

# Arab Muslims' Medicine and Pharmacy in Andalusia: 138-172 A.H./ 755-788 A.D

Sahar A.M. Al-Majali, Ph.D.

Associate Professor Department of Social & Applied Science, Princess Alia University College,  
 Al-Balqa' Applied University, P.O. Box: (144211) Amman (11814) Jordan

## Abstract

Andalusia played remarkable role in disseminating Arab system of medicine and pharmacy to rest of Europe and through Europe to other parts of the globe at a time when most of the geographic regions were living in the 'dark ages.' The Islamic scholars translated the Greek classics, studied them, particularly in the realm of medicine, conducted their own research and made new innovations in the field of medicine, pharmacy and other sciences thus enriching the existing knowledge. The world had almost lost the original Greek classics texts and the Arabic translations of these classics well-preserved were again translated into Latin and other languages and thus reached to Europe and other parts of the globe.

**Keywords:** Andalusia, Arab- Muslim's, Europe, Greece, Medicine, Pharmacy.

## 1. Introduction

**I. Subject of the Study:** Arab Muslims' Medicine and Pharmacy in Andalusia: 755-788 AD

**II. Problem of the Study:** To analyze the role and contribution of Andalusia in disseminating Arab system of medicine and pharmacy in rest of Europe and other parts of the world.

**III. Limitations of the Study:** This analysis is limited to developments in the field of medicine and pharmacy in Arab World as well as Andalusia from eighth century to tenth century. References to other periods and regions are cursory to prove the point or support the inferences.

**IV. Theoretical Framework:** It is a historical topic and no theoretical framework has been developed..

**V. Methodology:** Major tools of research – historical, analytical and comparative – have been applied. More emphasis is on historical technique. Relevant material available in English, Spanish and Arabic languages has been used.

**VI. Previous Researches etc:** This topic has not formed a part of serious academic analysis in recent years. The research studies available pertain to Western interpretations and there is dearth of Arab Islamic perspective in respect of Andalusia's role in disseminating knowledge about Arab system of medicine and pharmacy to the rest of world.

**VII. Results and Conclusion:** The trends emerging from this study show that Andalusia played remarkable role in disseminating Arab system of medicine and pharmacy to the rest of the contemporary Europe and while imbibing this system for itself, the Muslim scholars of Andalusia also made noteworthy contribution to Islamic medicine.

**VIII. Bibliography:** The books and other materials used in the study are shown in the notes. Both Arabic and English sources have been used.

## IX. Outline of the Study:

1. Introduction
2. Preface
3. Advent of Islamic Medicine
4. Ibn Sina
5. Al-Zaharawi
6. Ibn Rashid
7. Arab Pharmacy
8. Al-Razi's Contribution
9. Role of Andalusia
10. Conclusion
11. Notes

## 2. Preface

Development of medicine and pharmacy has not been an overnight phenomenon, but the culmination of endeavours of millions of people, of which some are known to us and others we do not. The flame of civilization, including medicine, has been kept aloft for thousands of years and has been handed over from one generation to another and from one country to the other. Depending on who took the onus of hosting it, sometimes it got brighter and sometimes it got dimmer, but it never died away, because if it did, it would have been too hard to start all over again. Between the ancient civilizations of Egypt, Greece, Rome, Persia, India, and China, and the

Renaissance era in Europe, there was a gap, commonly called *jahalia* or "the dark ages", during which the flame of civilization and science was hosted, not by the West, but by the Arab Muslims.

The term, 'the dark ages', refers to the period in Europe between the 7th and 13th centuries. However, the civilization, culture and science in the Arab world or the Islamic Empire at that time were as bright as the mid-day sun. That era has been usually neglected and over-passed, as if nothing happened. In the aftermath of the decline of the Western Roman Empire in the fifth century, Europe lost touch with much of its intellectual heritage. Of Greek science, all that remained were Pliny's *Encyclopedia* and Boethius's treatises on logic and mathematics; the Latin library was so limited that European theologians found it nearly impossible to expand their knowledge of their own scriptures (Tschanz, 2008).

