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Review article

# ANESTHESIA AND PAIN MANAGEMENT IN TRADITIONAL IRANIAN MEDICINE

## ANESTEZIJA I UPRAVLJANJE BOLI U TRADICIONALNOJ IRANSKOJ MEDICINI

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Summary

*Studying the history of science could help develop an understanding of the contributions made by ancient nations towards scientific advances. Although Iranians had an important impact on the improvement of science, the history of Iranian medicine seems not to have been given enough attention by historians. The present study focused on the history of anesthesia and pain management in Iranian medical history. In this regard, related books such as Avesta and Shahnameh were studied in order to obtain the history of anesthesiology in Iranian pre Islamic era. This subject was also studied in the famous books of Rhazes, Haly Abbas, Avicenna, Jorjani, MomenTunekaboni and Aghili from different times of the Islamic era. Scientific data bases such as PubMed, Scopus and Google Scholar were searched using key words "Iranian", "Persian", "pain management" and "anesthesia". It was discovered that pain management and anesthesiology were well known to the Iranians. Rhazes and Avicenna had innovations in this regard. Fourteen Mokhader (anesthetic) herbs, which were included in the collection of the previous knowledge of the 18th century entitled Makhzan al-Advieyh and used as the Persian Materia Medica, were identified and listed. This study introduces the history of anesthesiology and pain management at different periods in the history of Iran.*

***Key words**: Anesthesiology; pain management; traditional Iranian medicine.*

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## Introduction

Two terms could be seen referring to the country which today is known as Iran in historical literature. The term 'Iran' means land of the Aryans. Before 1949, this country was known as Persia. Persians were one of the Aryan tribes and their origin probably was the shores of the Caspian Sea [1]. Iran, as an old country and a great ancient civilization, has had a notable impact on scientific advances in the history of mankind. Studying the history of science could help develop a proper understanding of the contributions made by ancient nations in today's scientific advances [2]. In spite of the numerous studies which have been performed on the history of Persia, the history of Iranian medicine seems not to have received sufficient attention by the historians [3]. Iranian scholars not only conserved but also developed the scientific ideas of other ancient civilizations. They also added new theories and proven facts to the body of science [4]. The history of science in Iran is mainly divided into two eras: the pre-Islamic or ancient era and the Islamic era.

Many documents written in Persian from ancient period have gone missing over time due to the destruction of libraries during battles and wars [3]. But there still exist written evidences on the advances of ancient Iranians in different areas of science, including medicine. Apart from written documents and manuscripts, archaeological findings have also shown that ancient Persians had knowledge in the field of medicine and surgery [5]. Today, the earliest Persian text which has medical sections is Avesta, which is a collection of Zoroastrian writings. The exact time in which it was written is not known but it is estimated to have been compiled in the 6th Century B.C. According to this book, medical sciences of Persian ancient era were divided into health sciences, forensic medicine, surgery, psychiatry (cure by divine words) and herbal medicine [3]. The first Aryan physicians whose names are mentioned in Avesta are Hoom, Jamasp and Se'na (also known in Shananmeh of Ferdowsi as Simorgh). Mani, Roozbeh and Bozorgmehr are also known ancient Iranian physicians [3]. Evidences show that during the Sassanid Empire (226-652 A.D.), the Persians made significant progress in science and knowledge [6]. It was during this period that institutions of higher education, such as Jundishapur were established [7]. Academy of Jundishapurwas one of the most important and influential science centers in the history. It was a place of information exchange for the scholars of its time. Jundishapurplayed a great role in the harmonization of classical Greek philosophy, Indian culture, and the Persian scientific heritage. It was

believed that medicine and pharmacology were the important subjects of this academy [8]. It became the base for what is known today as traditional Iranian medicine.

In the 7th century A.D., great ancient civilizations including Persia submitted to the Islamic state and from this time a new civilization emerged [9]. Persian medicine and academy of Jundishapur had a great impact on the Islamic medicine. It is a stated fact that Persian scientists such as Razi, Ibn-e-Sina and Biruni had a great influence on Islamic medical science [3]. There are different types of medical books available today written by these scholars. The books discuss different aspects of medicine, form surgery to pharmacology. Although the majority of these books belong to Islamic era, but some of the concepts have roots in the history of ancient Persia. In this work, the major focus is on the history of anesthesia and pain management in traditional Iranian medicine (TIM).

## Method

This study was performed with the aim of bringing light to the history of anesthesia and pain management in Iranian medical history. In this regard, available written documents were searched from Persian pre Islamic era to Islamic era. These books included Avesta and Shahnameh for the history of Iranian pre Islamic era and the famous books of Rhazes, Haly Abbas, Avicenna, Jorjani, Momen Tunekaboni and Aghili from different times of Islamic era. Scientific data bases such as PubMed, Scopus and google scholar were searched using key words "Iranian", "Persian", "pain management" and "anesthesia".

