated with long-acting antipsychotics does not exceed 25% (19).

One of the main advantages of this type of antipsychotic therapy is the possibility of early recognition of discontinuation of therapy or non-compliance with treatment instructions, which is not the case with oral therapy. This way, the doctor can contact the patient if he misses an appointment for receiving therapy and try to influence the patient’s cooperation. The method of dosing the drug once every two to four weeks is considered an advantage by patients because, in addition to being easy to use, they do not have to think about taking the therapy every day and potentially hesitate about it (20).

Antipsychotics and complementary medicine

A new type of psychiatry, called integrative psychiatry, selectively includes elements of complementary and alternative medicine in practical work (21, 22). Depending on the type of schizophrenia or another psychotic disorder, the phase of the disease or the clinical picture in the phase of remission, the wishes and needs of each patient, and the cultural characteristics of the environment in which he lives should be taken into account. It is desirable to recommend some form of complementary therapy at some stage of the disease. It is certain that there are a large number of patients for whom modern medical methods and the listed complementary

methods can help, such as some type of diet and nutritional therapy, herbal therapy, manipulative therapy or, for example, energy therapy. It certainly cannot be harmful if a properly medicated schizophrenic patient goes to bioenergetic massage, takes certain herbal medicines or a multivitamin product. The most common natural medicines used in the treatment of schizophrenia are: omega 3 - fatty acids (DHA and EPA), ginkgo - ginkgo biloba, lecithin, glycine, gluten, multivitamin products. There is growing evidence that this type of complementary therapy helps in healing. They are not a substitute for traditional treatment methods. With appropriate use, the severity of the appropriate approach to the treatment of schizophrenia is not diminished. They should be recommended with caution and aligned with the therapy recommended by modern medicine for people who do not like or have difficulty accepting "chemical" drugs as additional therapy to standard psychoactive drugs (23-25, 1).

CHOICE OF ANTIPSYCHOTICS – OUR EXPERIENCES

There is no ideal antipsychotic. A well-chosen antipsychotic administered in a therapeutic dose must control psychotic symptoms and cause as few side effects as possible. The choice should be made individual, taking into account the symptoms of the disease of the individual patient and the profile of the side effects of the drug.

In the treatment of the first episode, which is characterized by a relatively mild clinical picture, we almost always use outpatient treatment. In drug therapy, we most often use an atypical antipsychotic, monotherapy with possible combination with an anxiolytic... (Risperidone, Olanzapine, Quetipain, Aripiprazole... Diazepam, Bromazepam)

In the treatment of repeated psychotic episodes or Sch psychosis characterized by a relatively mild clinical picture, we most often use an atypical antipsychotic or a combination of atypical or atypical and typical antipsychotic. (Risperidone, Olanzapine, Quetiapine, Aripiprazole...+ Haloperidol, Clozapine, Promazine...)

In the treatment of psychotic disorders characterized by a severe or very severe clinical picture in the initial phase, we usually use a typical antipsychotic in combination with another typical or atypical antipsychotic along with an anxiolytic, a mood stabilizer... (Haloperidol, Fluphenazine, Promethazine, Clozapine, Risperidone, Olanzapine, Diazepam...)

CONCLUSION

When prescribing antipsychotics, a rational choice and a personalized approach are very important in order to obtain the best therapeutic effect and as few as possible side effects. Older antipsychotics often have side effects in the form of neuroleptic phenomena (akathisia, dystonic reactions, akinesia, tardive dyskinesia...), and newer antipsychotics cause various manifestations of metabolic syndromes (obesity, hypertension, hyperglycemia, hypertriglyceridemia, hypercholesterolemia).

When dosing antipsychotics, it is important to know that they have a wide therapeutic range, and when determining the dose, the experience of a psychiatrist is also important in order to determine an adequate effective dose without or with as few side effects as possible. Once started,

treatment with antipsychotics often lasts a long time, sometimes lifelong. The purpose of extended treatment is to suppress psychotic symptoms and prevent relapses of psychotic illness. A special advantage in extended treatment is the so-called retard and depot forms of the drug that are usually prescribed weekly or monthly. If possible, it is best to treat a psychotic patient with only one antipsychotic, and if necessary, two or more antipsychotics can be combined. Antipsychotics can be combined with anxiolytics, hypnotics and mood stabilizers. The combination with antidepressants is rarely justified and most often incorrect. Antiparkinsonian drugs should only be given in case of side effects, and never as a preventive measure. For patients who do not like or have difficulties in accepting standard antipsychotic therapy, drugs and methods recommended by science-based complementary medicine can be recommended as additional therapy.

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IZBOR ANTIPSIHOTIKA: SUVREMENE SPOZNAJE

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SAŽETAK

Antipsihotici su skupina psihoaktivnih lijekova koji otklanjaju sumanute ideje i halucinacije, poboljšavaju sposobnost testiranja realiteta i dovode do reintegracije psihičkih funkcija i omogućavaju povratak u realnost. Osim antipsihotičnog imaju i sedativni, anksiolitički, antidepresivni, antimanični stabilizirajući, antisuicidalni i antiemetični učinak pa se primjenjuju u lječenju raznih drugih nepsihotičnih poremećaja. Cilj ovog rada je ukazati na suvremene spoznaje u izboru antipsihotika.

Živimo u razdoblju brzog napretka psihofarmakologije i naše mogućnosti u liječenju psihotičnih poremećaja su sve veće. Posljednjih desetljeća liječenje antipsihoticima je značajno unaprijeđeno zbog razvoja novih antipsihotika s boljim terapijskim učinkom i sigurnijim profilom nus pojava. Bazični mehanizam djelovanja antipsihotika su dopaminski receptori uz djelovanje i na noradrenalinski, serotoninski, histaminski, adrenergički i kolinergički sustav te posredno i na gama-aminomaslačnu kiselinu i glutaminski sustav. Sve to čini mehanizam djelovanja antipsihotika izrazito kompleksnim. Postoji više različitih podjela antipsihotika, a u kliničkoj praksi najčešća je podjela na tzv. tipične i atipične. Tipični antipsihotici koji svoj mehanizam djelovanja ostvaruju blokadom D2 receptora pokazuju učinkovitost u liječenju pozitivnih simptoma shizofrenije ali u liječenju negativnih, afektivnih i kognitivnih simptoma imaju puno manji učinak. Oni nerijetko imaju značajne nus pojave. Atipični antipsihotici djeluju i na pozitivne i negativne simptome psihoza. Kod teških oblika psihoza oni su često nedovoljni u liječenju pozitivnih simptoma pa smo prisiljeni na kombinaciju antipsihotika. Iako je monoterapija antipsihotikom idealna terapija u praksi smo nerijetko prisiljeni kombinirati dva ili više antipsihotika, kao i kombinirati antipsihotike s drugim skupinama psihofarmaka. Nije jednostavno odgovoriti jesu li kombinacije antipsihotika korisne ili nisu. Ključ uspjeha je individualnom pristupu, pažljivu izboru vrste i doze antipsihotika te uključivanje psiho i socioterapijskih metoda koje su indicirane u svakom slučaju individualno.

Ključne riječi: antipsihotici, izbor, suvremene spoznaje.

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THE CONNECTION OF SPIRITUALITY AND MENTAL DISEASES

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ABSTRACT

Understanding how spirituality affects mental health can provide important insights into treatment and support methods for people with mental illness. In modern society, spirituality is increasingly recognized as an important aspect of human life. It signifies the deep values and life views that people want to live by. A higher level of spirituality aids personal growth and development, including an individual's mental health and emotional well-being. Providing spiritual health care is considered important for the prevention of depressive symptoms and includes activities such as listening to patients, offering peace, respect, comfort and hope. A holistic approach to treating patients is increasingly being recognized and applied throughout the world. A holistic approach to health recognizes the interconnectivity of the psychological, social, biological and spiritual aspects of a person, which is reflected in the application of various methods including medication, education, communication, self-help and alternative therapies. History shows that scientific research has long confirmed the connection between spirituality and improved health. Spirituality seems increasingly important in the context of increased life stress, and recent research suggests that spiritual practices can contribute to the reduction of depressive symptoms. Spiritual beliefs and practices can also provide comfort to people who are fearful or anxious, increasing their sense of control, security and confidence. The effects of spirituality on mental health are individual and depend on personal beliefs, life experiences and the context in which it is practiced. An individualized approach in the assessment and integration of spiritual and religious aspects in the treatment of mental disorders is key. This paper explores the connection between spirituality and mental illness, with the aim of illuminating how spirituality can be both a source of support and challenge for people struggling with mental disorders.

Keywords: spirituality, mental diseases, mental health
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INTRODUCTION

The connection between spirituality and mental illness is a complex and multidimensional area of research that has significant implications for understanding mental health and well-being. Spirituality, often defined as a personal sense of connection to something higher or transcendent, can play a key role in the lives of people facing various forms of mental disorders. Understanding how spirituality affects mental health, whether through positive effects such as increased resilience and meaning or through challenges such as crises of belief, can provide important insights into treatment and support methods for people with mental illness.

Traditionally, spirituality and religiosity have often been associated with positive outcomes in the context of mental health. Research has shown that spiritual practice can contribute to improving the quality of life, reducing symptoms of depression and anxiety, and strengthening social support and resistance to stress. For example, people who practice religious rituals or have a deep spiritual connection often report a greater sense of peace and purpose in life, which can act as a buffer against mental illness. However, the relationship between spirituality and mental health is not always straightforward. In some cases, spiritual conflicts or a sense of spiritual crisis can worsen the symptoms of mental disorders. Also, the way spirituality affects mental illness can vary depending on cultural, social and individual factors. Some researchers emphasize the need for a more detailed analysis of how specific spiritual practices and beliefs may affect mental health, taking into account all the complexities and variations in the experiences of individuals.

This paper explores the connection between spirituality and mental illness, with the aim of illuminating how spirituality can be both a source of support and challenge for people struggling with mental disorders. Understanding these connections can contribute to the development of a holistic approach to mental health, where spiritual needs and experiences are taken into account in treatment and support.

RELIGIOSITY AND SPIRITUALITY

Recently, there has been a significant increase in interest in spirituality, which can be understood as the result of a growing recognition of the importance of nurturing the spiritual dimension of man. Spirituality is a concept with many definitions, but it is often confusing because it is sometimes confused with the concept of religion. Religion comes from the Latin word "religare", which means to connect, reunite or collect. Religiosity is a complex phenomenon that manifests itself through different dimensions and aspects. It refers to the institutional expression of religious beliefs and practices, including the human search for meaning and purpose in life. Religiosity provides a sense of control and understanding of the world around us, through beliefs, behavior and rituals that enable us to establish a connection with something transcendental, sacred or divine. It also includes the way we understand our relationships and responsibilities towards others in the community we live in (1). On the other hand, spirituality comes from the Latin word "spiritualis" (spiritual) and was first used in the context of Christianity. In

the Bible, a spiritual person is described as someone in whom the Holy Spirit resides. In the middle of the 20th century, the term "spirituality" was often used to describe the Catholic Church. However, with many authors, the meaning of spirituality becomes broader and is no longer tied exclusively to the Catholic Church. Spirituality today signifies deep values and views of life according to which people want to live. In this way, spirituality makes it easier to search for answers to fundamental questions about the meaning of life (2).

Spirituality and religion, although related, are not the same concept. Religion often involves organized structures and rituals, while spirituality is more of an individual experience, focused on personal growth and inner fulfillment. Spirituality can encompass a wide range of experiences and practices, including meditation, prayer, contemplation, and other forms of self-realization. While religion offers a set of beliefs and practices that are common to a group of people, spirituality is often more personal and flexible, tailored to individual needs and experiences. In modern society, spirituality is increasingly recognized as an important aspect of human life. People are searching for deeper meaning and purpose beyond material achievements, leading to the increasing popularity of spiritual practices and teachings. This change emphasizes the importance of inner life and spiritual growth as key elements of general well-being and quality of life. Spirituality can provide guidance and support in dealing with challenges, promoting emotional balance, and fostering a sense of connection to something greater than oneself. Spirituality can also be defined as personal transcendence, outside the context of reality, in contrast to rational feelings in the real world. This definition emphasizes the relationship between God and man, the supernatural and the natural world (3). Many definitions of spirituality include the idea of two dimensions: horizontal and vertical. The horizontal dimension refers to intrapersonal and interpersonal relationships, that is, to the relationship with oneself and one's environment. The vertical dimension, on the other hand, refers to the relationship to God, the universe or anything that the individual considers absolute, something above himself (4).

The horizontal and vertical dimensions of spirituality help the individual to recognize personal values and goals and encourage the integration of body, mind and spirit. In this way, spirituality allows individuals to gain a deeper understanding of themselves and their place in the world, while simultaneously developing a deeper relationship with something higher. Spirituality, as a concept, can also play a key role in mental health and emotional well-being. People who engage in spiritual practices often report a greater sense of calm, inner peace, and life satisfaction. These practices may include meditation, prayer, contemplation, and other forms of spiritual discipline that help connect with the inner self and supernatural forces. In addition, spirituality can provide a framework for dealing with life's challenges and crises. When faced with difficult situations, many people find comfort and strength in their spiritual beliefs and practices. This spiritual aspect can serve as a source of hope and resilience, enabling people to cope more easily with suffering and uncertainty. In modern society, an increasing number of

people are looking for meaning and purpose beyond material achievements and everyday obligations. Spirituality offers a path to a deeper understanding of ourselves and the world around us, helping individuals find balance between their inner and outer lives. Through this integration, spirituality can enrich life experiences and provide a greater sense of fulfillment and connection to something greater than ourselves. Spiritual practice can also have a positive impact on physical health. Research has shown that people who practice spiritual activities often have better immunity, lower blood pressure and a lower risk of chronic diseases. This connection between mind and body emphasizes the importance of a holistic approach to health, where physical, mental and spiritual well-being are viewed as interconnected aspects of an individual's overall health. Namely, in 2006, the American Psychiatric Association created the first guidelines and ethical guidelines related to the integration of religiosity and spirituality in psychiatric practice (5). These guidelines were also adopted by other national psychiatric societies in 2010. Later, in 2016, the World Psychiatric Association and the World Health Organization adopted guidelines dealing with the role of spirituality and religiosity in psychiatry (6).

