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Historical Article

Abu Reyhan Biruni (973-1048 CE): The Pioneer in Clarifying the Role of Pharmacy in Medical Practice

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Abstract

Abu Reyhan Biruni (973-1048 CE) was a Persian polymath in medieval era. He had more than 100 books and treatises on different subjects like astronomy, culture, history, mathematics and pharmacy. In medical sciences, he was one of the first persons who introduced pharmacy as a separated field from medicine. He was pioneer to define pharmacy and pharmacist similar to current definitions. It was one of the earliest definitions of pharmacy. Biruni can be introduced as a pharmacist, nor physician. He also had a book on pharmacy, *Al-Saydana fi al-Tibb* (Pharmacy in Medicine). This book is one of the most important works on pharmacy in medieval era. He clarifies the role of pharmacists to serve pharmaceutical services to the patients. It shows the importance of pharmacy as an *independent* field of medical sciences in Persia and Islamic civilization about a thousand years ago.

Keywords: Persian medicine; History of medicine; Pharmacy; Medieval age

Introduction

The history of Persian Medicine exceeds at least seven thousand years [1]. Historical evidence shows that there was an important value for pharmaceutical issues [2,3]. Mostly, it is considered that pharmacy was a part of medicine in ancient times until the time of Frederick the second, the King of Germany and Sicily in the 13th century [4]. However, it seems that pharmacy had been known as an individual science before that in Persia. Jamasb was the first semi-mythical, semi-historical character who was a philosopher and a pharmacist (not physician) in the history of Iran, dating back at least to 3000 years ago [5]. Also, in pre-Islamic Persia, there was a group of physicians who was called as *urvarō baēšaza*. This defines the physicians who work with medicinal plants, namely pharmacists [1]. Later, in Islamic era, there were also some persons who were pharmacists like Māsawayh (father of Yūhannā ibn Māsawayh). He was famous for his skills in pharmacy in Jondishapour University in 8th century CE [6]. Jondishapour was the first teaching hospital in the history, located in South Western part of Persia and founded during Sassanid kingdom (224-637 CE) in 4th century CE [7]. Also, there were pharmacies in the hospitals where serving pharmaceutical services were separated from medical services. These pharmacies were called as sharbat khaneh (house of syrups) and the chief of these pharmacies (pharmacist) was called *sheykh-e-seydalani* (head of pharmacy) [8]. Furthermore, there were many types

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of pharmaceutical books in the early medieval Persia. *Qarabadin Kabir* is the first remained pharmacopeia in the history; written by Shapur Sahl, the rector of Jondishapour University in 869 CE [9].

In Islamic civilization, pharmacy like other medical sciences was raised during 9-13th century CE which is called as Islamic Golden Age. There were many physicians and pharmacists like Rhazes (865–925), Haly Abbas (930–994) and Avicenna (980-1037) who had great contribution into the fields of medical sciences. Some of their books like *al-Qanoun fi-Teb* (*The Canon of Medicine*) by Avicenna, *al-Hawi* (*Liber Continens*) by Rhazes were used as the main medical textbooks in the Western and Eastern universities at least until 17th century [10]. One of the important figures during that time was Biruni who was a polymath [11]. His scientific character was mostly considered as astronomist, geologist and anthropologist [12]. But, he was a pharmacist, too; while it was not well-illustrated in scientific literature. Therefore, this paper aims to introduce the biography of this important scientist as a polymath, in particular pharmacist.