## Anesthesiology in pre-Islamic or ancient era

Today, there are evidences pointing to the fact that ancient Persians performed neurological and ophthalmic operations 2800 B.C.E [10]. It is a documented fact that ancient Iranian and Indian surgeons even had plastic surgical skills [11]. It is unlikely that these surgeons performed surgical operations without the use of anesthetic agents or without performing pain management. Ancient documents show that Persians used cannabis for pain management [12]. As an example, in Shahnameh (the history of the kings) which was written by Ferdowsi, Caesarian section was mentioned by the name "Rostamineh". This was recorded as the first alternative method of child birth. This operation was performed by Se'na [3]. According to Ferdowsi, in

Rostamineh operation, a combination of cannabis and camphor prepared as a special drink was used for the mother to reduce the pain [11]. These stories also described pain management by king Jamshid in the ancient times [4]. Shahnameh described him as the first person to use a mixture containing opium for pain relief [13].

## Anesthesiology in Islamic golden or medieval era

Medical sciences flourished during the Islamic golden era. From 7th to 9th century AD,there was great expansion in the scientific centers in the Islamic empire [3]. Iranian physicians during this period played important roles in the development of different areas of medical sciences [14]. Persian medicine had a great impact on the formation of Islamic medicine [3].

Abu Bakr Muhammad Bin ZakariaRazi (Rhazes), born 860 A.D in Ray (an Iranian city), was a known scientist famous for his precise documentation of medical observations [3, 15]. He contributed to the advancement of different medical fields [16]. One of his innovations was the use of anesthetic sponge in surgical operations [17]. Although this invention has been attributed to other Muslim scientists, such as Abu al-Gasim al-Zahravi [18] and Avicenna [19] but Razi is also believed to have been the first physician who used general inhalation anesthesia in surgeries. He immersed a sponge in a solution of opium, hyocyamus, mandragora and loiseuria, and used it in inhalation form to achieve anesthetic state for the patients [20].

Haly Abbas (949–982 AD) studied medicine in Shiraz. His famous encyclopedia was entitled Ka¯milal-Sina¯a al Tibbiya, which he dedicated to the king of his time. The book comprised 20 chapters which included anatomical details, clinical manifestation of diseases and their treatments. The 17th chapter of this book talked about pain. In the book, he introduced narcotic formulations for pain management and sleep induction. The main ingredients of these formulations were devil's snare, lettuce, hemlock and henbane. He used different terms such as Mokhader (anesthetic), Monavem (sedative), Mosabet (hypnotic) and Mosaken (pain relief) for these formulations.

Ibn-e-Sina (980–1037 AD) known in the west as Avicenna was an Iranian physician who had a great impact on medicine [21]. In his book 'canon of medicine' he explained nature of pain as well as its types and causes. He also included a chapter in the book entitled 'Pain and Analgesia' [22]. His classification of pain was very similar to McGill Pain Questionnaire. He also explained a range of taskin (pain relief), analgesics and anesthetic agents which

were used prior to surgeries [23]. As in Canon of medicine, he described different surgical procedures such as oropharyngeal intubation and tracheotomy [24]. For example, he mentioned the analgesic and hypnotic effect of opioids [25]. He also wrote formulations as anesthetic agents for teeth and eye problems [26].

Seyyed Esmaeil Jorjani was an Iranian scholar of the 11th and 12th century whose famous medical book was "Zakhireh Khwarazmshahi" [27]. In his book, he introduced formulations which produced local anesthesia. His formulations mainly contained *Papaver somniferum*, *Hyoscyamus niger* and *Mandragora officinarum*.

Seyyed Mohammad Momen Tunekaboni was an Iranian scholar of the 16th century. He lived during Safavid era and was the physician of Shah Suleyman Safavid [28]. In his book 'Tohfeh Hakim Momen' (Hakim Momen's gift) he described anesthetic (mokhader) as agents which inhibited perception of pain and motion; as an example, he introduced opium. He also wrote that narcotic agents usually had a cold and dry nature. Figure 1

Figure 1. Seyyed Mohammad Momen Tunekaboni definition of Mokhader (anesthetic) in the 16th century.

shows his definition of narcotics in Tohfeh Hakim Momen. This manuscript is presently being kept in Noorani Vesal museum, Shiraz University of medical sciences in Shiraz, Iran.

Aghiliin the 18th century A.D. had a famous meteria medica. This book was called Makhzanul Advia and contained monographs on the medicaments. By the description he provided on each herb, their identification is possible today. The medicinal herbs which were introduced as narcotics in this book are presented in Table 1 [29]. Apart from these herbs, Aghili also explained the topical application of ice for pain management in his book.