SPIRITUAL HEALTH

The spiritual dimension of man explores the search for the meaning of life, which helps people overcome various life challenges. When health is compromised, people tend to focus on the physical, emotional and mental aspects, while the spiritual dimension is often overlooked due to its intuitive and intangible nature, making it a taboo subject. For most people, spiritual health requires the development of both horizontal and vertical dimensions of spirituality through different stages of life. Physical and spiritual aspects are key parts of a human being, which strives to achieve happiness, stability and a fulfilled life, which requires continuous renewal (7). Spirituality can be practiced within all religions, and in today's world, the reduction of spatial distances and the rapid exchange of information and goods between different cultures, civilizations and races enable the recognition of the common characteristics of all religions. These common characteristics include striving for self-knowledge, understanding the world we live in, and finding the meaning of life (8).

Spirituality not only helps in personal growth and development but also plays an important role in overcoming difficult situations. People who nurture their spirituality often report a greater sense of inner peace and resilience when facing challenges. Spiritual practice, which can include meditation, prayer, contemplation, and other forms of reflection, provides inner strength and perspective that helps individuals cope with suffering and uncertainty. In addition, spirituality can improve interpersonal relationships and a sense of community. Through shared spiritual practices and activities, people can build deeper connections with each other, share experiences, and support each other in their spiritual quest. This strengthens the sense of belonging and connection within the community, which further contributes to the general well-being and quality of life.

Spirituality can have a positive impact on physical health. Research shows that people who regularly engage in spiritual practices have lower blood

pressure, stronger immune systems and a lower risk of chronic diseases. This holistic approach to health, which includes spiritual, mental and physical aspects, emphasizes the importance of a balanced and integrated lifestyle. A lack of purpose and a meaningless life often lead to feelings of despair, uselessness and abandonment. Providing spiritual health care is considered important for the prevention of depressive symptoms and includes activities such as listening to patients, offering peace, respect, comfort and hope. This type of care was first included in the definition of health set by the World Health Organization in 1948 (9).

A holistic approach to health recognizes the interconnectedness of the psychological, social, biological and spiritual aspects of a person, which is reflected in the application of various methods including medication, education, communication, self-help and alternative therapies. According to the American Holistic Nurses Association, holistic nursing is a holistic practice that seeks to heal the whole person. Florence Nightingale, a pioneer of holistic nursing, taught nurses to focus on the principles of holism, including the unity, well-being, and interconnectedness of people and their environment. This philosophy requires nurses to integrate self-care, self-responsibility, spirituality, and reflection into their professional lives. This often leads to a greater awareness of interconnectedness with self, others, nature, spirit and the global community.

CHRISTIAN SPIRITUALITY

The great world religions, such as Christianity, arose in ancient times when people became aware of their separation from the natural environment and developed more complex forms of shared consciousness. During this cultural evolution, religious revelations and experiences emerged that offered answers to fundamental questions about the meaning of life, suffering, and the true nature of existence. These answers became the beliefs and basic values of religions. Religions thus offer practical guidelines and rituals designed to guide man in his life's journey (10). Spiritual experience can be manifested through different forms of religiosity, but it is not necessarily related to religion. For some people, a spiritual experience is a discovery of the essential self and an opportunity to connect with one's inner core. For others, it is transcending physical reality and making contact between one's own being and the divine, ultimate reality (11). Spiritual experiences, although often associated with religion, can be universal and independent of a particular religious tradition. They can include feelings of peace, connection, transcendence, and unity with the universe. Regardless of the form, spiritual experiences often provide a deeper understanding of life and encourage personal growth and development. In modern society, an increasing number of people are looking for spiritual experiences outside of traditional religious frameworks. Meditation, yoga, mindfulness and other forms of spiritual practice are becoming increasingly popular as ways to achieve inner peace and spiritual fulfillment. These practices allow individuals to explore their inner reality and find meaning and purpose in life, without necessarily belonging to a particular religion. Spirituality, therefore, plays an important role in many people's lives, helping them to cope with challenges, find inner peace and develop a deeper understanding of themselves and

the world around them. Through spiritual practices and experiences, people can find answers to their deepest questions and live more fulfilling and meaningful lives. The authors Leutar and Leutar highlight the features of spirituality as a resource of strength and resilience of families in risky situations through the prism of the Catholic faith (12). Their research emphasizes the need to practice spirituality to nurture spiritual health and highlights the many benefits of such practice.

Spirituality helps alleviate vulnerable relationships or changes within the family, which is especially important in cases of illness, old age, disability, bad partner relationships, poverty or death in the family. The power of spirituality derives from the various forms of its practice, including knowing the value of faith, hope and love, prayer, reading religious texts such as the Bible, visiting religious institutions, belonging to a spiritual community, receiving the Eucharist, confession and pilgrimage.

Families who practice spirituality can increase their cohesion, work on themselves, grow and progress in faith together, foster honesty and love, and learn to forgive each other to get through difficult times. The authenticity of spirituality in the family is manifested through honest and open relationships and a clear division of family roles that are not guided by duty, but by love. The spiritual path is not devoid of crises, as people often face questions about the meaning of life, suffering, the existence of God and dealing with illnesses. However, these moments of crisis can be a blessing because they represent opportunities for growth, deepening faith, and strengthening relationships with yourself and your family. The success of spirituality depends on the time when it began to be practiced, the frequency of the practice and adherence to the basic principles of the faith. Family members in risky situations should understand grace and faith as undeserved gifts of God that are essential for cultivating spirituality. Problems within the family can serve as catalysts for positive change, encouraging members to lean on their faith, focus on the important things in life, and let go of the unimportant.

SPIRITUALITY AND RELIGION THROUGHOUT HISTORY AND TODAY

Every human being has a physical, psychological and spiritual dimension, whereby spirituality has been present since the earliest days of human history. From the very beginning, religion, spirituality and medicine have been intertwined in human life. Throughout history, the approach to treating illness has often been shaped by different religious beliefs, and in many cultures, healing has been considered an almost sacred act. In the Western world, the first public hospitals were founded by religious organizations, and members of religious communities worked in these institutions. During the Middle Ages, many doctors were also priests, and religious institutions gave them the authority to perform medical activities (6).

In the early development of psychiatry, during the 18th and 19th centuries, spirituality and religion played a key role in treatment within psychiatric institutions. Religious institutions contributed significantly to the care of psychiatric patients, and religious rituals, prayers and spiritual activities were considered beneficial for their recovery. In the 19th century, in the United States,

religion was an integral part of moral therapy, which was standard practice in treatment within psychiatric institutions. However, in the late 19th and throughout much of the 20th century, attitudes toward religion and spirituality in the context of psychiatric treatment changed. Religious practices began to be considered to have a negative effect on illness, causing hysteria and neurosis. This reversal of views led to a schism between religion and medicine, resulting in negative perceptions of spirituality and religion in the healing process. Sigmund Freud, in 1907, described religion as a "universal obsessional neurosis", and his negative attitude towards religion was influential among psychiatrists involved in psychoanalysis. In contrast, Carl Jung developed theories that included religious symbols and spiritual aspects, integrating them into psychotherapy work (13).

In the second half of the 20th century, interest in the integration of spirituality and religiosity into psychiatric practice began to grow again. At the end of the century, numerous studies showed a positive connection between spiritual and religious aspects and mental health. The modern period is marked by an increasing focus on spirituality and religiosity as key topics in psychiatric research and debate. Increasing evidence suggests that spirituality and religiosity can have a beneficial effect on treatment and recovery from psychiatric disorders. In 2016, the World Psychiatric Association officially recommended the inclusion of spiritual and religious factors in the clinical treatment of psychiatric conditions (6).

THE ROLE OF SPIRITUALITY IN TREATMENT AND DISEASE

When discussing the improvement of the health condition and the improvement of the quality of life in patients with deep faith, the question arises: is this improvement the result of their spiritual practice or is it perhaps a spontaneous remission according to medical terminology? Spirituality is a complex and multidimensional component of the human experience that has significant connections to health, illness, treatment, and the healing process. History shows that scientific research has long confirmed the connection between spirituality and improved health. Research on this connection began in the 19th century, when about 250 empirical studies were conducted. However, the real increase in the number of studies focusing on the relationship between spirituality and health occurred only in the sixties of the 20th century (14).

Spiritual therapies focus on deep religious beliefs and feelings, such as peace, purpose, connection with others, and understanding the meaning of life. Using prayer and spirituality as a healing method can provide emotional and psychological support to people facing illness. Religion can have a positive effect on health by providing a sense of coherence and purpose (15). These beliefs help people understand their role in the universe, find purpose in life, and develop the courage to face suffering (16). For example, Harris et al. (17) and Unantenne et al. (18) in their research highlighted a positive connection between spirituality and the ability to cope with chronic diseases, which results in improved psychosocial well-being and adaptability (16). Spirituality can provide the strength,

support, and resilience needed to cope with chronic illness, as well as to overcome other health challenges, including stress and depression.

Religious beliefs can significantly influence patients' treatment decisions and health habits, and can sometimes lead to delays in seeking help for people suffering from mental health problems. Therefore, it is extremely important how doctors approach their patients, because their supportive attitude can improve cooperation in treatment and make it easier for patients to cope with their condition. Also, the support provided by the religious community can have a positive effect on cooperation and generally make it easier for patients to cope with the disease. The approach to introducing spirituality and religiosity into treatment should be adapted to each patient individually. It is important to show understanding and respect for the patient's personal beliefs and accept his decision if he does not want to discuss his religious beliefs or spiritual needs. In such cases, treatment should focus on the medical aspect without imposing spirituality.

It is important that the psychiatrist does not show judgment with his attitude, but accepts each patient with regard to his views on religion and spirituality. The inclusion of religion and spirituality in psychiatric treatment should be consistent with the patient's personal values and wishes. Psychiatrists should seek to expand their knowledge of different beliefs and religious practices in order to better understand their patients and their specific needs (19).

THE CONNECTION OF SPIRITUALITY AND MENTAL DISEASES

Research among adults has found a consistent association between levels of spirituality and depressive disorders, with the association being inverse and significant. Spirituality seems increasingly important in the context of increased life stress, and recent research suggests that spiritual practices can contribute to the reduction of depressive symptoms. Studies investigating the relationship between spirituality and depression can usually be classified into three main categories: spirituality as a factor that reduces vulnerability to depression, spirituality as a coping tool for depression, and the benefits that spiritual components can have in the treatment of depression. Intrinsic spirituality, which is based on personal beliefs and inner faith, shows a significant association with lower levels of depressive symptoms. On the other hand, some private spiritual behaviors, such as watching spiritual programs on television or personal prayer, are sometimes associated with higher levels of depression, especially in the elderly (20).

In his review of 850 scientific papers on the influence of religiosity, Koenig concluded that religious individuals often tolerate diseases better, have better mental health and cope with stress more successfully (21). In addition, religiosity and spirituality can positively influence attitudes and beliefs, which consequently improves relationships between health workers and patients, and can contribute to the healing process (22). In his five-dimensional model of depression, Jakovljević includes the spiritual dimension in addition to the

psychological, moral, social and physical (23).

Research shows that spirituality and religiosity can improve general satisfaction and reduce suicidality and depression by providing hope, optimism and a sense of purpose. Namely, there is an inverse relationship between the feeling of hopelessness, which can be a predictor of suicidality, and the level of spirituality or religiosity. Various studies have documented associations between higher levels of spirituality and religiosity and fewer depressive symptoms in various populations, including the elderly, adolescents, people with physical illnesses, and cancer and terminally ill patients. In addition to investigating prevalence, the ways in which spirituality and religiosity can influence positive health outcomes are also being studied (24). According to research by Dervić and colleagues, several factors can help reduce the risk of suicidal tendencies associated with religiosity. These protective factors include moral attitudes, a low level of aggression, as well as the presence of support in the social network, cognitive restructuring, finding meaning in events, internal reflection that improves self-esteem, motivation and participation in personal changes. Additionally, strengthening social ties can also be helpful. Spirituality and religiosity can also have benefits for physical health as they often encourage a healthy lifestyle, including avoiding smoking and drugs and promoting healthy eating and rest. Many studies have shown that people who seek psychiatric help often use religiosity as a coping strategy. Patients deeply affected by their illness often seek religious solace to find meaning in their suffering.

Spirituality and religiosity can help in understanding and dealing with unpleasant situations and stress without falling into depression. Religious beliefs often provide hope and can motivate people with serious illnesses to cope better with emotions and recover (25). Research dealing with the relationship between spirituality and religiosity and depression often produces contradictory results. While some studies suggest a positive association, others have shown the opposite. Certain studies have observed a negative impact of certain aspects of religiosity, including feelings of guilt, increased levels of depression, and decreased self-esteem. Also, negative forms of religious coping and internal spiritual struggle are associated with worse health outcomes (26). Spiritual beliefs and practices can also provide comfort to people who are fearful or anxious, increasing their sense of control, security and confidence. Positive forms of spiritual coping can reduce anxiety in stressful situations, while negative forms of conflict with spiritual beliefs can worsen it. For example, a recent study of women with gynecological cancer found that women who felt punished by God or abandoned by their spiritual community had significantly higher levels of anxiety (27).

Research on the connection between spirituality and eating disorders, somatoform, dissociative or bipolar disorders is relatively rare. Vitz and Mango discuss the role of Kernberg's psychodynamic approach and spiritual aspects such as forgiveness in the treatment of patients, emphasizing that concepts such as remorse and forgiveness cannot always be addressed through psychotherapy, but require spiritual and moral approaches to treatment (28). Also, spirituality has been investigated in the context of the causation and treatment of

eating disorders. McCourt and Waller analyze how spirituality, along with factors such as gender and acculturation, can influence eating disorders or changed attitudes towards eating habits, exploring potential causal factors of eating disorders (29).

In the last few decades, interest in spirituality and quality of life has led to global changes in the work with chronically ill persons and the development of several instruments to assess spiritual well-being. The Spiritual Well-Being Questionnaire (SWBQ), as the name suggests, is a questionnaire that assesses spiritual well-being (30). The Spiritual Well-Being Scale (SWBS) is a measurement instrument developed by Paloutzian and Ellison in 1982 to measure quality of life and spiritual well-being (31). The Index of Core Spiritual Experiences (INSPIRIT) is a measuring instrument designed for the purpose of identifying intense and concrete spiritual experiences related to the existence of God or a higher power in respondents. This instrument measures key elements of core spiritual experiences, identifying specific spiritual events and subjective cognitive evaluations of those events that result in a personal belief in the existence of God (32). The Spiritual Assessment Inventory (SAI) is a measurement instrument developed to assess an individual's spiritual development or maturity, using both objective aspects and contemplative approaches to spirituality. It is intended for use in clinical and research settings, based on theological and psychological foundations (33). The Spiritual Needs Questionnaire (SpNQ) is a key measurement instrument developed in 2009 to assess patients' spiritual needs. This instrument enables a comprehensive assessment of spiritual needs and shows considerable adaptability and utility in different contexts (34).

