

Transformation of Pharmacology in the Islamic Civilization

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Abstract: This study is a research on the transformation of pharmacology in the Islamic civilization (7th-10th centuries AD). Its purpose is to expose the development and progress in this field. The objective is to highlight the factors which led to transformation in this field. The research method used is content analysis by examining sources on pharmacology in the Islamic civilization to obtain information on the extent of transformation which had occurred in this field. Results analysis shows that the transformation of pharmacology did occur in the Islamic civilization. It began with a focus on only pharmacotherapy and extended to the rise of the fields of pharmacy, pharmaceuticals and toxicology. Results analysis also shows that the transformation of pharmacology occurred because of six factors. The first factor was the great increase in demand for medicine in the market. Second was the extreme curiosity about pharmacology. Third was the maturity of professionals in this field. The fourth factor was the royal patronage and commands issued by the rulers. Fifth was the translation movement which occurred in the Muslim world and the sixth factor was the development in other fields of knowledge.

Key words: Pharmacology, Islamic civilization, transformation, toxicology, information, Malaysia

INTRODUCTION

Beginning in the 8th century, the Muslim world was inundated with scientific and technological knowledge which was absorbed from earlier civilizations into the Islamic civilization. Among these fields of knowledge absorbed was in the area of pharmacology. Pharmacology was one of the areas encompassed in the field of medicine. As with medicine, it is vital to human life throughout time as it plays the role of searching, studying as well as preparing medicine for treating diseases. Without it, patients would face difficulty in getting healed.

Before pharmacology was practised in the Islamic civilization, it had appeared earlier in previous civilizations such as the Greek, Egyptian, Chinese and Indian. After it was brought into the Islamic civilization, it went through transformation from time to time. This transformation occurred with the development and improvement of this field which is perceived in the early Islamic period in the golden age of the Islamic civilization and the post-glorious period. Hence, this study will set out in detail the transformation which had occurred in pharmacology in the Islamic civilization, in addition to studying the factors which caused it.

DEFINITION OF PHARMACOLOGY

Pharmacology is a combination of two Greek words, *pharmakon* and *logos*. *Pharmakon* means medicine whereas *logos* means to speak. The combination of these two words means speech about medicines. Based on Kamus Dewan, pharmacology means science or study of medicine (or drugs), their physical properties, preparation, uses and effects.

In terminology, there are two definitions of pharmacology. The first opinion states that pharmacology is a study of the interaction between chemicals (medicines) and the organism (body system). The second view states that pharmacology is the science or field of knowledge related to the interaction between a living organism and the molecules of a substance, especially chemicals which enter from outside the organism. Thus, it can be summarised that pharmacology is a field of knowledge which studies medicines and its interaction with a living organism (Razak, 1985; Bertram, 1984).

BRIEF INTRODUCTION TO PHARMACOLOGY

Pharmacology is one of the branches of medical science such as biology, physiology and anatomy. As

with other medical sciences, pharmacology according to Razak (1985) can be subdivided into several more specific areas such as pharmacodynamics, pharmacy, pharmaceuticals, pharmacokinetics, pharmacotherapeutics or named as clinical pharmacology, pharmacognosy and toxicology.

Each subdivision has its own field of study and each field differs from the others. In the field of pharmacodynamics, study is more focused on the power or effects of drugs on the parts of anatomy in an organism while pharmacokinetics is a study of the way the body takes up, distributes and eliminates medicine or drugs (Ravindra Rao and Narsing Rao, 1982).

Pharmacy refers to the tasks of pharmacists in the preparation of medicines for patients. It includes identifying, standardising, processing, formulating and dispensing of medicines to patients. In addition, they also provide advice to doctors and patients on the dosage and side-effects. Pharmaceutics is a field closely linked to pharmacy. This field studies the ways of preparing medicine or drugs.