The church, which had become centre of Europe's new worldview, exerted deep new influences in medicine. Undoubtedly, the Christian monastic orders ran fine hospitals, but those were merely places to look after seriously ill patients, who were expected to either recover or die as God willed. There was acute dearth of learned physicians to attend the patients, only kindly monks who dispensed comfort and the sacraments, but not medicines. Owing to the Christian Church's emphasis on care of the soul far more important than care of the body, almost all Europeans came to regard illness as a condition caused by supernatural forces, which could assume the form of diabolical possession. Therefore, diseases could only be remedied by religious means. Kings, considered as divinely appointed, were believed to be able to cure various maladies, with the 'royal touch.' The resultant outcome of these developments was discernible in the neglect of the study of disease and well-being of patients along with the petering out of licensed medicine as an independent craft. The so-called physicians were mostly linked with monasteries and abbeys. The ban on surgery by the monks imposed by the Catholic Church in the middle of the seventh century culminated in putting an end to the practice of surgery in Europe. Such were the conditions prevailing throughout Europe prior to the advent of Islam.

### 3. Advent of Islamic Medicine

The coming of Islam in the seventh century was followed by continuous geographical expansion in the eighth century and an unprecedented era of ferment in all branches of learning. The Arab Muslims lost no time in melding the various cultures of the Islamic domain, which by the tenth century extended from the Rann of Kutch in India to the south of France (For more details in this regard see: *Aramco World*, 1991). The Islamic scholars accorded priority to study medicine among the Greek sciences. The medical school at Jundishapur in Persia emerged as the greatest center of medical teaching in the Islamic world between seventh and ninth centuries. The Islamic physicians there first studied the works of Hippocrates, Galen and other Greek physicians and concomitantly they were also exposed to the medical knowledge of Byzantium, Persia, India and China.

Medicine in Islam passed through three stages. The first stage was the stage of translation of foreign sources into Arabic. It extended mainly during the seventh and eighth centuries. The second stage was the stage of excellence and genuine contribution in which the Islamic physicians were the leaders and the source of new chapters to medicine. This stage extended during the ninth through the thirteenth centuries. The third stage was the stage of decline where medicine, as well as other branches of science, became stagnant and deteriorated, mainly after the thirteenth century.

During the first stage, Islamic scholars did a marvelous job by translating honestly the ancient literature from Greek in Arabic. They translated different branches of science including philosophy astrology, and medicine. The establishment of a translation bureau in Baghdad, known as *Bayt al-Hikmah*, or House of Wisdom, in the closing part of the eighth century to facilitate translation of Greek works into Arabic proved instrumental in ushering in the first era in Islamic medicine (For further information see: *Aramco World*, 1982). By the closing part of the ninth century, Hunayn ibn Ishaq al-Ibadi (809-73), and his team of translators had rendered most of Greek medical texts, including all the works of Galen(131-210 A.D.), Oribasius, Paul of Aegin, Hippocrates(460-370 BC), and the *Materia Medica* of Dioscorides, into Arabic and these translations laid the foundations of Arab medicine system.

The Arabic translation of Greek classics helped in preserving the knowledge for the posterities because from Arabic, the classic Greek literature was translated into Latin, then into Greek as most of the original scripts were lost and the only source was the Arabic translation. The Arabs not only preserved the ancient literature but handed over the same to Europe, which was a great contribution in itself.

Geoffrey Chaucer, the great English poet, in the 'General Prologue' of *The Canterbury Tales*, had identified the authorities used by his "Doctour of Phisik" in the following six lines:

*With us ther was a Doctour of Phisyk  
In all this world ne was ther noon him lyk  
To speke of phisik and surgerye, . . .  
Wel knew he the olde Esculapius,  
And Deiscorides, and eek Rufus,  
Old Ypocras, Haly, and Galien,*

*Serapion, Razes, and Avicenna*. (Chaucer's poetry cited in: Tschanz, 2008).

The list includes four Arab physicians: Jesu Haly (Ibn 'Isa), Razi (Al-Razi, or Rhazes), Avycen (Ibn Sina, or Avicenna) and Averrois (Ibn Rushd, or Averroes). Chaucer cited these four not to make his list only to add an exotic flavour to his late-14th-century poetry, but because they were considered as among the great medical authorities of the ancient world and the European Middle Ages, physicians whose textbooks were used in European medical schools, and would be for centuries to come. In order to comprehend the full gamut of the issues involved in the development of Islamic medicine in Europe in general and Andalusia in particular, it seems essential to briefly appraise the role and contributions of these Muslim physicians of that period.