Several studies have been conducted at the Faculty of Health Studies of the University of Mostar, which confirm the significant correlation of spirituality and religiosity with an individual's mental health. The results of the study conducted by Kvesić et al. show that a lower level of religiosity is statistically significantly negatively associated with a stronger expression of psychological symptoms in oncology patients. Their results show that less satisfaction with physical health is statistically significantly negatively associated with stronger psychological symptoms and a higher level of intrinsic religiosity (35). Dilber et al concluded that religiosity proved to be an important factor in the level of psychological resilience of nursing students (36). Specialist neuropsychiatrist Dragan Babić, full professor at the Faculty of Health Studies of the University of Mostar, is the author of several books in which he wrote chapters on spirituality and mental disorders (37, 38). Professor Babić states that spiritual and religious beliefs affect people's psychological functioning, and that spirituality "facilitates coping with stress and reduces stress in difficult life situations, represents an opportunity to gain social support and encourages healthier lifestyles" (37). Babić et al point out that spiritual therapy is a part of complementary treatment methods, and that it is necessary that experts in the field of mental health not only know about them, but also give them adequate advice (39).

CONCLUSION

Spirituality and religiosity can have a significant impact on mental health, but this impact is not always clear-cut. Spirituality can provide a sense of purpose, hope and community, which can positively impact mental health. Spiritual practices such as meditation, prayer, and participation in religious communities often help individuals cope with emotional pain, reduce stress, and improve general well-being. This type of support can be particularly important for people facing mental disorders as it allows them to find meaning in their suffering and strengthen their resilience. In some cases, spiritual conflicts or a sense of spiritual crisis can contribute to the deterioration of mental health and make the recovery process more difficult. An individualized approach in the assessment and integration of spiritual and religious aspects in the treatment of mental disorders is key.

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POVEZANOST DUHOVNOSTI I DUŠEVNIH BOLESTI

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SAŽETAK

Razumijevanje kako duhovnost utječe na mentalno zdravlje može pružiti važne uvide u metode liječenja i podrške za osobe s duševnim bolestima. Duhovnost se u suvremenom društvu sve više prepoznaje kao važan aspekt ljudskog života. Označava duboke vrijednosti i životne poglede prema kojima ljudi žele živjeti. Viša razina duhovnosti pomaže osobnom rastu i razvoju, uključujući mentalno zdravlje i emocionalno blagostanje pojedinca. Pružanje duhovne zdravstvene skrbi smatra se važnim za prevenciju simptoma depresije i obuhvaća aktivnosti kao što su slušanje pacijenata, pružanje mira, poštovanja, utjehe i nade. U svijetu se sve više prepoznaje i primjenjuje holistički pristup liječenja pacijenata. Holistički pristup zdravlju prepoznaje međusobnu povezanost psiholoških, društvenih, bioloških i duhovnih aspekata osobe, što se ogleda u primjeni različitih metoda uključujući lijekove, obrazovanje, komunikaciju, samopomoć i alternativne terapije. Povijest pokazuje da su znanstvena istraživanja odavno potvrđivala vezu između duhovnosti i poboljšanja zdravlja. Duhovnost se čini sve važnijom u kontekstu povećanog životnog stresa, a novija istraživanja sugeriraju da duhovne prakse mogu doprinijeti smanjenju simptoma depresije. Duhovna uvjerenja i prakse također mogu pružiti utjehu osobama koje su uplašene ili tjeskobne, povećavajući njihov osjećaj kontrole, sigurnosti i samopouzdanja. Efekti duhovnosti su na mentalno zdravlje individualni i ovise o osobnim uvjerenjima, životnim iskustvima i kontekstu u kojem se prakticira. Ključan je individualizirani pristup u procjeni i integraciji duhovnih i religioznih aspekata u tretman mentalnih poremećaja. Ovaj rad istražuje povezanost između duhovnosti i duševnih bolesti, s ciljem da se osvijetli kako duhovnost može biti i izvor podrške i izazova za osobe koje se bore s mentalnim poremećajima.

Ključne riječi: duhovnost, duševne bolesti, mentalno zdravlje

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EMOTIONAL INTELLIGENCE IN NURSING

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ABSTRACT

Nurses are often exposed to work under pressure, the challenges of making extremely quick and responsible decisions, and dealing with other people's pain, suffering and losses. Of all healthcare professionals, they spend the most time with the patient, creating a special relationship based on trust. Previously, it was an intuitive process where nurses were only sometimes successful. Today, in evidence-based nursing, we are aware of how important emotional intelligence is in all aspects of nursing and nursing education. Physical fatigue is less of a problem for nurses than emotional exhaustion and compassion fatigue. Therefore, effective emotional regulation is necessary to improve business satisfaction. Managing emotions is achieved by developing emotional intelligence, which has become a more ubiquitous concept in nursing in recent years. The most desirable employees in healthcare (and elsewhere) are those with developed academic intellectual abilities, but also emotional intelligence. With the help of the components of emotional intelligence, the internal mechanism of the specific nurse-patient relationship could be explained, which has proven to help both the patient in achieving favorable health care outcomes and the nurses themselves in acting and understanding the very essence of nursing. Emotional intelligence as a mental skill helps an individual in various personal, social, professional, communication and financial domains such as: time management, decision making, service delivery, responsibility, empathy, presentation skills, stress tolerance, trust and communication management. This overview paper will try to present its importance in nursing.

Keywords: emotional intelligence, nursing, empathy, communication

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INTRODUCTION

The term emotional intelligence (EI) dates back to 1990. It means the ability to recognize one's own and other people's feelings and to use them as a starting point for decision-making (1). EI can be learned and improved and is not like classical, academic intelligence determined by genetics and biology. Everyone has the opportunity to develop it, which contributes to the interest in this concept. Today, EI mean four groups of hierarchically arranged abilities. Each previous one needs to be developed in order to develop the next one:

1. the ability to accurately observe, assess and express emotions

2. the ability to perceive and generate emotions that facilitate thinking

3. the ability to understand and analyze emotions

4. the ability to regulate emotions in order to promote emotional and intellectual development (2).

EI is not in opposition to the classic intelligence quotient, i.e. cognitive skills, but is in a dynamic relationship with them, both on a conceptual level and in everyday life. Bar-On defines EI as a set of emotional and social competencies, which help determine a person's ability to adapt in an environment characterized by interaction with oneself and others (3). It is ideal when exceptional cognitive and emotional skills are combined in one person (4). It is well known that people with high EI make fewer mistakes, can better control their emotions and can make better decisions (5). There is a global interest in EI in nursing. International research has shown that the work and interaction of nurses with patients is affected by their EI. It is associated with kindness and care. Compared to students of other study programs, nursing students achieve better results on EI tests, and its levels increase with age and are often higher in women (6). Many healthcare systems have come under fire in recent years due to an alleged lack of compassion and care, which leads to adverse patient outcomes (7). Employers today have the option of testing EI when hiring medical personnel (8).

MATERIALS AND METHODS

The data for this work was collected by reviewing the literature of various biomedical journals searched from the beginning of November 2022 to the end of May 2023. The databases EBSCO, Scopus and PubMed were used for materials in English, and Hrčak and CROSBI for scientific journals and articles in Croatian. The inclusion criteria were mainly related to the age of the publication. Preference is given to newer publications. The keywords used in the literature search were: emotional intelligence, nursing, empathy, communication. 64 articles from biomedical journals, doctoral theses and graduate theses were reviewed.

RESULTS

Emotional intelligence and professional communication

Communication skills belong to social skills and represent forms of behavior necessary for interaction with other people. Empathy, active listening and

assertiveness as complex communication skills as well as self-reliance, openness, warmth and politeness create prerequisites for improving communication, and are usually associated with EI. Patients wish for better communication with healthcare personnel, which leads to more precise detection of problems, detection of emotional discomfort and improvement of patient satisfaction with the service provided (9). Patient satisfaction is related to the nurse's ability to reflect and express warmth, emotional support, understanding, care and availability to patients (10). By communicating with empathy, nurses can reduce complications, improve treatment outcomes, and improve their professional satisfaction. Empathy and satisfaction with communication serve as mediators between EI and positive evaluation of health care (11).

A higher level of education improves EI and emotional regulation, which increases the making of correct clinical decisions in nursing students (12). It is obvious and understandable that the nursing profession requires a certain emotional investment. Although the idea of EI has only recently been discussed in the nursing literature, many health professions agree that it is valuable. Previous research suggests a link between EI and emotionally charged work, but further research is needed to fully understand this relationship. Some nurses and technicians will be more emotionally committed to their work, but it is not clear whether this is due to a higher level of EI (13).

Empathy, compassion fatigue and burnout

Empathy is a key component in building a strong nurse-patient relationship and is deeply rooted in the process of nursing care. However, little is known about the specifics of how nurses show empathy towards their patients. All nurse-patient interactions revolve around empathy, which can be considered a crucial clinical indicator of providing high-quality medical care. This compassionate connection between nurses and patients affects the improvement of clinical results, for example, empathic treatment of elderly mentally ill patients or nurse empathy can help patients reduce pain, has a beneficial effect on heart rate, helps patients share their emotions. Williams (1979) found that elderly patients who received empathy from nurses experienced a statistically significant improvement in their self-concept and that empathy can dramatically reduce anxiety, sadness, and anger in cancer patients (14). Empathy can be measured by the empathy quotient, a questionnaire created to be sensitive to empathy disorders as a component of psychopathology and is often used in other areas of psychological research (15). The results of a meta-analysis from 2018 showed that empathy is a moderately strong predictor of therapy outcome (16). The foundations of providing humane care are compassion and empathy, which requires nurses to understand and support patients as they deal with different suffering and pain, to feel and perceive from the patient's perspective and to feel and perceive from their own perspective. Their presence prevents the patient from feeling helpless and isolated. Empathy means "getting under the skin" of another person in order to see and feel things through their eyes. Through this way of communication, the nurse becomes sensitive to the thoughts, feelings, problems and needs that the patient may or

may not express openly (17). However, it is important to set a limit. If the nurse does not separate her feelings in time and identifies with the patient completely, there is a possibility of being overwhelmed and unable to provide help. Each patient arouses reactions in us and there is a wide range of emotions that can be triggered in us. These can be positive (sympathy, understanding and tenderness) or negative reactions (roughness, impatience, repulsion) (18). Due to constant exposure to patients' suffering, nurses often experience empathy fatigue and find it difficult to empathize, which can affect: physical, mental health, lead to job burnout, reduce service standards and affect both patient and staff safety (19, 20). Medical errors and loss of nursing skills are problems that often arise in the context of compassion fatigue (21).

A 2022 meta-analysis by Chen et al. shows that a psychological intervention can improve the level of empathy satisfaction of nurses, improve the symptoms of empathy fatigue, and have a certain preventive effect on its occurrence and development. It is suggested that managers take care and take measures to improve the level of mental health and the quality of nursing care provided, which would ensure the sustainable and healthy development of the nursing profession (22).

Nurses are exposed to psychosocial risks that can affect mental and physical health through stress. Prolonged stress at work can lead to burnout syndrome. An important factor in the protection against psychosocial risks is EI, which is associated with physical and psychological health, job satisfaction, increased commitment to work and reduced burnout (23). Nursing staff are more emotionally competent, but at the same time subject to a higher level of workplace stress compared to, for example, radiology staff. There is a positive correlation between emotional competence and stress level (24). Landa and Zafra (2010) point out that the development of empathy, as one of the aspects of EI, is the central factor of many nursing theories and that EI enables nurses to develop a therapeutic relationship with patients and their families and to cope better with stress. In addition, EI is associated with a lower incidence of burnout syndrome, and greater job satisfaction and better health among nurses (25).

Emotional intelligence and the quality of health care

Patient requirements are met with proper and safe care, empathy, appropriate communication and respect. Quality of care and nurses' EI may be significantly related. Intraprofessional and interprofessional communication of nurses is essential in the workplace. Consequently, having sufficient EI abilities can help them better understand the emotional climate in their workplaces. Those who work in a clinical setting must base important decisions on the patient's emotional state. Nursing assessment can significantly influence the patient's treatment outcomes and raise the standard of treatment (26). Nursing care pays much attention to improving the quality of health care since it can improve patient satisfaction, efficiency of care, and hospital costs (7). Often, patients' opinions have a direct impact on how to improve the quality of care (28). Additionally, outcomes that show improvement in the quality of nursing care have a significant

impact on patient satisfaction (29). Patients' satisfaction with medical care is directly, significantly and positively related to nurses' emotional intelligence (30). Overall, having excellent EI abilities can improve healthcare quality and patient satisfaction. According to previous studies, patients with an EI of up to 94% can fairly assess the quality of hospital care (31). In addition, nurses can serve as a precise "measuring tool" for the standard of hospital care (32).

From the perspective of nurses and patients, there are numerous problems with the quality of care. Askari et al. find a significant difference only in the psychosocial component, while Jamsahar et al. state that the attitudes of nurses and patients about the quality of health care are different in all psychological, physical and communication domains. In addition, there are problems with how data such as age, gender, education, and work experience can affect the investigated variables (33,34).

In order to care for patients more effectively, nurses need different communication, psychological, emotional, decision-making and empathy abilities (35,36). Although previous studies have reported a number of beneficial effects, none of them have looked at the impact of EI on the overall standard of care. All aspects of the quality of health care, including psychological, physical, and linguistic, appear to be directly influenced by EI, which also improves caregivers' abilities related to these aspects (37,38). EI has a favorable influence on the dimensions and quality of health care.

Emotional intelligence of leaders in nursing

EI is associated with effectiveness and success in the workplace, especially in leadership positions (39,40,41). By guiding others toward common goals while fostering productive interpersonal relationships with their coworkers and team members, emotionally intelligent leaders demonstrate sensitivity to their own and others' mental health and well-being. In the context of the corona virus pandemic, nurse managers needed to demonstrate emotional intelligence in managing teams under high levels of stress, fatigue and the possibility of moral distress (42). Reduced patient mortality was associated with higher EI of nursing managers (43).