In addition, pharmacotherapeutics or known also as clinical pharmacology or pharmacotherapy is a field which studies the methods of using medicine in treating diseases and their symptoms. Pharmacognosy studies medicines from natural sources such as flora, minerals and fauna in their unprepared state. And toxicology is a study of toxins or poisons which are released by drugs or medicines in the body, their effects, detection and antidotes, etc. Each specific subdivision plays an important role in the transformation of pharmacology (Tjay and Rahardja, 1980).

THE HISTORY OF THE EMERGENCE OF PHARMACOLOGY IN THE MUSLIM WORLD

Brief history: Pharmacology as a body of knowledge had long existed in earlier world civilizations. These were the civilizations of Mesopotamia, Greek, India and Ancient Egypt. But pharmacology was a new field of knowledge in the Islamic civilization. Even though it had emerged in Arab land before the Islamic era and was inherited by the Muslim world, this could not be proven as there were no records or manuscript discovered for that era, unlike the discovery of writings on clay tablets which proved this knowledge existed in the Mesopotamian civilization. Levey (1973) explained that the existence of pharmacology was only recorded in pre-Islamic poetry.

That Arabic poetry as recorded by Ibn Khaldun and quoted by Pormann and Smith (2007) is as follows:

Many a wailing women have I sent away when
the star Belletrix rose who wailed whilst
examining the wound so that her palm and wrist
disappeared (in the wound), (the wound) of a
man whose head is bent and whose wound
exhaled blood, (a woman) who separated his
joints with a probe as the comb separates the
hair hanging down

The poem above shows that the Bedouins who lived in the desert of Arabia had the knowledge to treat disease by using natural medicines made from flora, fauna and minerals. So, when Islam was revealed there, it was inherited by the Muslim world. This shows that pharmacology had already existed in the Islamic civilization when Islam was revealed at the time of the Prophet (PBUH) (Levey, 1973).

However, during the Prophet's (PBUH) time pharmacology was not as fully developed as today. It was centred only on the area of pharmacotherapy. Then around the 7th or 8th centuries AD, pharmacology began to rise and experience transformation in the Islamic civilization. It was increasingly explored in depth. The rise and flow of knowledge occurred around the 7th or 8th centuries AD in the Islamic civilization. This led to the view that pharmacology appeared in the Islamic civilization in the 7th or 8th centuries AD (Syed, 2002).

Generally, the rise of pharmacology in the Islamic civilization was through translation. Translation of this knowledge had begun ever since, the Umayyad Muslim army captured Jundishapur city, a renowned centre of knowledge consisting of a hospital and its academies. The conquest occurred in the year 636 AD. However, according to Levey (1973), on examining history, translation activity occurred earlier in Jundishapur in early 6th century AD when the Persian ruler then King Chosroes Nushirwan encouraged translation activity from various languages into Syriac (Syed, 2002).

As the hospital and academies in Jundishapur were not destroyed at the time of the conquest by the Muslim army, Jundishapur turned into a cultural city for the new Muslim ummah. This led the Muslims to study pharmacology, science and other fields of knowledge. When translation activity intensified, pharmacology became increasingly developed in the Islamic civilization.

In summary, pharmacology had already appeared in the Islamic civilization by the time Islam was revealed. However, the rise of pharmacology in the Islamic civilization began about the 7th or 8th centuries AD which caused the confusion that it emerged only then. The emergence was through the conquest of Jundishapur city as well as through translation.

PROMINENT FIGURES WHO CONTRIBUTED TO THE RISE OF PHARMACOLOGY IN THE ISLAMIC CIVILIZATION

There were several figures who contributed to the rise of pharmacology in the Islamic civilization. They comprised of Muslims and non-Muslims. One of them was Yuhanna bin Masawayh.

Yuhanna bin Masawayh was one of the doctors in the Jundishapur Academy. He was born in Baghdad to a Nestorian Christian family during the rule of Caliph Harun al-Rashid (786-809 AD). His father, Masawayh came from Jundishapur to Baghdad and served as pharmacist to a doctor, Jibra'il bin Bakhtiyashu. His mother Risala was a slave bought by his father from a doctor named Dawud bin Sarbiyun. Thus, it can be deduced that he was born and raised in a Nestorian Christian medical environment which played an important part in the 8th and 9th centuries AD in the Muslim world (Kirmani and dan Singh, 2005).