#### 4. IBN SINA

Born in Bukhara (Uzbekistan), Abu 'Ali al-Husayn ibn 'Abd Allah ibn Sina (980-1037), known in the West as Avicenna, was to the Arab world what Aristotle was to Greece, and Leonardo da Vinci to the Renaissance (Keys and Wakim, 1971). Called by his contemporaries as 'the prince of physicians', Ibn Sina was a genius whose preeminence was not confined to medicine only but also embraced the realms of philosophy, science, music, poetry and statecraft. He is reported to have completely memorized the Qur'an by age 10. Having studied law, mathematics, physics, and philosophy, he turned to the study of medicine at the age of 16 and within a short span of two years, his fame as a physician was so great that he was summoned to treat the Samanid prince Nuh ibn Mansur. His success with that patient earned him access to the Samanid royal library, one of the greatest of Bukhara's many storehouses of learning.

He authored many books, of which 20 deal with various aspects of theology, metaphysics, astronomy, philology and poetry and remaining books 20 are on medicine—including *Kitab al-Shifa'*, or *The Book of Healing*, a medical and philosophical encyclopedia. His *magnum opus*, however, is the *Al-Qanun fi al-Tibb*, or *The Canon of Medicine*, containing over one million words. Regarded as a codification of all contemporary existing medical knowledge, it contained summaries of the Hippocratic and Galenic traditions, description of Syro-Arab and Indo-Persian practices and included notes on his own observations.

*The Canon of Medicine* comprised five volumes. The first volume described the principles and theories of medicine, whereas the second volume contained the simple drugs arranged alphabetically. The description about the localized diseases of the body from the head to the toes was incorporated in the third volume while the fourth volume was addressed to generalized diseases of the body. An explanation of compound drugs was facilitated in the fifth volume (Haddad, 1942).

Apart from laying emphasis on the importance of diet and the influence of climate and environment on health, *The Canon* included discussions of rabies, hydrocele, breast cancer, tumours, labour and poisons and their treatment. While differentiated meningitis from the meningismus of other acute diseases, Ibn Sina explained chronic nephritis, facial paralysis, ulcer of the stomach and the various types of hepatitis and their causes. He also talked about the dilation and contraction of the pupils and their diagnostic value, described the six motor muscles of the eye and discussed the functions of the tear ducts, and attributed the contagious nature of some diseases to 'traces' left in the air by a sick person (Broawe, 1962).

There was also a description of some 760 medicinal plants and the drugs included in *The Canon*. Simultaneously, Ibn Sina envisaged the basic rules of clinical drug trials, principles that are still in vogue today. *The Canon* soon emerged as the standard medical reference work of the Islamic world. It was frequently used as a reference, a teaching guide and a medical textbook until well into the 19th century. When Arab astronomical texts were first translated during the 10th century in Catalonia (Andalusia), Europe began to reap the intellectual dividends of the Arabs and, in so doing, to seek out its own classical heritage. Thus Europe recovered some of its past through the intellectual ferment of the Islamic present.

Constantinus (also known as Leo) Africanus (1020-1087), who worked at Salerno and in the cloister of Monte Cassino, and Gerard of Cremona (1140-1187), who worked in Toledo, were two main persons who facilitated translation of classical material from Arabic into Latin. Both these persons lived in the Arab-Christian transition zone, where the two cultures fructified each other. Interestingly, Salerno, Europe's first great medical faculty of the Middle Ages, was close to Arab Sicily, and Montpellier was founded in 1221 in southern France, near the Andalusian border.

The closing part of the 12th century witnessed Ibn Sina's *Canon* making its first appearance in Europe, and it quickly became the standard European medical reference work. The dramatic impact of Ibn Sina's *Canon* on Europe could be discerned from the fact that during the last three decades of the 15th century, it was issued in 16 editions; and in the century that followed more than 20 further editions were printed. From the 12th to the 17th century, its *materia medica* was the pharmacopoeia of Europe, and as late as 1537 *The Canon* was still a required textbook at the University of Vienna (Broawe, 1962: Pp.89-90).

Ibn Sina and Al-Razi were regarded as the greatest authorities on medical matters by contemporary Europeans and their portraits still adorn the great hall of the School of Medicine at the University of Paris. Dante in his *The Inferno*, placed Ibn Sina side by side with antiquity's two greatest physicians, Hippocrates and Galen.