Emotional intelligence of nursing students and their teachers

A high degree of EI is crucial for nurses because they spend the most time with patients and their families. Nursing students must be taught the value of EI in nursing throughout their education. According to a literature review, nursing students have a higher level of emotional intelligence (EI) than students of other study programs (6). In order to provide high quality health care, nursing students learn a range of skills and knowledge from daily interactions with people from different cultures and backgrounds. Although it is often shown that women have a higher level of EI, research in Slovenia in 2018 did not confirm this, but it was shown that students of higher years have a higher level of EI than students of the first year (44). Nursing teachers have a significant influence on how the teaching

content is adopted and how they are exposed to clinical settings. One way to improve teaching effectiveness in clinical nursing faculty is to increase their EI. In the field of research in the field of nursing education, a statistically significant positive relationship between EI and the effectiveness of clinical teaching was established, which indicates that more emotionally competent teachers will provide more successful clinical teaching. The results of the study support the idea that EI abilities are desirable for improving the effectiveness of clinical teaching in nursing. Nursing staff members must have a good understanding of their own emotions and how their actions affect students in order to help students learn in the clinical setting. In nursing colleges, emotional intelligence should be central In nursing colleges, emotional intelligence should be a central component of education. Nurses continuously face their environment and must possess EI abilities. In a large part of the health care process, they deal with the physical, cognitive and social assessment of individuals, and therefore it is important to assess the emotional intelligence abilities of nursing students and include training for its development in the nursing curriculum (45, 46). There is an obvious need for teacher development and a stronger connection between teachers and students, which have implications for clinical teaching practice (47).

Emotional intelligence and ethical sensitivity

Moral sensitivity is necessary to provide high-quality care and to make wise choices in challenging workplace situations. Healthcare is influenced by EI and ethical sensitivity. Ethical sensitivity places a relatively high value on EI. A nursing student who has a strong EI will be aware of emotions and how they affect moral judgment. Currently, educational institutions have a key responsibility for fostering ethical awareness in nursing students and updating the curriculum in this regard, especially in light of the recent increase in ethical challenges facing the healthcare system. This will prepare nurses to provide high-quality care in accordance with contemporary nursing philosophy and raise the status of their profession (48).

CONCLUSION

Emotional intelligence (EI) is essential in the nursing profession since nurses deal with unforeseen situations on a daily basis for which they were not adequately prepared during their education. Emotional intelligence (EI) components should be included in educational programs in order to help students understand and control their emotions and to influence the improvement of care standards. It would be preferable if EI had been assessed prior to admission to nursing programs, and then compared after graduation or when applying for jobs. The enhancement of emotional intelligence in nursing would benefit all parties involved in the health system, particularly patients, by raising the standard of nursing care.

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EMOCIONALNA INTELIGENCIJA U SESTRINSTVU

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SAŽETAK

Medicinske sestre su često izložene radu pod pritiskom, izazovima donošenja iznimno brzih i odgovornih odluka te suočavanju s tuđom boli, patnjom i gubitcima. Od svih zdravstvenih djelatnika provode najviše vremena uz pacijenta stvarajući poseban odnos temeljen na povjerenju. Nekada je to bio intuitivno vođen proces u kojem su medicinske sestre bile više ili manje uspješne. Danas, u sestrinstvu temeljenom na činjenicama, svjesni smo koliko je emocionalna inteligencija važan čimbenik u svim segmentima sestrinstva i sestrinskog obrazovanja. Fizički umor medicinskim sestrama predstavlja manji problem u odnosu na emocionalnu iscrpljenost i umor od suosjećanja. Stoga je nužna učinkovita emocionalna regulacija koja bi unaprijedila poslovno zadovoljstvo. Upravljanje emocijama se postiže razvijanjem emocionalne inteligencije koja postaje sveprisutniji pojam u sestrinstvu posljednjih godina. Najpoželjniji zaposlenici u zdravstvu (i drugdje) su oni razvijenih akademskih intelektualnih sposobnosti, ali i emocionalne inteligencije. Uz pomoć sastavnica emocionalne inteligencije bi se mogao objasniti unutarnji mehanizam specifičnog odnosa sestra - pacijent koji dokazano pomaže, kako pacijentu u postizanju povoljnih ishoda zdravstvene njege, tako i samim medicinskim sestrama u djelovanju i razumijevanju same esencije sestrinstva. Emocionalna inteligencija kao mentalna vještina pomaže pojedincu u raznim osobnim, društvenim, profesionalnim, komunikacijskim i financijskim domenama poput: upravljanja vremenom, donošenja odluka, isporuke usluga, odgovornosti, empatije, prezentacijskih vještina, tolerancije na stres, povjerenja i upravljanja komunikacijom. Ovim preglednim radom će se pokušati predočiti njena važnost u sestrinstvu.

Ključne riječi: emocionalna inteligencija, sestrinstvo, empatija, komunikacija

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THE INFLUENCE OF NURSES ON THE QUALITY OF CARE IN THE TREATMENT OF PATIENTS WITH INFLAMMATORY BOWEL DISEASES

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ABSTRACT

Introduction: Inflammatory bowel disease (IBD) refers to two main diseases: ulcerative colitis and Crohn's disease. In terms of structure and process, it has been postulated that IBD treatment requires a multidisciplinary approach in which physicians, nurses, nutritionists, and social workers interact to achieve goals. The role of doctors in treatment is clearly defined, but it is useful to define the role of nurses in the care of patients with IBD.

Objective: Clarify the influence of nurses on the quality of care in the treatment of patients with inflammatory bowel diseases.

Methods: An electronic search of the PubMed, MEDLINE, EMBASE databases was conducted and the Cochrane database. The search was performed using keywords. This paper includes studies which examines contributions within 10 years of nurses in the quality of care for patients with IBD.

Results: The number of hospital visits decreased from 1,377 to 853 (38 % decrease) in institutions that had a specialized IBD nurse. Patient satisfaction has been improved in key areas, particularly in IBD information approaches and conservation health advice. The number of patients in remission increased from 63 % to 69 %. Recognized IBD nurse released the doctor's resources, and better contacts with patients were achieved, and thus a smaller number of hospitalization.

Conclusion: It is important to recognize the role of specialized nurses who are dedicated to the care and observation of patients with inflammatory bowel diseases in the management of specialist nursing interventions to improve the care and observation of patients, the disease itself, access to treatment, discharge, morbidity and quality of life. Nurse education is an important part of care for patients suffering from inflammatory bowel diseases, because the nurse is the first person from whom patients will ask for cooperation after diagnosing the disease.

Keywords: inflammatory bowel disease, nurse, IBD specializations

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INTRODUCTION

The term inflammatory bowel disease (IBD) refers to idiopathic chronic inflammatory diseases of the gastrointestinal system, ulcerative colitis (UC) and Crohn's disease (CD). Ulcerative colitis is an idiopathic, chronic inflammatory bowel disease characterized by a chronic course with numerous remissions and exacerbations. The inflammatory process always affects the rectum and spreads continuously more proximally. Crohn's disease is defined as a chronic inflammatory disease of the digestive system of unknown etiology. It is characterized by transmural inflammation and frequent local and intestinal complications. The disease has a chronic unpredictable course with numerous remissions and relapses. Numerous extraintestinal manifestations of the disease also appear. Clinically, these diseases are characterized by recurrent inflammation of segments of the digestive system with very diverse clinical manifestations and, as a rule, a chronic, unpredictable course of the disease. Indeterminate colitis is present in about 10 % of patients with inflammatory bowel disease, and its characteristic is that inflammatory changes in the colon cannot be classified as either ulcerative colitis or Crohn's disease. The natural course of this form of the disease is not clear, and therapeutic recommendations are difficult (1).

These diseases lead to significant morbidity, but increased mortality. Today, there is an increase in the incidence and prevalence of inflammatory bowel diseases, which, due to their chronic nature and the need for lifelong treatment and monitoring of inflammatory activity, are a great diagnostic and therapeutic challenge.

A large increase is observed in industrialized urban areas and is attributed to the Western lifestyle and other related environmental factors.

It is constantly increasing in developing countries as well, and is the result of rapid modernization and acceptance of the Western way of life (2). Some ethnic groups have a higher incidence of inflammatory bowel disease than the general population, for example, the incidence of inflammatory bowel disease is higher in people of Jewish origin than in people of non-Jewish origin (3). IBD produces high costs in healthcare systems. Medical and surgical hospitalizations are the main components of direct medical costs. However, indirect costs (loss of productivity due to sickness period) are even higher (4). For example, in Europe, indirect costs for CD represent 64–69% of total costs (5). Costs vary significantly depending on the severity of the disease; they are 3 to 9 times higher in patients with severe disease than in those in remission (6). The clinical impact of IBD on the quality of life and its economic impact are increasing, because the frequency of the disease is increasing in developed countries; the current incidence is estimated at 9 cases per 100,000 inhabitants per year (7,8).

THE ROLE OF THE NURSE IN THE TREATMENT OF IBD PATIENTS

Quality life, resocialization and

professional activity are indispensable common goals of the patient and the healthcare team. The closest "collaborators" to patients with inflammatory bowel diseases are nurses/technicians, from patient visits to outpatient clinics and day hospitals to their frequent stay in patient rooms during hospitalization (9). According to the definition of health by the WHO organization, "health is a state of complete physical, psychological and social well-being and not just the absence of disease and infirmity" (10), we look back to the very foundation of the existence of each individual, which is a good quality of life that is can call if all the listed factors are provided. Although the diseases are different, they should definitely be looked at together. The most common symptoms of inflammatory bowel disease are: diarrhea, high temperature, abdominal cramps and fatigue. During the activation of the disease, the patient's state of health, his "mental, physical and social well-being" is severely impaired, and there is an increasing need for quick help and reliance on a specialist health team. Guided by all the challenges that inflammatory diseases can cause in patients with inflammatory bowel diseases, with the desire for better and higher quality care, nurses/technicians from all over Europe united to create guidelines and make it easier for patients to live with their chronic disease. The relationship in which the patient is at the center of health care and an equal member in making decisions related to the course and outcome of treatment is extremely important for the patient's autonomy and taking responsibility for the further outcome of treatment and the course of the disease.

It is extremely important for patients suffering from inflammatory bowel diseases to know their disease, the course of the disease and, of course, all the options available to them. Nurses communicating with IBD patients must have basic knowledge about inflammatory bowel diseases, know the difference between Crohn's disease and ulcerative colitis, in order to be able to appreciate the importance of timely therapy and know the key diagnostic strategies and basic medical and surgical options available in the treatment of inflammatory bowel diseases, and all for the purpose of better informing IBD patients. During the patient's hospitalization in the wards or visits to day hospitals, it is important to establish the patient's adherence to the therapy in order to be able to assess whether the medical effect is the result of a well-chosen therapy and thus try to reduce or prevent the effect of noceb on the patient. When communicating with patients, nurses/technicians should be aware of the immediate and long-term physical, psychological and social impact of inflammatory bowel diseases on the patient's daily life, including the patient's concern about the outcome of the treatment and the disease it self.

A randomized controlled trial conducted by Smith et. al in the United Kingdom of 100 patients with IBD showed that health-related quality of life improved in patients who were under the psychological guidance of a nurse (11). A similar study conducted in England that investigated the effects of an IBD nurse on patient outcomes showed that hospital visits were reduced by 38 % and length of hospital stay was reduced by 19 %. The number of patients in remission increased

from 63 % to 69 %. Patient satisfaction are improved in key areas, particularly access to information about IBD and advice on health maintenance. Out of 251 calls to the helpline, only 19 patients were referred for a medical opinion and 5 patients for hospital admission (12). A review of the report the UK IBD Group issued says that an IBD unit who serves the population of 250,000 should have 1.5 IBD specialist nurses and 1.5 ostomy and ileoanal surgery nurses. Among the quality standards is that patients should have quick access to clinical counseling from a specialist nurse (mainly when they have seizures), by phone or e-mail, and that nurses should participate in expert meetings and multidisciplinary team meetings (13). An observational study conducted in Norway, Denmark, the Netherlands, Italy, Greece, Portugal and Israel aimed to compare European healthcare institutions and define "best practice" in the management of IBD, which was led by Van der Eijk I, Verheggen FW, Russel MG, Buckley M, Katsanos K, Munkholm P, defined that "Best Practice" related to the care of IBD patients includes: availability of daily telephone consultations, doctors and nurses on the patient's medical condition should be in the same file, protocols given to doctors and nurses, continuous postgraduate training, broad integration and rotation of nurses in outpatient clinics, inpatients, and endoscopy units (14). A study conducted in Finland showed that a health facility that had an IBD specialist nurse established more contacts with patients, 4-9 % fewer hospitalizations were reported compared to clinics that did not have an IBD nurse. Annual savings in hiring an IBD nurse are extremely significant (15). There are IBD nursing role descriptions available from the RCN and the European Crohn's and Colitis Organization N-ECCO nursing consensus statement on what IBD nursing is. The N-ECCO statement outlines two levels of care for IBD; one of which is described as advanced. This recognition of advanced practice in IBD care has been supported by Crohn's & Colitis UK in its specialist nursing program which supports advanced practice education at Masters level and is a joint venture with the Royal College of Nurses (RCN). Accreditation of advanced practice nurses in IBD with an accompanying (soon to be published) new professional practice framework for nurses working in IBD to support this process is now a reality. A number of skills, both conceptual and operational, are assigned to nurses in the management of IBD. Significant among them is the integration within the multidisciplinary team (16,17), which acts as a link between the patient - the team and primary health care (18), which includes adherence to treatment (19), early recognition of side effects (20), providing health information to patients and their families (21,22) providing emotional support (23,24) being available when the patient so requests (25) (eg, giving advice over the phone), and organizing a support group for patients by selecting group participants, setting goals and searching for subjects of interest. The characteristics of nurses most valued by patients and their families include accessibility, kindness, empathy, and the ability to communicate and build patient trust.

CONCLUSION

Despite the research carried out in the world, the importance of IBD nurses is

still insufficiently accepted by economic management, although the roles of specialized nurses is (IBD NURSES) dedicated to the care and monitoring of patients with inflammatory bowel diseases are widely recognized in the management of specialist nursing interventions to improve care and monitoring of patients, the disease itself, access to treatment, discharge, morbidity and quality of life. Nurse education is an important part of care for patients suffering from inflammatory bowel diseases, because the nurse is the first person from whom patients will ask for cooperation after diagnosing the disease.