Yuhanna was a personal doctor to Caliph Harun al-Rashid, Caliph al-Ma'mun as well as three later caliphs. During the rule of Caliph Harun al-Rashid, he was commanded by the Caliph to translate Greek medical books bought from Byzantine and ancient books found in Ankara as well as other Roman cities conquered by the Muslim army. He translated many books as well as wrote his own books (Tschanz, 2003).

His contribution in pharmacology was in terms of book translation as well as his own writings. Among his famous writings was a book on pharmacy, *Kitab al-Nawadir al-Tibbiyyah*. In addition, in his writing on aromatic simples, he had listed as many as 30 types of aromatics, their physical properties method of detecting adulteration as well as their pharmacological effects. In addition, he also wrote the book *al-Mushajjar al-Kabir*, a medical encyclopaedia on diseases and their treatment through medicines and diet practices (Plinio, 2004; <http://www.islamset.com/heritage/pharmacy/3rd&9th.html>).

Yuhanna bin Masawayh is an example among non-Muslims who contributed to the development of pharmacology in the Muslim world. This shows that the emergence and development of science and technology in the Muslim world was not necessarily initiated or pioneered by Muslims. Of course, there were Muslims who contributed to the emergence of pharmacology in the Islamic civilization. Among them was Hunayn bin Ishaq al-Ibadi.

Hunayn bin Ishaq al-Ibadi was one of Yuhanna's students. He became Head of Bayt al-Hikmah during Caliph al-Ma'mun's rule. Among his contributions was

the translation of many books in Greek and Syriac into Arabic including books on pharmacology, especially the researchers by Galen, a Greek doctor.

TRANSFORMATION OF PHARMACOLOGY IN THE ISLAMIC CIVILIZATION

This study discusses the transformation which occurred in pharmacology in the Islamic civilization. It can be perceived in the early Islamic period that pharmacology did not exist as an independent field until its emergence and development in the Golden Age of Islam.

Early Islamic period: Early Islamic period began with the first Divine revelation to the Prophet (PBUH). At that time, knowledge of pharmacology existed in Arab society as Bedouin herbal lore and was passed down the generations from the pre-Islamic period to the Arabs of the early Islamic period. In pre-Islamic times, knowledge was discovered indirectly through individual experience. Then, the knowledge was inherited orally through poetry by successive generations. This fact shows that pharmacology existed in the Islamic civilization as early as the appearance of Islam (Ponnamm and Smith, 2007).

However, there was only one field related to pharmacology that is pharmacotherapy (knowledge of treating diseases using medicines) which existed earlier than pharmacology. Apart from being a legacy from pre-Islamic times, it also existed earlier because with the revelation of Islam, personal cleanliness and health were emphasised. In fact, there are Quranic verses which touch on medical matters. Among them are verses 68-69 of surah Al-Nahl which mention that Allah has created a remedy (honey) for mankind for many kinds of diseases. These verses support the notion that pharmacology, specifically pharmacotherapy, existed in the early Islamic period.

Further, it is observed in principle based on the Quranic verses above that medicines of that time were inclined to be from natural sources such flora, fauna and so on. At that time, drug medicines based on chemicals were not yet in use. This shows that knowledge of the chemical composition of a medicine for treatment of a particular disease was not yet studied and identified. This also goes to show that pharmacology had already existed in the early Islamic period but was not yet fully developed.

In the early Islamic period, most of the disease treatments were based on the Prophet's (PBUH) ways. Although, there was then a doctor available by the name of Al-Harith bin Kaladah who received his medical

training in Jundishapur yet the Muslim ummah of that time were still inclined towards treatment according to the Prophet's (PBUH) methods. However, the Prophet's (PBUH) knowledge on treatment of disease, more or less, came from al-Harith himself because the Prophet (PBUH) was one of his patients. Among the treatments suggested by the Prophet (PBUH) included cupping, cauterization and dietary practices (Browne, 2003).