Roger Bacon consulted Ibn Sina to further his own inquiries into vision. Apart from Al-Razi and Ibn Sina, translations of more than 400 Arab authors, writing on such varied topics as ophthalmology, surgery, pharmaceuticals, childcare and public health, tremendously impacted the revival of European science.

The Arab physicians recommended accurate diagnoses of plague, diphtheria, leprosy, rabies, diabetes, gout, cancer and epilepsy. Ibn Sina's theory of infection by 'traces' led to the introduction of quarantine as a means of limiting the spread of infectious diseases. While uncovering the secret of sight, Arab doctors also laid down the principles of clinical investigation and drug trials. They had mastered the techniques of operations for hernia and cataract, filling teeth with gold leaf and prescribed spectacles for defective eyesight. The rules pertaining to health, diet and hygiene, as laid down by Arab physicians then are still largely valid today.

## 5. AL-ZAHRAWI

Abu-Al-Qasim Khalaf Ibn'Abbas Al-Zahrawi (930-1013), known in the Western World as Abulcasis, Bucasis or Alzahrauius; a renowned Arab surgeon, was born in Al-Zahra, a suburb of Cordova in 930 A.D. During that period Cordova, the magnificent capital of Al- Andalus, had a population of one million (Hitti, 1977). Under the Islamic rule in Al-Andalus, culture and science were at their peak in Europe. By the dint of his hard work and erudition, Al-Zahrawi became an eminent surgeon and was appointed as the Court-Physician of King Abdel-Rahman III. He spent a productive life in practicing medicine, especially in surgery and medical writings.

Among the main four books Al-Zahrawi wrote, *Al-Tastif Liman Ajiz'an Al-Ta'lif* is the best medieval surgical encyclopedia. It was used in Europe until the 17th century. He stressed the importance of basic sciences:

... Before practicing, one should be familiar with the science of anatomy and the functions of organs so that he will understand them, recognize their shape, understand their connections, and know their borders. Also he should know the bones, nerves, and muscles, their numbers, their origin and insertions, the arteries and the veins, their start and end. These anatomical and physiological bases are important, and as said by Hippocrates: 'There are many physicians by title and a few by practice.' ...If one does not comprehend the anatomy and physiology, he may commit a mistake that can kill the patient. I have seen someone, who pretended to be a surgeon, incised an aneurysm in the neck of a woman, mistaking it for an abscess. The woman bled to death (Cited in *ibid.*).

Heller stated that Al-Zahrawi described the ligation of arteries long before Ambrose Pare (Cited in: Khairallah, 1942: Pp.409-415). Al-Zahrawi also used cautery to control bleeding. He used wax and alcohol to stop bleeding from the skull during cranial surgery. Sprengel said that Al-Zahrawi was the first to teach the lithotomy position for vaginal operations (Quoted in *ibid.*). Al-Zahrawi also described the tracheotomy operation and performed it as an emergency on one of his servants. He was the first to write on orthodontia. He showed evidence of great experience from details of clinical picture and surgical procedures e.g. his description of varicose veins stripping, even after ten centuries, is almost like modern surgery:

... Have the leg shaved if it is much hairy. The patient gets a bath and his leg is kept in hot water until it becomes red and the veins dilate; or he exercises vigorously. Incise the skin opposite the varicose vein longitudinally either at the ankle or at the knee. Keep the skin opened by hooks. Expose, dissect, and separate the vein. Introduce a spatula underneath it. When the vein is elevated above the skin level, hang it with a blunt rounded hook. Repeat the procedure about three fingers from the previous site and hang the vein with another hook as previously done. Repeat the procedure at as many sites along the varicose vein as necessary. At the ankle, ligate and strip it by pulling it from the incision just above. When it reaches there, repeat at the higher incision until all of it is stripped. Ligate the vein and then excise it. If difficulty is encountered in pulling it, ligate its terminal part with a string and pass it under the spatula and dissect it further. Pull gently and avoid its tearing because if it does, it becomes difficult to strip all of it and can cause harm to the patient. When you have stripped it all, put alcohol sponges at the sites of the skin incisions and take care of the incisions until they heal. If the varicose vein is tortuous, you have to incise the skin more frequently, at each change of direction. Dissect it and hang it with the hooks and strip it as previously described. Do not tear the vein or injure it. If this happens, it becomes difficult to strip it. The hooks used should be blunt, eyeless, and rounded; otherwise it can injure the vein, (Al-Zahrawi's this quotation is cited in Al-Okbi, 1971).