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UTJECAJ MEDICINSKIH SESTARA NA KVALITETU SKRBI U LIJEČENJU BOLESNIKA OBOLJELIH OD UPALNIH BOLESTI CRIJEVA

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SAŽETAK

Uvod: Upalna bolest crijeva (IBD) označava dva glavna poremećaja: ulcerozni kolitis i Crohnovu bolest. Obzirom na strukturu i proces, postulirano je da za postizanje ciljeva liječenje IBD-a zahtijeva multidisciplinarni pristup u kojem liječnici, medicinske sestre, dijetetičari i socijalni radnici međusobno djeluju. Uloga liječnika u liječenju je dobro definirana, ali je korisno definirati ulogu medicinskih sestara u vođenju skrbi za pacijente s IBD-om.

Cilj: pojasniti utjecaj medicinskih sestara na kvalitetu skrbi u liječenju bolesnika oboljelih od upalnih bolesti crijeva.

Metode: Provedena je elektronska pretraga baze podataka PubMed, MEDLINE, EMBASE i Cochrane baza podataka. Pretraga je obavljena korištenjem ključnih riječi. U ovaj rad uključena su istraživanja koja su se unutar 10 godina bavila ispitivanjem o doprinosima medicinskih sestara u kvaliteti skrbi oboljelih od IBD-a.

Rezultati: Broj posjeta u bolnici smanjen je s 1377 na 853 (38 % smanjenje) u ustanovama koje su imale specijaliziranu IBD sestru. Zadovoljstvo pacijenata poboljšano je u ključnim područjima, posebno u pristupima informacija o IBD-u i savjetima o očuvanju zdravlja. Broj bolesnika u remisiji povećao se s 63 % na 69 %. Priznata IBD sestra oslobodila je resurse liječnika, te su ostvareni bolji kontakti s pacijentima i samim tim manji broj hospitalizacija.

Zaključak: Važno je prepoznati ulogu specijaliziranih medicinskih sestara koje su posvećene brizi i praćenju bolesnika s upalnim bolestima crijeva u upravljanju specijalističkim sestrinskim intervencijama za poboljšanje skrbi i praćenju bolesnika, same bolesti, pristup liječenju, otpust, morbiditet i kvalitetu života. Edukacija medicinske sestre čini važan dio skrbi u pacijenata oboljelih od upalnih bolesti crijeva, jer je medicinska sestra prva osoba od koje će pacijenti tražiti suradnju nakon dijagnosticiranja bolesti.

Ključne riječi: upalne bolesti crijeva, medicinska sestra, IBD specijalizacije

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PATIENT CARE FOR INDIVIDUALS WITH HUNTINGTON'S DISEASE

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ABSTRACT

Introduction: Huntington's disease is a progressive autosomal dominant neurodegenerative disorder characterized by a triad of clinical features affecting an individual's cognitive, physical, and psychological functions. Symptoms typically manifest in middle age, between 30 and 40 years, leading to death within one to two decades after the onset of neurological deterioration. This incurable disease renders patients entirely dependent on care, significantly impacting family members, friends, and close associates. Patient care focuses on alleviating symptoms, maintaining functional ability, and preserving quality of life. It is provided by a multidisciplinary healthcare team that includes pharmacological and nonpharmacological interventions.

Objective: This paper aims to conduct a literature review and present a comprehensive overview of nursing care processes for patients with Huntington's disease.

Conclusion: Guidelines for caring for patients with Huntington's disease provide a foundation for a multidisciplinary approach and enhance patient quality of life, emphasizing comfort, safety, and dignity. As key team members, involving specialized nurses contributes to reducing hospitalization durations, optimizing care levels, and improving the quality of life for patients with Huntington's disease.

Keywords: patient, Huntington's disease, patient care.

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INTRODUCTION

Huntington's disease (HD) is defined as a chronic, neurodegenerative, hereditary disorder causing the degeneration of nerve cells within the brain. The middle age range of 30–40 years is the most common period for disease onset, irrespective of gender or race. However, juvenile-onset HD, appearing before age 21, is also possible. The disease affects movement, behavior, personality, memory, cognition, learning, and comprehension, with chorea being the most common symptom. The cause of HD is a gene mutation on the short arm of chromosome 4, and the diagnosis can be confirmed through genetic testing (1).

Since the disease is incurable, treatment is symptomatic, involving both pharmacological and non-pharmacological methods. As a member of a multidisciplinary team, nurses perform numerous interventions focused on providing palliative care. Given the significant impact of HD on the lives of patients and their families, the nurse's role is to offer support, uphold patient dignity and autonomy, and ensure an optimal quality of life (2).

This paper aims to showcase the role of the nurse within the multidisciplinary approach to nursing care for patients with Huntington's disease. Publications in scientific databases like PubMed, Hrčak, Medline, Google Scholar, CROSBI, BMJ Journals, ScienceDirect, Scopus, NIH, and Sci-Hub were reviewed using keywords: Huntington's disease, chorea, movement disorders, and nursing care, in both Croatian and English. Despite the recognized need for specialized nurses to improve the quality of care for HD patients, there is a lack of research papers specifically addressing HD patient care. Two caregiving guides featuring case studies provided the most comprehensive overview of care for HD patients.

NURSING CARE FOR PATIENTS WITH HUNTINGTON'S DISEASE

Care Guidelines are joint documents developed by experts to optimize care standards within specific geographic regions. These guidelines provide standards of care and promote uniform quality through broad dissemination of their content (2). Given the considerable variability in HD symptomatology, appropriate patient care requires a multidisciplinary approach involving a team of specialists: a general practitioner, psychiatrist, geneticist, nurse, rehabilitation team, nutritionist, and social work services (2, 3).

Patients with Huntington's disease have specific care needs that require specialized nursing knowledge. HD-specialized nurses reduce hospital admissions (>50%), shorten hospital stays, and improve care quality in hospital and outpatient settings (4). During patient hospitalization, the primary responsibility of the nurse is to assess the patient's needs when establishing a care plan, prioritizing a team approach to meet patient needs (5).

Weight loss in HD patients is common, especially in advanced stages, and may result from metabolic dysfunction, eating and swallowing difficulties, loss of fine motor control, anorexia, or cognitive impairment. The risk of aspiration is notably high for patients on oral diets, particularly in the later stages of dysphagia. Managing food consistency and portion size is an effective strategy for safe swallowing in HD patients. Monitoring patients during feeding, ensuring adequate caloric intake and nutritional supplementation, and consulting with a speech therapist to assess swallowing

abilities and a nutritionist are recommended (6, 7).

Whether a patient consumes food orally or uses alternative feeding methods, such as percutaneous endoscopic gastrostomy, nausea, and vomiting may be problematic. Possible causes of these symptoms, such as infection, medication side effects, constipation, and symptom timing (before/after food or drink consumption), should be explored. Providing ample time and proper positioning during feeding, offering small and frequent meals, and encouraging patients to eat slowly and sip fluids can significantly reduce nausea and vomiting. For patients on tube feeding, checking patient positioning, feeding rate, and food suitability is essential; antiemetic medication should also be considered (8).

Elimination issues, common in neurodegenerative disorders, can significantly reduce the quality of life for HD patients. Overactive bladder, urinary incontinence, and incomplete bladder emptying are prevalent among HD patients, along with diminished anal sphincter tone and voluntary control. These symptoms, reflecting central nervous system degeneration, worsen over time and may result in fecal incontinence or constipation. Depending on disease progression, assistance may be required to maintain hygiene and recognize signs of incontinence. Nursing interventions include timely identification of elimination difficulties and skin integrity maintenance. To ensure comfort and dignity, appropriate products and aids should be used. With chorea, standard pads may be ineffective, and suprapubic catheterization may be the best option. In addition to using pads and bladder catheterization, antimuscarinic medications may be included in the therapy.

Urinary tract infections, unfortunately common in advanced HD patients, result in acute symptom worsening and require immediate treatment. Preventive and treatment interventions include maintaining adequate hydration. Disease progression, increased immobility, effects of therapy, and poor nutrition and hydration status lead to patient constipation, managed through increased fluid and fiber intake and the use of laxatives (5).

Sleep and wakefulness disorders are among the earliest symptoms of many neurodegenerative disorders. Even when patients are in familiar surroundings, they often experience sleep disturbances such as difficulty falling asleep, frequent awakenings, insomnia, and daytime fatigue. If the patient is hospitalized, these issues tend to intensify. Standard strategies to improve sleep, like removing environmental factors that hinder sleep, minimizing noise and light, maintaining routines and daily activities, and keeping a sleep diary, are effective for patients with Huntington’s Disease (HD) and aid them in achieving better rest. Medication and relaxation techniques are also recommended. Improved sleep quality can positively affect cognitive impairment in HD patients, as well as reduce anxiety, depression, and irritability (7).

Progressive changes in mobility are an integral part of the clinical picture in HD patients, leading to decreased independence and an increased risk of falls. Cognitive decline also affects mobility, gait problems, and balance. Safe movement and handling, especially lifting, can be very challenging due to choreatic movements (5). Nurses should implement all interventions aimed at preventing falls and injuries in line with institutional policies, with an emphasis on educating patients about the safe use of

assistive devices and assessing their mobility capabilities. Optimizing function according to disease stage and encouraging participation in self-care activities are key goals of nursing care for HD patients. Stiffness, rigidity, and dystonia can cause significant pain and hinder hygiene maintenance, dressing, and comfortable positioning. Jaw stiffness can further complicate eating, drinking, and oral hygiene. Integrating physical and occupational therapy is imperative in the treatment of HD patients.

In the later stages of Huntington's disease, severe behaviors such as aggression and impulsivity become less problematic as the patient becomes physically less able to act out. However, other behaviors, like resistance, agitation, and screaming, may emerge, and episodes of aggression remain possible, potentially endangering the patient or others. If the patient’s behavior changes suddenly, it is important to check for factors that could worsen symptoms, such as infection or pain, and to rule out head injury. Environmental factors contributing to behavioral changes and issues should be considered. Familiar, calm surroundings, adherence to routines, and allowing adequate time for self-care activities may help with resistance. Unfortunately, the exact cause of the screaming is often not identifiable. In such cases, strategies for managing agitation, providing reassurance and comfort, alleviating possible pain, and reviewing medications that may cause side effects are recommended (7).

In addition to motor and cognitive disorders, Huntington's Disease also causes psychiatric issues. Depression, irritability, and apathy are among the most common psychiatric symptoms. The severity of symptoms varies significantly and can manifest as aggressive outbursts, impulsivity, social withdrawal, and even suicide (4). Patients should be assessed for suicidal thoughts and ideas, and treatment should start with low doses of pharmacological therapy to minimize potential side effects (9). In cases of irritability, staying calm and avoiding conflict is essential, along with trying to identify situations that trigger anger and irritability in the patient. Apathy requires interventions that include encouraging the patient and maintaining routines with calendars and schedules to help with motivation. Psychotherapy should not be dismissed solely because of communication issues and/or cognitive impairment, as it provides many HD patients an opportunity to discuss their feelings, fears, and frustrations, which is highly beneficial (6).

Patients in advanced stages of HD may experience pain for various reasons, though assessing pain can be difficult if the patient is unable to communicate. Using validated pain scales for patients who are non-communicative and/or have dementia can be helpful. Attention should be paid to non-verbal cues and possible sources of pain (e.g., bruises, wounds, fractures). Effective treatment may be achieved with medications such as gabapentin, pregabalin, and amitriptyline. In some cases, opioid analgesics, such as tramadol and fentanyl patches, are necessary. Besides pharmacological methods, non-pharmacological interventions should also be included in the pain management process (5, 6).

As Huntington's disease progresses, the ability to communicate effectively and make decisions declines. Dysarthria develops, and choreatic movements further complicate speech comprehension. Establishing a trusting nurse-patient relationship is crucial for effective

communication (10). Early referral to speech and language therapy enables continuous assessment of communication skills and provides suggestions for alternative communication methods, which may include various symbols, devices, strategies, and techniques to compensate for speech, language, and communication difficulties. Devices used may be low-tech or high-tech, including talking and memory boards, diaries, photo albums, pictorial symbols, and thumb-up/thumb-down responses. Equipment that has proven particularly effective includes devices like the LightWriter and talking mats, which should be adapted to accommodate possible chorea or rigidity (8). During communication, it is essential to provide ample time, remain patient, and minimize background noise, which can be disturbing and distracting to the cognitive process. Attention should be given to non-verbal cues, voice changes, or any sounds the patient can make. Introducing new skills to enable effective communication in the later stages of the disease is sometimes not advisable, as cognitive decline may prevent the patient from developing the skills to use them appropriately. Nurses should understand this complex set of behaviors to adapt their practice accordingly and develop various ways to communicate with the patient.

HD patients have hobbies and interests, and it is essential that they engage in them. Caregivers/family members play a role in facilitating this, and, where possible, the involvement of an activities coordinator can be beneficial. Planning activities based on the patient's interests and considering their shorter attention span and tendency to fatigue are important. Developing and using tools like books and gathering information from family and friends about the patient's hobbies and interests can guide patients toward activities that engage them (7, 8).

Formal involvement of palliative care providers usually begins in the later stages of the disease. Given the nature of disease progression, palliative care should prioritize setting immediate care goals that improve quality of life and prevent caregiver burnout (2). Some HD patients are cared for at home, often by a family member or caregiver. Nurses should assist family members in providing informal care and support, aiming to ensure individualized care for the patient and guiding treatment decisions according to the patient's wishes. For many patients, caregiver loss, inability to live independently, inappropriate behavior, and complex care needs may result in admission to a chronic long-term care facility. For such patients in nursing homes, common issues include smoking, urinary and/or fecal incontinence, pressure ulcers, and skin ulcers.

The comprehensive goals of nursing care are to optimize the comfort, safety, dignity, and autonomy of the patient. These principles should be considered when creating care plans and implementing them (7).