Biography of Biruni

Abū Rayḥān Muḥammad ibn Aḥmad Al-Bīrūnī (Figure 1), who was known as Biruni in English literature was born in a Persian family in Birun, a village near Kath in Horesmia (Chorasmia or Khwarezm; North East of Old Persia) in 973 [13,14]. As he was born outside of Horesmia (current Khiveh), he got the epithet Biruni which means “out of” in Persian language [15]. Biruni finished his primary education in Urgench in Horesmia [15,16]. His first teacher for astronomy and mathematics was Abu Nasr Mansur who was a famous Persian scientist, belonging to a royal family [17]. Until 1005, Biruni served in the field of astronomy before leaving Horesmia [15]. At that time, he leaved there and went to Rey (center of Iran, near current Tehran). Later, he lived in Gorgan (North of Iran) in the court of Qabus in ibn Wushmagir, the king of that region [15,16]. In 1009, he returned back to his homeland and started discussing and idea consultancy with great scientists like Avicenna [16,18]. Later, Biruni wrote the biography of Rhazes and also some books about his works [18]. Sultan Mahmud Ghaznavi (971–1030), the king of Ghaznavid dynasty forcibly took Abu Rihan al-Biruni to Ghazni [14]. When the king conquered India, Biruni traveled to this country, learned Sanskrit language and searched about Indian cultures and knowledge and finally wrote some books about his knowledge about Indians [19]. After that, he spent the rest of his life in Ghazni (East of Old Persia), the capital of Ghaznavid Empire in the court of kings. Finally, he passed away in 1048 in this city [15,20].

Figure 1. The statue of Biruni in the Laleh garden of .Tehran, designed by Mohammad Ali Madadi in 1994

Biruni as a polymath

Biruni was a Persian polymath who became expert in astronomy, mathematics, engineering, philosophy, ecology, travel, and pharmacy [16,21]. He had a number of hypothesis and findings in these fields of science like measuring the circumference and diameter of earth; finding the cause of Artesian wells mechanism; guessing about the existence of current America; and etc [15]. He had more than a hundred books and treaties (some sources mention 148 titles) in that subjects [15]. Although his native language was Persian (Khwarezmian) [22], he preferred to write most of his books in Arabic because it was the *lingua franca* of that time. Some of the most important ones are as follows:

• *Kitab al-Athar al-Baqiyah `an al-Qurun al-Khaliyah* (The remaining signs of past centuries/the chronology of the old people): The first book that Biruni wrote on astronomy and calendar. This book is a chronology concerning cultural events in the calendar of various ancient civilizations accompanied with historical descriptions about these ceremonials and events. He denoted this book to Qabus, the king of Gorgan [23,24].

• *Qanun Masudi* (The Mas’udi Canon): a book about astronomy [25,26].

• *Tahdid Nahayat al Amaken le Tahsis Masafat al Masaken*: A treatise on mathematical geography [19]

• *Kitab al-Jamahir fi Ma’rifat al-Jawahir*: About mineralogy and jewelry [27].

• *Kitab al-Tafhim li-Awa'il Sina'at al-Tanjim* (The Book of Instruction in the Elements of the Art of Astrology): Biruni dedicated this book to Reyhaneh, the daughter of the king. This book is his sole book written in Persian [28].
• *Tahghigh Ma Lel-Hend* (Albiruni's India): It is a book on history, culture, philosophy and life in India [29].
• *Al-Saydana fi al-Tibb* (Pharmacy in Medicine): It is a book in pharmacy [30].
He also knew many languages like Persian, Arabic, Sanskrit, Assyrian and Greek. He used this ability in his findings and learning knowledge from other countries. Also, he translated some books into Persian [15].

Biruni as a pharmacist

Biruni was a pharmacist as well as his other professions as a polymath. He had a great book on pharmacy *Al-Saydana fi al-Tibb* (Pharmacy in Medicine). He presented a definition for pharmacist (*seydalani*) in this book similar to current concept as the person who "*should have enough knowledge about collecting drugs, choosing the best ones, preparing formulations based on accepted methods, and so forth*" [30,31].
He also presented one of the first definitions for pharmacy as a separated field of science from medicine as follows: "*pharmacy (Seydaneh) became independent from medicine as language and syntax are separated from composition, the knowledge of prosody from poetry, and logic from philosophy; for pharmacy it is an aid to medicine, rather than a servant*" [31-33].
He classified learning pharmacy in three steps:
1- Preliminary stage: learning pharmacology of drugs based on only study of drugs information
2- Advanced stage: Learning natural sciences and the philosophy and logic behind the pharmacology. The person who passed this stage reaches to advanced knowledge that can have his/her own analysis on pharmacology.
3- Final stage: the final stage is practice. Pharmacist needs to have enough practice and experience to be well familiar to drugs and serve pharmaceutical services. Biruni also mentioned that pharmacist needs to have teachers to learn pharmacy well [31]. Furthermore; he discussed about the rout of the word "*Seydalani* (pharmacist)" and believed that it derived from an Indian word "Chandal". Chandal refers to Indian sandalwood (*Santalum album* L.) [31].