Dietary practice as a treatment method is perceived when the Prophet (PBUH) recommended a certain food for a patient. Among the types of disease and their remedies according to the Prophet (PBUH) was fever and the recommended remedy was drinking lots of water. The remedy for diarrhoea was honey. And oedema could be treated with drinking camel's milk. In addition, many other foods were suggested by the Prophet (PBUH) as remedies or to prevent diseases (Penelope, 1998).

Cupping was a practice suggested by the Prophet (PBUH) in preference to cauterization. In a Hadith of Sahih Bukhari quoted by Penelope (1998) is stated:

From Sa'ad b. Jubayr, from Ibn 'Abbas that the Prophet (PBUH) said: Healing lies in three things: drinking honey, the incision of the cupping glass and cauterization by fire. I forbid my community to practise cauterization

This shows that the Prophet (PBUH) expressly forbade cauterization for Muslims except when there was no choice. Cupping is a process which drains out or extracts blood through the skin layer. It was normally done on the 17th, 19th or 21st day of each month to avoid interfering in blood circulation. This treatment was to cure and alleviate diseases of the eyes, nose and ears, shoulders and neck, according to the part of the anatomy cupped (Penelope, 1998).

Even though according to the Hadith above, the ummah was forbidden to practise cauterization by the Prophet (PBUH), it was a treatment of last resort thus making it permissible if there were no other choice. Cauterization was usually done to treat wounds which could not be treated by medicines. It was done by burning the wound so as to stop bleeding (Penelope, 1998).

The golden age of Islam: The golden age of Islam began in the 8th century and lasted until the 9th century AD during which translation was intensively done. Pharmacology was developed by this translation activity and went through a transformation. In this transformation, pharmacy appeared as a separate field from the medical field (Tschanz, 2003).

During the Umayyad period, pharmacology was not clearly known by its activity. But what is certain is that

pharmacy for the first time appeared in the Islamic civilization. This is evident from the discovery of glasses of different sizes. These glasses are believed to be designed for pharmacists of that period. Another discovery was a measuring cup 70 mm high with a kufi khat stamp similar to the Umayyad official style of writing. This cup was used to measure amounts of medicine.

The other transformation in this period was the progress in technique and technology of preparing medicines. This transformation was the outcome of the peak in development of chemistry which occurred in the 9th century AD (Tschanz, 2003).

According to Tschanz (2003), chemistry appeared in the Islamic civilization in the 7th century AD. In the 8th century AD, chemistry was further developed by the alchemist and the world's first practical chemist, regarded also as the father of chemistry, Jabir bin Hayyan. Known as Geber to the Westerners, he founded the experimental scientific method and made many new discoveries. Among them was the method to refine metals, preparation of various substances as well as the use of the chemical, iron pyrite to make gold writings. This shows that chemistry at that time had thrived (Sarton, 1975).

In the 9th century AD, development in chemistry reached its peak. A prominent figure who played an important role in its development was Muhammad bin Zakariyya al-Razi, known as Rasis or Rhazes to the Westerners. In the 9th century AD, new ways of making medicines were discovered. This was made possible by the progress made in chemistry which found methods of making medicines by extraction, distillation and crystallization. Al-Razi invented a variety of apparatus to cater for the new methods mentioned. With this, pharmacy became more advanced (Sarton, 1975; Syed, 2002).

The transformation which followed occurred in pharmaceuticals as a result of the development in botany in the Islamic civilization during the 10th century AD. Botany helped in the development of pharmacology as a consequence of discoveries by botanists regarding flora which could be made into medicine for treating diseases. In addition, pharmacology went through another transformation during this time with the development of toxicology, a field which studies poisons and ways of antidoting them (Tschanz, 2003; Sarton, 1975).