Given the diversity of Huntington's disease symptoms, there is a wide range of nursing diagnoses, the most common of which include (11):

- Risk for injury related to disorientation
- Risk for falls related to cognitive impairment
- Risk for infection related to invasive procedures
- Risk for violent behavior related to delusional thinking
- Risk for aspiration related to dysphagia
- Chronic confusion related to structural/functional changes in brain tissue

- Impaired self-care abilities (feeding, elimination, dressing, bathing) related to cognitive impairment
- Impaired mobility related to musculoskeletal damage, evidenced by uncoordinated movements
- Decreased social interaction

The nurse, as a member of a multidisciplinary team, plays a key role in caring for patients with Huntington's disease (12). The nurse ensures that care plans are developed to maintain the patient's safety and dignity, identify medically significant changes in the patient's condition, communicate these to the physician, and provide ongoing support to the patient and their family throughout the illness. Additionally, the nurse may assume the role of team leader, coordinating with physicians (including family medicine doctors, neurologists, psychiatrists, and palliative care/hospice physicians), dentists, rehabilitation therapists, and support providers (such as psychologists, social workers, and spiritual care providers), as well as other healthcare professionals (dietitians, pharmacists, laboratory technicians, etc.) (7, 13). Each team member has a specific role in the care of Huntington's patients, with the nurse being ideally positioned to determine when their services are needed and prioritize their involvement. Developing treatment guidelines and including patients and their families in high-quality, compassionate care, although challenging, greatly improves the lives of those affected by Huntington's disease. Conclusion Guidelines for caring for HD patients are a crucial tool in ensuring quality and consistent care. Given the diversity of symptoms, a multidisciplinary approach is essential, including doctors from various specialties, nurses, therapists, and other specialists. Specialized nurses play a key role in improving care quality, reducing hospitalizations, and optimizing patients' comfort and autonomy levels. During hospitalization, nurses assess patients' needs and provide appropriate care, particularly in areas such as nutrition, elimination, safety, and communication. Nursing interventions aim to ensure patient comfort, safety, dignity, and autonomy.

CONCLUSION

Guidelines for caring for HD patients are a crucial tool in ensuring quality and consistent care. Given the diversity of symptoms, a multidisciplinary approach is essential, including doctors from various specialties, nurses, therapists, and other specialists. Specialized nurses play a key role in improving care quality, reducing hospitalizations, and optimizing patients' comfort and autonomy levels. During hospitalization, nurses assess patients' needs and provide appropriate care, particularly in areas such as nutrition, elimination, safety, and communication. Nursing interventions aim to ensure patient comfort, safety, dignity, and autonomy.

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ZDRAVSTVENA NJEGA BOLESNIKA OBOLJELOG OD HUNTINGTONOVE BOLESTI

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SAŽETAK

Uvod: Huntingtonova bolest kao progresivno autosomno dominantno neurodegenerativno stanje, okarakterizirano trijadom kliničkih značajki koje utječu na kognitivno, fizičko i psihičko funkcioniranje pojedinca. Obično se simptomi javljaju tokom srednje životne dobi, između 30 i 40 godina, te dovode do smrti jedno do dva desetljeća nakon početka neurološkog pogoršanja. Ova neizlječiva bolest stvara potpunu ovisnost oboljelog o skrbi te značajno utječe na obitelj, prijatelje i bližnje bolesnika. Skrb bolesnika usmjerena je na ublažavanje simptoma, održavanje funkcionalne sposobnosti kao i kvalitete života. Pruža ju multidisciplinarni tim zdravstvenih djelatnika koji osim farmakoloških, uključuju nefarmakološke intervencije.

Cilj rada je istražiti literaturu i cjelovito prikazati proces zdravstvene njege u sestrinskoj skrbi za bolesnika oboljelog od Huntingtonove bolesti.

Zaključak: smjernice za skrb bolesnika oboljelog od Huntingtonove bolesti pružaju temelj za multidisciplinarni pristup i poboljšanje kvalitete života bolesnika, uz naglasak na udobnost, sigurnost i dostojanstvo. Uključivanje specijaliziranih medicinskih sestara, kao ključnih članova tima, doprinosi smanjenju trajanja hospitalizacije, optimizaciji razine skrbi te poboljšanju kvalitete života bolesnika s Huntingtonovom bolesti.

Ključne riječi: bolesnik, Huntingtonova bolest, zdravstvena njega.

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"PATIENT RIGHTS" AND "INFORMED CONSENT" IN UNIVERSITY CURRICULA AT PUBLIC UNIVERSITIES IN BOSNIA AND HERZEGOVINA

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ABSTRACT

Education in Bosnia and Herzegovina (B&H) is the responsibility of the entity the Republic Srpska (RS), ten counties in the Federation of Bosnia and Herzegovina (FB&H) and Brčko District (BD).

Higher education in Bosnia and Herzegovina is regulated by the Framework Law on Higher Education in Bosnia and Herzegovina.

The rights of patients are determined by the Law on Rights, Obligations and Responsibilities of Patients, which determines the rights, obligations and responsibilities of patients in health care, rules of those entitlements, the protection and improvement of those rights, as well as other issues related to rights, obligations and responsibilities of patients.

Informed consent, as one of patients' rights, is a free manifestation of the patient's will, i.e. his consent to the implementation of the proposed medical measure or participation in research, and for its validity the patient's competence, adequacy of information and voluntariness are required.

The aim of this paper is to review available curricula and programs on the websites of organizational units at public universities in Bosnia and Herzegovina, and to see how much the concepts of "patient rights" and "informed consent" are studied at public universities in Bosnia and Herzegovina.

Keywords: education, higher education, patients' rights, informed consent, curriculum, university, Bosnia and Herzegovina

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INTRODUCTION

Education in Bosnia and Herzegovina (B&H) is the responsibility of the entity Republic of Srpska (RS), ten counties in the Federation of Bosnia and Herzegovina (FB&H) and Brčko District (BD).

Although education in the Federation of Bosnia and Herzegovina is the exclusive responsibility of the counties, the Ministry of Education and Science of the Federation of Bosnia and Herzegovina was established on February 14, 2003 (1).

Higher education in Bosnia and Herzegovina is regulated by the Framework Law on Higher Education in Bosnia and Herzegovina (2). This law establishes the organization of higher education in Bosnia and Herzegovina, the responsibility of competent authorities in this area, establishes bodies for the enforcement of laws and international obligations of Bosnia and Herzegovina, and the method of ensuring quality in the field of higher education. Also, the Law established the basic principles and standards for higher education in Bosnia and Herzegovina, in accordance with the relevant provisions of the European Convention on the Protection of Human Rights and Fundamental Freedoms (ETS No. 5, 1950) and its protocols, by the Recommendation of the Committee of Ministers of the Council of Europe on the recognition and assessment of the quality of private higher education institutions [R(97)1], the Recommendation on access to higher education [R(98)3] and the Recommendation on the research at universities [R(2000)8], and other relevant principles of internationally recognized legal instruments whose contracting state is Bosnia and Herzegovina, and in accordance with the Council of Europe/UNESCO Convention on the Recognition of Qualifications in Higher Education in the European Region (ETS No. 165, 1997).

Based on the Framework Law on Higher Education, the Law on Higher Education was harmonized in the Republic of Srpska, ten counties in the Federation of Bosnia and Herzegovina and the Brčko District of Bosnia and Herzegovina, whereby Bosnia and Herzegovina completely transitioned to the Bologna system of education (3).

The most significant legal act that regulates the area of patients' rights in the FBiH, and therefore their consent, i.e. informed consent for taking certain medical measures, is certainly the Law on the Rights, Obligations, and Responsibilities of FBiH Patients, which recognizes and defines the right to self-determination and consent, and gives the right that the patient can freely decide on everything concerning his life and health, except in cases where it directly threatens the life and health of others. Furthermore, without the patient's consent, no medical measure may, as a rule, be taken on him (4).

The aim of this paper was to review available curricula and programs on the websites of organizational units at public universities in Bosnia and Herzegovina, and to see how much the concepts of "patient rights" and "informed consent" are studied at public universities in Bosnia and Herzegovina.

PATIENT RIGHTS AND INFORMED CONSENT

The end of the 20th and the beginning of the 21st century is marked by

the strong development of IT knowledge, permanent technological progress, and numerous political changes (the creation of the European Union, the collapse of communism, and the creation of numerous states in the South-East and Eastern Europe…(5).

The rights of patients are determined by the Law on the Rights, Obligations and Responsibilities of Patients, which determine the rights, obligations and responsibilities of patients using health care, the manner of using these rights, the way of protection and improvement of these rights, as well as other issues related to rights, obligations and responsibilities of patients. This Law guarantees patients the right to access health care, including the right to emergency medical assistance, the right on information, the right to be informed and participate in the treatment process, the right of free choice, the right to self-determination and consent, including the protection of the rights of a patient who is not able to give consent, the right to confidentiality of information and privacy, the right to confidentiality of data, the right of personal dignity, the right to prevent and alleviate suffering and pain, the right to respect the patient's time, the right to inspect medical documentation, the right to voluntarily leave the healthcare facility where medical research is carried out, the right to preventive measures and information on health preservation, the right to object, the right of compensation, the right to nutrition in accordance with the worldview, the right to maintain personal contacts, the right to perform religious ceremonies (6, 7).

Informed consent is a statement by a patient or subject of a scientific study that authorizes a doctor or medical researcher to carry out certain measures, therapy or to include the subject in the research protocol (8).

In order for informed consent to be valid, the following conditions must be met: patient competence, adequacy of information and voluntariness.

Competence is a person's ability to understand information relevant for decision making, understand the importance and significance of information in a given situation, draw conclusions using information, and choose and express their choice. If the patient is incompetent, the closest family member or guardian assigned by the court will have the right to make decisions on his behalf. Adequacy of information refers to the moral duty of the doctor to explain to the patient in a in a comprehensible manner how the intervention will be carried out, what are its possible consequences, present possible alternatives and its consequences. Good communication between doctor and patient is of key importance for this form of informed consent.

Voluntariness implies the patient makes a decision voluntarily, free of any influence, coercion, deception or manipulation. Voluntariness can easily be violated in the medical practice, first of all due to the disparity in knowledge and power between doctors and patients, then in cases of extremely vulnerable patients such as mental disability, psychiatric patients, convicts, children, and homeless people (9).

The legal rights of patients include civil rights for patients and the duties of healthcare professionals. Knowledge of legislation and the ability to put juridical

norms into practice are among the main aspects of professionals (10).

Direct interaction with patients constitutes a key feature of medical curricula, leading to the development of knowledge, clinical reasoning, communication skills, and professional attitudes among medical students (11-13).

In the realm of healthcare, informed consent has evolved into an act of both legal and ethical-deontological significance (14). From an ethical perspective, getting informed consent is good medical practice and the training of students is not an exception. Undeniably, a lack of valid informed consent represents a breach of proper medical practice, potentially leading to disciplinary, civil or criminal repercussions for the physician responsible (15).

It is important to mention that medical students, like clinical teachers, can be liable for damages caused to the patient, including those arising from infringement of the right to self-determination. Indeed, from a legal perspective, a failure to provide prior information to the patient and secure valid informed consent can be viewed as a factor contributing to liability for healthcare professionals (14).

PUBLIC UNIVERSITIES IN BOSNIA AND HERZEGOVINA

There are currently eight public universities in Bosnia and Herzegovina: University of Sarajevo, University of Banja Luka, University of Mostar, University of "Džemal Bijedić" in Mostar, University of Tuzla, University of East Sarajevo, University of Zenica, and University of Bihać.

There are a total of 108 organizational units at eight public universities in Bosnia and Herzegovina, and there are a total of 988 majors or study programs at the same universities. Of the total number of study programs, 97 did not have available curricula on the websites of the organizational units, and the website was not functional for three study programs.

The concepts of "patient rights" and "informed consent" are studied at a total of 9 organizational units.

1. There are ten organizational units (faculties or academies) at the University of Mostar. The concepts of "patient rights" and "informed consent" are not studied in the curricula of seven organizational units, and five of them do not have available III cycle curricula on their websites.

At the University of Mostar, the term "patient rights" is studied at three organizational units (School of Medicine, Faculty of Pharmacy and Faculty of Law), and the term "informed consent" is studied at two organizational units (School of Medicine and Faculty of Law).

2. There are eight organizational units at the University of "Džemal Bijedić" in Mostar. The concepts of "patient rights" and "informed consent" are not studied seven of the eight available curricula.

The concepts of "patient rights" and "informed consent" are studied in one organizational unit (Faculty of Law).

3. There are eight organizational units at the University of Zenica. The concepts of "patient rights" and "informed consent" are not studied in the curricula of seven organizational units.

The term "patients' rights" is studied in one organizational unit (Faculty of Law).

4. There are seven organizational units at the University of Bihać. The

concepts of "patient rights" and "informed consent" are not studied in the curricula and programs of three organizational units, and the curricula of four faculties are not available on their websites.

5. There are eighteen organizational units at the University of East Sarajevo. Curricula and programs are not available on the websites of seventeen organizational units.

At the University of East Sarajevo, the concept of "patient rights" is studied in one organizational unit (Faculty of Medicine).

6. There are thirteen organizational units at the University of Tuzla. The concepts of "patient rights" and "informed consent" are not studied in the curricula of twelve organizational units.

The mentioned terms are studied at one organizational unit (Faculty of Law).

7. There are seventeen organizational units at the University of Banja Luka. In the curricula and programs of sixteen organizational units, the terms "patient rights" and "informed consent" are not studied, and in five organizational units the curricula are not available online.

At the University of Banja Luka, the terms "patient rights" and "informed consent" are studied in one organizational unit (Faculty of Medicine).

8. There are twenty-six organizational units at the University of Sarajevo. In the curricula and programs of seventeen organizational units, the terms "patient rights" and "informed consent" are not studied, and in eight organizational units the curricula are not available on their websites.

The concepts of "patient rights" and "informed consent" are studied at two organizational units (Faculty of Dentistry and Clinics and Faculty of Health Studies).

CONCLUSION

After reviewing the available curricula at all public universities in Bosnia and Herzegovina, it is evident that the terms "patient rights" and "informed consent" are studied the most at the University of Mostar, namely the term "patient rights" at three organizational units, and the term "informed consent" at two organizational units, and then at the University of Sarajevo, where the concepts of "patient rights" and "informed consent" are studied at two organizational units. At the University "Džemal Bijedić" in Mostar, the University of Tuzla and the University of Banja Luka, the concepts of "patient rights" and "informed consent" are studied at only one organizational unit, while at the University of Bihać and the University of East Sarajevo, the concept of "patient rights" is found at only one organizational unit. At the University of Bihać, the terms "patient rights" and "informed consent" are not studied among the available curricula.