Table 1. Medicinal herbs introduced in Makhzan ul-Advia (18th century material medica) as narcotics

| No. | Traditional name | English common name | Scientific name | Family |
|---|---|---|---|---|
| 1. | نان‌كوش | Hemlock | *Conium maculatum* L. | Apiaceae |
| 2. | مرقرا زوج | Kippernut | *Conopodium majus* (Gouan) Loret | Apiaceae |
| 3. | سخ | Lettuce | *Lactuca sativa* L. | Asteraceae |
| 4. | طرخون | Tarragon | *Artemisia dracunculus* L. | Asteraceae |
| 5. | حب الكلي | Stinking Bean Trefoil | *Anagyris foetida* L. | Fabaceae |
| 6. | افنيقون | - | *Hypecoum procumbens* L. | Papaveraceae |
| 7. | افيون | Opium Poppy | *Papaver somniferum* L. | Papaveraceae |
| 8. | مرلي | Darnel | *Lolium temulentum* L. | Poaceae |
| 9. | بيش | Indian Aconite | *Aconitum ferox* Wall. ex Ser. | Ranunculaceae |
| 10. | لفاح | Mandrake | *Mandragora officinarum* L. | Solanaceae |
| 11. | لثامرازوج (دروتات) | Devil's Snare | *Datura stramonium* L. | Solanaceae |
| 12. | بنج | Henbane | *Hyoscyamus niger* L. | Solanaceae |
| 13. | كاكنج | Bladder Cherry | *Physalis alkekengi* L. | Solanaceae |
| 14. | عنب الثعلب | Black Nightshade | *Solanum nigrum* L. | Solanaceae |

## Discussion

Pain management and anesthesia was known to ancient Persians. There are written documents which show the application of Cannabis for analgesic purposes by ancient Persians [5]. Iranian scholars knew the scientific ideas of other ancient civilizations, such as the Greek in this field and added their own experiences to them as well. It was Galen (130-200 CE) who introduced brain as the point-or-origin for pain sensation, unlike his ancestors who accepted heart for this role. He also introduced hidden hollows of nerves as the transferring route of pain. Galen introduced 'disruption of continuity' as the only cause of pain. Avicenna explained Galen's theory in his book and also introduced alteration of the physical condition of the body organs or temperamental changes as other causes of pain. He also expanded on Galen's classification of different types of pain [12]. A Comparison of pain classification made by Galen and Avicenna to the McGill Pain Questionnaire showed the progressions made by Iranian scholars in this field. In this area,four similarities exist between Galen and McGill Pain classification, which are Pulsating, Lancinating, Weighty and Stretching pain. Avicenna introduced these classes of pain and also added Soft, Itching, Breaking, Tiredness, Coarse, Disintegrating, Pricking, Penetrating and Compressing type of pain, which are similar to the modern classification [22]. Iranian scholars also explained the causes and treatments of neuralgia which illustrated their understanding of pain and its physiology [30]. Furthermore, in Iranian medical history, different terms were described for pain management such as Mokhader (anesthetic), Monavem (sedative), Mosabet (hypnotic) and Mosaken (pain relief). Iranian Scholars wrote formulations, as well as single medicaments, which they used as anesthetic agents prior to their surgeries. One of the innovations related to Iranian scholars was the invention of soporific sponge as an anesthetic means. This invention made general anesthesia possible and made many surgical procedures possible [16].

## Conclusion

The footnotes of anesthesia and pain management could be seen in different historical eras of Iran. The development of this field was achieved by the work of scholars and surgeons of different civilizations throughout history. Although the available written documents on ancient Persia are very limited however, the remaining documents showedthe use of anesthetic agents by ancient Iranians. As any other aspect of medicine, the details about

medication used by medieval and more recent Iranian physicians for pain management could be found in their books.

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Sažetak

*Proučavanje povijesti znanosti može pomoći razvoju razumijevanja doprinosa drevnih naroda znanstvenom napretku. Iako su Iranci imali značajan utjecaj na unapređenje znanosti, čini se da povjesničari nisu pridali dovoljno pozornosti povijesti iranske medicine. Ova studija usredotočena je na povijest anestezije i liječenje boli u iranskoj medicinskoj povijesti. U tom smislu povezane knjige kao što su Avesta i Šahname proučavane su kako bi se istražila povijest anesteziologije u iranskoj predislamskoj eri. Navedena je tema također istraživana i u poznatim knjigama Razesa, Haly Abbasa, Avicenne, Jorjanija, Momen Tunekabonija i Aghilija iz različitih doba islamske ere. Znanstvene baze kao što su PubMed, Scopus i Google pretraživane su pomoću ključnih riječi 'iranski', 'perzijski', 'liječenje boli' i 'anestezija'. Otkriveno je da su kontrola boli i anesteziologija bile dobro poznate Irancima. Razes i Avicena također su doprinijeli razvoju u tom pogledu. Identificirano je i navedeno četrnaest Mokhader (anestetičkih) biljaka koje su sadržane u zbirci dotadašnjeg znanja iz 18. stoljeća naslovljenoj Makhzanal-Advieyh te korištenoj kao perzijska Materia Medica. U tom kontekstu ovaj rad predstavlja povijest anesteziologije i liječenja boli u različitim razdobljima povijesti Irana.*

**Ključne riječi:** *anesteziologija; liječenje boli; tradicionalna iranska medicina.*