Briefly, pharmacology experienced transformation throughout the duration of the Islamic civilization. Beginning with the early Islamic period, pharmacology was limited to pharmacotherapy. Then, in the golden age of Islam, it went through transformation with the appearance of pharmacy. With the development of other fields, pharmaceuticals and toxicology also developed.

REASONS FOR TRANSFORMATION IN PHARMACOLOGY

Transformations in pharmacology were caused by several factors. According to Tschanz (2003), the emergence and development of pharmacology in Islamic civilization was caused by three main factors. First was a great increase in demand for medicines in the market. Second was the extreme curiosity towards pharmacology and third was the maturity of the professionals in this field.

In addition to the three main factors above, other factors also had an effect on transformation of pharmacology. Among these was the patronage of the rulers and their direct orders or commands such as the order issued by Caliph Harun al-Rashid to Yuhanna, his personal doctor to translate Greek medical books bought from Byzantine as well as ancient books found in Ankara and several Roman cities captured by the Muslim army. Through the Caliph's order, pharmacology increasingly developed in the Muslim world (Tschanz, 2003).

The next factor was the intense translation activity which occurred in the Muslim world. During the golden age of Islam, there was intensive translation of knowledge from other civilizations such as the Greek, Indian and Roman civilizations. Numerous books were translated from other languages into Arabic including books on pharmacology. This translation had an impact on the flow of knowledge into the Muslim world.

Another factor just as important in contributing to the transformation of pharmacology was the development of other fields of knowledge. This was evident by the progress of pharmacy in the Muslim world following the development of chemistry and botany. In the Islamic civilization, chemistry appeared during the Umayyad rule in the 7th century AD through, translation of chemistry books into Arabic. The appearance of chemistry in the Islamic civilization was pioneered by Prince Khalid bin Yazid.

When chemistry developed in the 9th century AD, it helped in the development of pharmacy in the context of preparing medicines. Through the methods of extraction, distillation and crystallization developed by chemists, preparation of medicines was upgraded by one more level. Likewise with the development of botany which enabled many herbal plants to be identified and used for preparing medicines. This shows that developments of other fields, in this case, chemistry and botany, contributed to the transformation of pharmacology (Syed, 2002).

Based on the above, it can be summarized that several factors played an important role in the transformation of pharmacology in the Islamic civilization.

Beginning with the Caliph's patronage and commands to the initiative of the common people to explore knowledge in depth, there was a positive impact on the development of pharmacology in the Islamic civilization.

CONCLUSION

The study shows that Pharmacology is the study of medicines, their physical properties as well as their interaction with the human anatomy. Bedouin herbal lore appeared in the Arab land even before the birth of Islam. By the time Islam was revealed, this knowledge had been inherited through successive generations from pre-Islamic times by the Muslim world. However, this field experienced transformations only around the 7th or 8th centuries AD. Such transformation was the result of scholarly work in intensively translating works from earlier civilizations into Arabic language. Among the early scholars who contributed to this transformation was Yuhanna bin Masawayh, a Nestorian Christian as well as his student, Hunayn bin Ishaq al-Ibadi.

Transformation in the field of pharmacology can clearly be perceived in two Islamic periods that is early Islamic period and the golden age of Islam. Beginning from the early period of Islam, pharmacology was limited to pharmacotherapy or the knowledge of treating diseases with medicines. When the Muslim world experienced its golden age during Abbasid rule, pharmacology became increasingly developed and experienced transformation and resulting in the rise of the new fields of pharmacy, pharmaceuticals and toxicology. Pharmacy is a field relating to the preparation and dispensation of medicines. Its progress occurred with the development of chemistry and botany.

Various factors played a role in the transformation of pharmacology in the Islamic civilization. The factors which played a main role in the development of this field was the great increase in demand for medicines, the extreme curiosity towards pharmacology and the maturity of the professionals involved. Other factors which gave the impetus for the development of knowledge in pharmacology were the patronage and commands of the rulers, the intensive translation as well as the development of other related fields.

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