If we consider that in the second half of the 20th century and in the 21st century, a series of documents were adopted that regulate, promote and raise the rights of patients in Europe to a higher level (the Declaration of Helsinki from 1975, the Declaration on the Promotion of Patients' Rights in Europe from 1994 , the European Convention on Human Rights from 1997, the European Charter on Patients' Rights from 2002), it is clear that Bosnia and Herzegovina must follow this path. The knowledge on patient rights and informed consent in healthcare should me more represented in higher education in Bosnia and Herzegovina, especially among

university educated individuals. Public universities should take effective measures to improve the overall awareness of their students for the issues concerned. This can certainly be achieved on several levels, and one of them is the educational process, especially if we take into account that Bosnia and Herzegovina has adopted and implemented the Bologna process of education. Namely, students in the field of biomedicine and healthcare and the field of law, but also in the fields of psychology, educational rehabilitation, social work and other similar fields, should definitely be more educated about patients' rights, and informed consent, as well as possible consequences of ignorance the same.

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"PRAVA PACIJENATA" I „INFORMIRANI PRISTANAK" U NASTAVNIM PLANOVIMA I PROGRAMIMA NA JAVNIM SVEUČILIŠTIMA U BOSNI I HERCEGOVINI

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SAŽETAK

Obrazovanje u Bosni i Hercegovini (BiH) u nadležnosti je entiteta Republika Srpska (RS), deset županija u Federaciji Bosne i Hercegovine (FBiH) i Brčko Distrikta (BD).

Visoko obrazovanje u Bosni i Hercegovini regulirano je Okvirnim zakonom o visokom obrazovanju u Bosni i Hercegovini.

Prava pacijenata utvrđena su Zakonom o pravima, obvezama i odgovornostima pacijenata, kojim su određena prava, obaveze i odgovornosti pacijenata prilikom korištenja zdravstvene zaštite, način korištenja tih prava, način zaštite i unaprjeđenja tih prava, kao i druga pitanja u vezi s pravima, obavezama i odgovornostima pacijenata.

Informirani pristanak, kao jedno od prava pacijenata, predstavlja slobodno očitovanje volje pacijenta odnosno njegovu suglasnost za provođenje predložene medicinske mjere ili sudjelovanja u istraživanju, a za njegovu valjanost potrebni su kompetentnost bolesnika, adekvatnost informacije i dobrovoljnost.

Cilj ovog rada je pregledati dostupne nastavne planove i programe na mrežnim stranicama ustrojbenih jedinica na javnim Sveučilištima u Bosni i Hercegovini, te vidjeti koliko se pojmovi „prava pacijenata" i „informirani pristanak" izučavaju na javnim sveučilištima u Bosni i Hercegovini.

Ključne riječi: obrazovanje, visoko obrazovanje, prava pacijenata, informirani pristanak, nastavni plan i program, sveučilište, Bosna i Hercegovina

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SCIENTIFIC REVOLUTION

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ABSTRACT

It can be asserted that the Scientific Revolution and its development represent a complex series of events that have occurred. The opportunities and possibilities we enjoy in society today are result of the actions of many bold individuals that allow us to experience a vision of the world that would have been difficult to imagine in the past. Scientific Revolution marked progress in science, technology, and society. It laid the foundations of the scientific method, primarily based on observation and experimentation. Academies and scientific institutions were established, promoting science in its finest form. Science itself has the ability to evolve, regulate, and recover. With the changes in science, universities also evolved, responding to variable circumstances in social life since the 12th century. University, a place of research and teaching, transformed into a conscious participant involving many stakeholders. The Revolution reconstructed science based on new attitudes within certain communities. Its goal was to modify frameworks through the influence and persuasion of the scientific community. Scientific Revolution (Latin *revolvere* - to return, to overturn) according to Rodin, is essentially the revolution of science itself, while Hegel, from a philosophical perspective, sees Scientific Revolution as nothing other than the return of individual sciences in particular sectors of being to the origin of being itself. Term "science" comes from the Greek word *epistēmē* – understanding, comprehension, knowledge, and the Latin *scientia*, *scientiae* – knowledge based on data that can be proven and reproduced. The objective of this paper was to demonstrate how intellectual capital, which includes results of scientific research, scientific discoveries of theoretical, developmental, and practical significance, as well as the educational level and research activities of the active population, becomes a crucial factor for the contemporary functioning of social reproduction in the most developed countries in world, significantly influencing the overall social and economic development and transforming social reproduction through the contributions of individuals with their knowledge, skills and creativity.

Keywords: Scientific Revolution, science, university, classification of sciences, humanities and social sciences
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INTRODUCTION

The concept of science can be comprehended in the historical context in which it originated. The Scientific Revolution of the 17th century consisted of two interconnected developments in science: changes in scientific practice, which led to the establishment of associations, and accompanying changes in the way scientists described the behaviors emerging from these new scientific practices. Initially, the progress of science was relatively slow, as knowledge itself was passed down orally for centuries. The history of the advancement of knowledge and the development of science can be viewed as the history of humanity. With the progress of the Scientific Revolution, critical thinking also evolved, encouraging the analysis and exploration of many creations and theories. Scientific Revolution allowed science to develop in a new direction, where, thanks to the pioneers of modern science, became the primary authority in the modern world. The concept of Scientific Revolution is a speculative term, meaning that it does not express a stance on something external but rather denotes a self-contained concept. In essence, the Scientific Revolution carries its own problem, as it does not require a relationship with anything else but only with itself. Therefore, we can say that Scientific Revolution is, in fact, a revolution within science. The Latin root of the term *revolutio* is *revolvere*, which means: to turn back, overturn, reversal, rotation, upheaval (1).

The term *science* originates from the Greek word epistēmē – understanding, knowledge, and the Latin word *scientia*, *scientiae* – knowledge based on data that can be proven and reproduced. There are various definitions of science, with conceptual definitions distinguishing between science in a broader and narrower sense. The encyclopedic definition (Croatian Encyclopedia) of science understands it broadly as "a collection of all systematically methodical and structured knowledge, and the activity through which such knowledge is acquired." In a narrower sense, science is the collection of knowledge obtained through scientific methods and the rational activity of predicting and explaining phenomena in the environment, achieved by subsuming individual phenomena under universal laws (2, 3). Before the onset of Scientific Revolution, science as a discipline was often mixed with other fields, such as magic, which was then considered a form of science. Although many reject it today, it is essential to examine its origins and role during the time when it was widely accepted (4). During the Renaissance and early modern period, science began to separate from the arts, as seen in more recent scientific developments. In 17th century, there were various ways of understanding natural phenomena, most commonly accepted by scholars, as philosophy lacked adequate rational explanations for the natural world. Science, as we understand it today, has existed for approximately four hundred years. With the arrival of Galileo, Descartes and Newton, the idea emerged that the physical world could be described through a few basic concepts linked by quantitative laws. Throughout its history, science has aimed to be accessible to all, while Scientific Revolution paved the way for new enthusiasts and restored faith in knowledge. It laid the foundations of the scientific method (5, 6). In the mid-15th century, a need arose to establish

institutions where scholars could gather. In these institutions, intense debates on humanities-based topics took place. Such institutions were called academies, and they flourished in 17th century. (7) Unofficially, they were founded in the 1440s, with one of the first being established in Florence under the name *Accademia Platonica (8).* Following their model, the first scientific societies were also formed in the same century.

The objective of this paper was to demonstrate how intellectual capital, which includes the results of scientific research, scientific discoveries of theoretical, developmental, and practical significance, as well as the educational level and research activities of the active population, becomes a crucial factor for the contemporary functioning of social reproduction in the most developed countries in the world, significantly influencing the overall social and economic development and transforming social reproduction through the contributions of individuals with their knowledge, skills, and creativity.

THE SCIENTIFIC REVOLUTION AS A CONCEPT

The development and dominance of Scientific Revolution was caused by a complex series of events that have occurred. Scientific Revolution is result of a grand idea about a new civilization, one that strives for constant progress. The opportunities and rights we have today in this world – from technological advances to social progress – were once unimaginable. Thanks to many courageous individuals, today we can say that we enjoy the vision of the world they imagined centuries ago. The great complexity of all historical events, from religious conflicts to scientific ones, led to Scientific Revolution as we know it today. Although talk of revolution is often exaggerated, most analysts agree that there were transformative scientific developments of various kinds (9). Unlike normal science, a revolution is a non-cumulative developmental episode. A revolution is essentially a reconstruction based on new foundational views within a scientific community. When speaking of revolutions in the plural, one can say that they are special episodes where there is a reversal in expert opinions. The goal of revolutions is to alter frameworks in a way that is impossible to do within the same framework. This is where the persuasion of the scientific community comes into play (10). History shows that the creation of knowledge has always embraced new opportunities. Therefore, Scientific Revolution must be directed in the right direction. Scientific Revolution is an overarching concept that encompasses a multitude of assumptions about the future creation and spread of knowledge. A revolution could relate to many things: to the process of creation, to the result, to scientists, but also to the rest of society. The diversity and ambiguity of discourse directly affect the changing scientific environment. Scientific Revolution, as such a whole, can be somewhat confusing (11).

TYPES OF CLASSIFICATIONS OF SCIENCE

The classification of science involves division of science according to certain principles and criteria, such as general characteristics, subjects, methods, and so on. Throughout history, there have been various classifications of science. Each classification leads to new insights

and new classifications (12). As for the method of classification, one could say that it is a ubiquitous and generally accepted method. Everything that had developed and branched out needed to be divided to a great degree, categorized, and classified, where the classification method helps. According to Kedrov, science can be divided into three main groups: natural sciences, social sciences, and philosophy. Thus, at the crossroads between natural and social sciences, we find technical sciences (13). Agricultural and medical sciences belong to the technical sciences. Psychology is the only independent science that studies human psychological activity from its natural-historical side (14). Today, science is most commonly classified according to the subject it studies. Formal sciences are those sciences that study formal side of real things and events, such as mathematics and formal logic. Real sciences study real objects and events, and they are divided into natural sciences, which study natural phenomena, such as biology, physics, and chemistry; spiritual sciences, such as psychology, sociology, history, and economics; social sciences, which study social phenomena, including political and social history and political economy; and systematic sciences, which aim to systematically round off knowledge of a particular area, such as systematic zoology, botany, and general sociology of plants and animals. Classification of science essentially involves discovering connections between sciences based on certain principles. No classification of science can be final. Nature of scientific revolutions is a topic that raises a series of questions about sciences and how to interpret them (15). This is a topic that concerns philosophers of science and their colleagues from other disciplines, as Lelas points out (16). To have trained, experienced, inventive, and creative intellectuals, researchers and scientists create scientific programs, projects, and other scientific, technical and professional written works, they must possess an appropriate quantum of disciplinary and interdisciplinary knowledge: about scientific fields, branches, areas, and disciplines (i.e., classification of science), about at least twenty scientific methods that can be successfully applied in scientific research in appropriate combinations (i.e., methodology of scientific research), and knowledge of methodological procedures and intellectual activities in the production of scientific products, or the transformation of ideas into written works (i.e., technology of scientific research). This is because the scientific industry cannot efficiently produce quality scientific products without the interactive link between classification of science, methodology, and technology of scientific research. Such an interactive link implies the existence of a stable interrelationship between classification of science, disciplinary, and interdisciplinary scientific research (17).

UNIVERSITY AS A SCIENTIFIC INSTITUTION

Although experts generally believe that universities are highly resistant to change and strongly oppose it, they have always evolved. Today's scientists comment that the development of science was questioned in the past and that the understanding of science and the acquisition of knowledge were dramatic (18). Namely, since the establishment of the first universities in Europe during the 12th century, universities have responded

to the changing circumstances in the social, economic, and political environment. Cumulatively, all these processes of change, which have been ongoing for centuries, led to the creation of the 21st-century university system, which is fundamentally different from all previous university systems (19). Higher education, the development of the knowledge society and the dominance of neoliberal public policies in education have led to the creation of new models of modern university. Models such as the second and third type of university and the triple helix emphasize the practical dimension of higher education and its applicability, which is manifested through innovations, patents, and collaboration with a wide range of regional, national, and supranational stakeholders. Previously dominant Humboldtian model, characterized by a foundation in teaching and research, is being replaced by an expanded role for universities through the "third mission," which is primarily defined by the commercial nature of creating new knowledge. Science is primarily evaluated through its applicable and commercial dimensions, and the role of scientists is changing, with scientists increasingly focusing on the managerial aspect of their work. Meanwhile, natural and technical sciences are taken as epistemic models, while social sciences and humanities are marginalized (20). The understanding of university as a place of research and teaching is expanded by the idea of the third mission, which is primarily based on the economic dimension. In this way, university transforms into a conscious and networked actor in regional development, connected to many different stakeholders (21). This type of approach is based on the principles of natural and technical sciences. In this context, social and humanities sciences become the "blind spot," and their contribution, due to the epistemological shift, is primarily evaluated through the criteria of natural and technical sciences, with activities directed toward social entrepreneurship. The critique of modern university models, which arises as a response to these trends, can be synthesized through three main responses: criticism of the entire models as universally inapplicable and/or methodologically insufficiently developed; attempts to integrate into the existing model by expanding the applicable dimension of social sciences, with an effort to redefine the third mission of the university to include the social dimension; and, finally, the rejection of modern university models as epistemologically incompatible with social and natural sciences (22).