The book of Al-Saydana fi al-Tibb (Pharmacy in Medicine)

As Biruni said, he was curious about learning the ingredients used in medications since he was an adult, so during his lifetime, he accumulated and acquainted himself with a lot of information but he could not find the chance to transform them into a book until he was an old man. Towards the end of his life, he wrote his book called *Al-Saydana fi al-Tibb* with the help of his physician friend, Abu Ahmed ibn Muhammed Nahshaei (or Beyhaghi) [34].
Biruni used his ability to understand different languages to use a wide range of references in different languages like Indian, Greek, ancient Persian, Syrian, and so on. He carefully cited to the references he used and it is a valuable source to find many unknown physicians and books in ancient eras. There are about 250 physicians he cited to them in his book [18,31].
Biruni wrote *Al-Saydana fi al-Tibb* in Arabic because it was the *lingua franca* of that time. Later, it was translated to many languages including Persian (in 13th century by Kasani), Russian, German, and English. *Saydana's* Arabic copy was first kept in the city of Kayseri in Turkey. It was later transferred to Bursa where it was preserved in Kurşunluzade Library [34].
Max Mayerhof who translated *Al-Saydana fi al-Tibb* into German in 1932 used this bulletin while expressing his character: "I did not see a treatise on pharmacy that criticized previous works in the language of Arabic, which seems to have been a battle of writers about pharmacy before this." Also, Karimov, the translator of *Al-Saydana fi al-Tibb* to Russian stated that "*Saydana is the most precious historical work on pharmacology in the middle age in the east that gives us the most complete imagination about known drugs in that era and clarify some theories of this field* [31]."
Al-Saydana fi al-Tibb consists of two main parts: the preface and the main part (Table 1). Biruni presented 1116 monographs on herbal, mineral and animal

Table 1. The content of the book of *Al-Saydana fi al-Tibb*

The content of the book	
Preface	Main Body of the book
Introduction: Definitions of pharmacy and pharmacists and their role in medical sciences	29 Chapters according to the Arabic alphabet. All 1116 monographs of herbal, mineral and animal simple drugs are sorted and put alphabetically in these 29 chapters.
Chapter 1: The origin and root of the word *seydanani* (pharmacist)	
Chapter 2: Classification of drugs to simple (one ingredient) and compound drugs and the response of body to foods, drugs and poisons	
Chapter 3: About replacements of drugs and also the role of civilizations to progress of science	
Chapter 4: About Persian and Arabic languages	
Chapter 5: About his interests to herbals and the content of the book and also the references he used in this book	

simple drugs in this book. He mentioned to more than 4500 names of herbal, animal and mineral drugs and their products during these monographs. Each monograph consists of the names of drug in different languages like Arabic, Persian, Indian, Syrian, Greek and even sometimes local names; then morphology and complete description of the drug, discussing about the quality of different types of that drug, and also replacements for this drug when it is not available. Biruni does not talk about pharmacology of drugs in this book. It seems that the book was not completed due to Biruni's death and some monographs seem to be incomplete [31].

Conclusion

Biruni was a great polymath and expert in various professions. However, in medical sciences, he was a pharmacist, nor physician. Furthermore, Biruni's definitions on pharmacy and pharmacist are important historical issues showing that the separation of pharmacy and medicine dates back to at least 1000 CE in the Islamic territories. Also, his work *Al-Saydana fi al-Tibb* was a book solely on pharmacy and it did not contain pharmacological topics. It shows the importance of pharmacy as an independent field of medical sciences in Persia and Islamic civilization about a thousand years ago.

Conflict of Interest

None.

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