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ZNANSTVENA REVOLUCIJA

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SAŽETAK

Može se utvrditi da je znanstvena revolucija kao i njen razvoj zapravo jedan kompleksan niz događaja koji se dogodio. Mogućnosti i prilike koje nam se danas pružaju u društvu su rezultat djelovanja niza odvažnih ličnosti i gdje zaista možemo reći da uživamo ideju svijeta koja je u prošlosti bila teško zamisliva. Znanstvena revolucija je označila napredak u znanosti, tehnologiji i društvu. Postavili su se temelji znanstvene metode koja se primarno bazirala na opažanjima i pokusima. Osnivale su se akademije i znanstvena društva koja su promovirala znanost u njenom najboljem smislu. Znanost sama po sebi može biti sposobna da se mijenja, regulira i da oporavlja. Mijenjanjem znanosti, mijenjala su se i sveučilišta koja su od 12. stoljeća odgovarala na varijabilne okolnosti u društvenom životu. Sveučilište kao mjesto istraživanja i poučavanja se pretvara u svjesnog aktera kojeg čini veliki broj dionika. Revolucija je rekonstruirala znanost temeljem novih stavova u nekoj zajednici. Njezin cilj je izmjena okvira i to utjecajem te uvjeravanjem znanstvene zajednice. Znanstvena revolucija (lat. *revolvere* - natrag vratiti, preokret) prema Rodinu je ustvari sama revolucija znanosti, dok Hegel s filozofske strane znanstvenu revoluciju smatra ničim drugim do povratkom pojedinačne znanosti o ovom ili onom sektoru bića na iskon bića samog. Pojam znanost dolazi od grčkog pojma *epistēmē* – razumijevanje, znanje i latinskog pojma *scientia, scientiae* – znanje koje se bazira na podacima koji se mogu dokazati i reproducirati. Cilj rada je prikazati kako intelektualni kapital, koji uključuje rezultate znanstvenih istraživanja, znanstvena otkrića teorijskog, razvojnog i praktičnog značaja, te razinu obrazovanosti i znanstveno-istraživačke djelatnosti aktivnog stanovništva, postaje ključan faktor za suvremeno funkcioniranje društvene reprodukcije u najrazvijenijim zemljama svijeta, značajno utječući na cjelokupni socijalni i ekonomski razvoj te transformaciju društvene reprodukcije kroz doprinos pojedinaca svojim znanjima, vještinama i kreativnošću.

Ključne riječi: znanstvena revolucija, znanost, sveučilište, klasifikacija znanosti, društvene i humanističke znanosti

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HEMOLYTIC DISEASE OF THE NEWBORN DUE TO UNRECOGNISED ANTI-Kp^a ANTIBODY

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ABSTRACT

Background: Kp^a occurs in less than 2 percent of the Caucasian population. Antibody to this low frequency antigen causes mild to moderate delayed hemolytic transfusion reactions and hemolytic disease of fetus and newborn. Screening for antibodies to low frequency antigens such as Kp^a is not routine, so sensitization is more difficult to diagnose.

Case report: We present a case of hemolytic disease of the newborn due to anti-Kp^a antibody unrecognised during regular considered first pregnancy.

Results: Newborn, blood group O RhD positive**,** has been diagnosed with neonatal jaundice and positive direct antiglobuline test. Mother's screening test for irregular antibodies was negative three times during pregnancy. Elution was negative with screening red blood cells, but in identification using gel technology with cell's panels, anti-Kp^a has been identified.

Conclusion: Screening for antibodies to low frequency antigens such as Kp^a is not routine, so immunisation to low incidence antigens is hard to diagnose, but very important. This case should alert us that there really is potential of antibodies to low incidence antigens to cause severe reactions.

Keywords: Kell blood group system; Hemolytic disease of newborn; red cell alloimmunisation

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INTRODUCTION

The Kell blood group system is complex and contains many highly immunogenic antigens (1). Antibodies against these antigens are usually immunoglobulin class G. Anti-K, anti-k, and anti- Kp^a can cause severe hemolytic transfusion reactions (HTR), and severe hemolytic disease of the fetus and newborn (HDFN). Following ABO and Rh blood group system antibodies, antibodies to Kell blood group system are the most common immune red cell antibodies. It is very important and well known that the titer of anti-K does not correlate with the severity of HDFN because these antibodies cause suppression of erythropoiesis in the fetus and severe anemia(1) (2). Kp^a occurs in less than 2 percent of the Caucasian population. This low frequency antigen causes mild to moderate delayed hemolytic transfusion reactions (DHTR) and HDFN (3). Kell antigen as highly immunogenic is the common cause of antibody production in mismatched blood transfusions, HTR and maternal alloimmunization, which causes severe anaemia in neonates. However, among the anti-Kell antibodies anti-Kp^a is extremely rare antibody (4) (1).

CASE PRESENTATION

We report a case of hemolytic disease of the newborn (HDN) caused by unrecognized anti- Kp^a alloantibody. We recieved blood sample from baby who was diagnosed as neonatal jaundice in first day of his life. Baby was blood group O RhD positive; Rh phenotype CCee and K antigen negative. Direct antiglobulin test (DAT) was positive, DAT IgG positive. Eluat indirect antiglobulin test (IAT) was negative, but an anti- Kp^a was diagnosed by identification using gel technology with commercially made cells panels. So, we searched for mother's history of laboratory findings. It was her first pregnancy, with no abortion, blood transfusion or transplantation previously. She was blood group B RhD positive; Rh phenotype CCee and K antigen negative. According to our procedure IAT was performed three times during this pregnancy, but she has never been diagnosed with positive IAT. Since anti- Kp^a was eluted from babies red blood cells after delivery, we performed IAT again. It was negative but in identification using gel technology with commercially made cell's panels anti- Kp^a has been identified. Mother was typed as Kp^a negative, newborn and father as Kp^a positive. Laboratory findings of the newborn are presented in the Table 1.

Table 1. *Laboratory findings of the newborn*

Day of life	Erythrocytes (3,90-5,5)	Hemoglobin (136-199)	Hematocrit (0,391-0,585)	(150-450)	Total bilirubin (0-100)	Direct bilirubin (10)
1	5,56	178	0,541	138	108,8(0-100)	15,0
2					180,5(0-100)	15,9
3	5,94	196	0,542	86	303	19,9
4					256,7 (0-200)	23,5
5	5,15	158	0,458	132	214,8	25,3
6					204,3 (0-200)	27,3
7	5,39	166	0,490	164	182,8(0-200)	16,1
10	4,78	143	0,425	158	125,2 (0-200)	20,0
11	5,14	153	0,458	184		
13	4,74	139	0,420	294	58,2 (0-200)	14,0
15	4,73	141	0,410	393		
25	3,39	99	0,290	473		

Newborn has been treated with phototerapy and immunoglobulins.

DISCUSSION

As abovementioned Kell blood group system contains many highly immunogenic antigens which antibodies following ABO and Rh blood group system are the most common immune red cell antibodies. Although antibodies to low frequency antigen Kp[a] were identified in 2-5 percent of those multiple transfused patients with alloantibodies, there are just few cases reported with haemolytic reaction caused by anti- Kp[a]. In literature there is a case of an eldery woman who was presented with sudden onset of rigorous chills, elevated temperature, tachycardia, hypertension and uremia, elevated creatinine, positive DAT, and low haptoglobin in laboratories testing. This acute haemolytic reaction was caused by serologic detected anti- Kp[a] antibody (5). There is a case of severe DHTR attributed to anti- Kp[a] after multiple red blood cell (RBC) transfusions. It was a 52-year-old Caucasian woman who received multiple units of RBCs for a lower gastrointestinal bleed. As antibodies screening was negative anti- Kp[a] was identified when an additional RBC panel was tested (6). Likewise it is well known that the titer of anti-K doesn't correlate with the severity of HDFN because antibodies causes suppression of erythropoiesis in fetus and severe anemia. There is reported a case involving anti- Kp[a] in which one twin was anemic and the other was not. The laboratory findings and clinical course of the affected twin showed suppression of erythropoiesis in addition to immune RBC destruction. PCR-based assays showed affected twin was KEL*841T/C (KEL*03/KEL*04), which is predicted to encode Kp(a+b+) an the other was KEL*841C/C (KEL*04/KEL*04), which is predicted to encode Kp(a–b+). It was the first reported case of probable suppression of erythropoiesis attributable to anti-Kp[a] (2). There is also a reported case of fetal hydrops in third pregnancy for which no cause was found as the antibody screening cells used to investigate the fetal hydrops were Kp[a] negative. After that in fourth pregnancy during routine antenatal screening in 17 weeks gestation anti- Kp[a] was detected (7). There is also a case of severe hemolytic disease of fetus due to

anti-Kp[a] and treatment for presumed acute parvovirus B19. Six intrauterine and one neonatal RBC transfusion were required (8).

CONCLUSION

All of these cases should alert us that there really is potential of low incidence antigens to cause severe reactions. Acute and DHTR, suppression of fetal erythropoiesis and hemolytic disease of the newborn still occur due to undetected anti- Kp[a] alloantibody. Screening for antibodies to low frequency antigens such as Kp[a] is not routine so sensitization from uncommon antigens is more difficult to diagnose. Antibody screening cells used in our reported case were also Kp[a] negative so we didn't diagnosed immunisation until positive DAT and neonatal jaundice occured. We have to think of this possibility even IAT is negative.

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HEMOLITIČKA BOLEST NOVOROĐENČETA UZOKOVANA NEPREPOZNATIM ANTI-Kp^a PROTUTIJELOM

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SAŽETAK

Uvod: Kp^a se pojavljuje u manje od 2 % bijelaca. Protutijelo na ovaj antigen niske učestalosti uzrokuje blagu do umjerenu odgođenu hemolitičku reakciju i hemolitičku bolest fetusa i novorođenčeta. Test pretraživanja na antigene niske učestalosti kao što je Kp^a nije rutinski, zbog čega se imunizacija teže i dijagnosticira.

Prikaz slučaja: Prikazan je slučaj hemolitičke bolesti novorođenčeta uzrokovan anti-Kp^a protutijelom koje nije prepoznato u uredno kontroliranoj prvoj trudnoći.

Rezultati: U novorođenčeta krvne grupe O RhD pozitivna s novorođenačkom žuticom detektiran je pozitivan direktni antiglobulinski test. Indirektni Coombs test majke bio je negativan tri puta tijekom trudnoće. Indirektni Coombsov test eluata bio je negativan, ali je identifikacijom s panel eritrocitima u gel mikrokarticama detektirano anti-Kp^a protutijelo.

Zaključak: Test pretraživanja na protutijela na antigene niske učestalosti kao što je Kp^a nije rutinski, zbog čega je prepoznavanje imunizacije otežano ali jako važno. Ovaj slučaj bi nam trebao biti upozorenje da protutjela na antigene niske učestalosti mogu uzrokovati ozbiljne reakcije.

Ključne riječi: Kell sustav krvnih grupa; hemolitička bolest novorođenčeta; aloimunizacija na eritrocitne antigene.

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DEUTSCH FÜR PFLEGEBERUFE

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The university textbook "Deutsch für Pflegeberufe" by Dr. Magdalena Ramljak and Dr. Darija Glibić, published by the University of Mostar, is primarily intended for students of healthcare studies. However, given its scope and content, it can be used by all interested in renewing and expanding their knowledge on topics and specialized vocabulary in the field of German for medical and healthcare professions, making a significant contribution to education in biomedicine and healthcare.

The textbook is written in German and builds on existing knowledge starting from level A2 of the Common European Framework of Reference for Languages (CEFR), guiding readers towards levels B1 and B2. It addresses specific needs of specialized German language training within the healthcare profession.

Through authentic texts included in the textbook, authors have transformed complex linguistic structures and extensive topics related to German for medical and healthcare professions into a coherent and reader-friendly format. Methodically tailored exercises and tasks enable users to acquire and expand specialized vocabulary while developing the skills needed for precise communication in healthcare settings.

Structured into 15 clearly organized units divided and into five modules, the book thematically covers key areas of the healthcare profession. The topics address various aspects of healthcare activities, including professions and work environments, medical record management, the human anatomy, descriptions of diseases and health issues, and the organization of work in healthcare institutions.

The first module is dedicated to professions and different jobs in the healthcare sector, including nursing, radiological technology, and other technical roles. Lessons on diagnostic imaging methods and X-rays allow students to acquire terminology and basic knowledge essential for the description of technical procedures in daily practice. This module emphasizes the importance of understanding specialized terms for precise communication within teams and patients, thereby developing essential language competencies.

The second module focuses on medical and health documentation, with special emphasis on conducting patient histories and shift rotation. Students learn

how to accurately record and communicate information on patients' health conditions, which is crucial for ensuring continuity of care and avoiding errors in practice. The emphasis on professional phrases and expressions in this context helps students gain confidence in using German in everyday professional tasks.

The third module of the textbook Deutsch für Pflegeberufe is devoted to the human anatomy, highlighting internal organs, body parts, the immune system, and blood donation. Through carefully designed lessons, students become familiar with fundamental terms and the functions of human organs while acquiring vocabulary needed for professional communication in healthcare settings. Special attention is given to the topic of blood donation, underlining the benefits of this humanitarian act.

The fourth module covers the ICD – the International Classification of Diseases, related health problems, childbirth, and various types of labor pain. This section is designed to provide students with the opportunity to gain detailed knowledge of specialized vocabulary and linguistic structures needed for describing symptoms, diagnoses, and treatment procedures.

The fifth module focuses on healthcare institutions, including hospital and clinic departments, nursing homes, and emergency medical centers. Through this module, students learn how to express themselves professionally about the organization of healthcare institutions, their functions, and their roles within the healthcare system. This prepares them for effective communication in professional contexts and future interdisciplinary collaboration.

Across all five modules, the textbook facilitates the integration of professional knowledge and language skills, enabling students to acquire key terms and phrases while building confidence in applying German in real-life healthcare practice scenarios.

Particularly valuable elements of this textbook include a review of essential grammar rules and a detailed glossary of technical terms, allowing students to systematically master German for healthcare professions. The appendix provides basic information about German-speaking countries, offering students insights into the cultural and linguistic characteristics of these regions. Additionally, the content is linked to the university platform SUMARUM via QR codes, granting students access to supplementary exercises, their answers, and interactive materials.

The textbook Deutsch für Pflegeberufe by Assistant Professor Dr. Magdalena Ramljak and Dr. Darija Glibić represents a significant contribution in enhancing the quality of German language learning in the context of healthcare professions. The authors have successfully integrated complex linguistic structures with specific healthcare topics, achieving a high level of functionality and practical applicability. The methodological approach ensures the textbook is user-friendly for both teaching and everyday practice, while its clarity, modern resources, and flexible application make it an ideal tool for students aiming to improve their German language skills.

The textbook fully meets the requirements of scientific and educational literature. Given its quality and relevance, I highly recommend it as essential literature

for learning and studying German in healthcare professions.

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Internet: Cancer-Pain.org [Internet]. New York: Association of Cancer Online Resources, Inc.; c2000-01 [updated 2002 May 16; cited 2002 Jul 9]. Available from: http://www.cancer-pain.org/.

Foley KM, Gelband H, editors. Improving palliative care for cancer [Internet]. Washington: National Academy Press; 2001 [cited 2002 Jul 9]. Available from: http://www.nap.edu/books/0309074029/html/.

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