Apart from writing about fracture of the skull, Al-Zahrawi described many dental operations such as dental extractions, fixation, re-implantation, and artificial teeth. Chapter 6 of his book was all devoted to foreign bodies of the ear and their treatment. He also devoted one whole chapter to midwifery, giving tips to midwives, and describing the problems of difficult labour and obstetrical manoeuvre. He recommended decompression of the foetal head for obstructed labour and described the instruments used. He described the management of liver abscess by treating it into two stages (Khairallah, 1942: Pp.409-405). The first stage was to allow adhesions

around it and to close it from the peritoneal cavity. The second stage was to incise it. Viewed in a broad perspective, surgery had become a respected specialty in the Islamic World during the time of Al-Zahrawi. On the other hand, the practice of surgery by barbers and butchers in Europe not only belittled it but prompted the Council of Tours in 1163 A.D. to call for its abandonment by the schools of medicine and by all decent physicians.

## 6. IBN-RASHID

Ibn-Rashid (1126-1198), known in Europe as Averroes, was born in Granada in 1126 A.D. Having studied philosophy, medicine and law; he was appointed as a judge in Seville in 1169 A.D. where he stayed in office for over two decades. Greatly influenced by Aristotle, he wrote important commentaries on the great philosopher (For more details see: Black, 1970, and Al-A'sar, 1972: Pp.1-3). His interpretations that the human soul was not independent, but shared a universal mind, caused a great controversy and was later declared heretical by both the Muslims and Christians alike because it contradicted the doctrine of personal immortality. Owing to his bold ideas, he was dismissed from his work and sent to Morocco where he was kept in prison till he died on 12 December 1198.

His important contribution to medicine was *Al-Kulliyat fi Al-Tibb*, comprising seven chapters, it contained a summary of the medical science at that time. Another book written by him was *Al-Taisir* on practical medicine. It contained useful excerpts and a clinical description of diseases including serous pericarditis and mediastinal abscesses. He personally suffered from the latter disease and left very careful records of his own symptoms. The book is not known in Arabic, but there are several Latin editions (Haddad, 1942, P. 69).

## 7. Arab Pharmacy

The institution of the pharmacy has been an Islamic development. Islam teaches that 'God has provided a remedy for every illness', and that Muslims should search for those remedies and use them with skill and compassion. Jabir ibn Hayyan (ca. 776), who is considered the father of Arab alchemy, composed one of the first pharmacological treatises. According to I.B. Syed: "The Arab pharmacopoeia of the time was extensive, and gave descriptions of the geographical origin, physical properties and methods of application of everything found useful in the cure of disease" (Syed, 2008). A large number of new drugs were introduced to clinical practice by the Arab pharmacists or *saydalani*. These, *inert alia*, included senna, camphor, sandalwood, musk, myrrh, cassia, tamarind, nutmeg, cloves, aconite, ambergris and mercury. The *saydalani* also developed various kinds of syrups and juleps, along with pleasant solvents such as rose water and orange-blossom water as means of administering drugs. They were familiar with the anesthetic effects of Indian hemp and henbane, both when taken in liquids and inhaled (Syed, 2008).

Pharmacy had emerged as a profession practiced by highly-skilled specialists during the al-Ma'mun's caliphate period. Pharmacists were required to pass examinations and be licensed, and were then monitored by the state. At the outset of the ninth century, the first private apothecary shops opened in Baghdad. Pharmaceutical preparations were manufactured and distributed commercially, then dispensed by physicians and pharmacists in a variety of forms—ointments, pills, elixirs, confections, tinctures, suppositories and inhalants.

Pharmacology took deeper roots during the 9th century when Yuhanna bin Masawayh (777-857 A.D.) embarked on scientific and systematic applications of therapeutics at Baghdad. His students Hunayn bin Ishaq al-Ibadi (809-874 A.D.) and his associates established solid foundations of Arabic medicine and therapeutics in the ninth century. They outlined methods for confirming the pharmacological effectiveness of drugs by experimenting with them on human beings. The importance of prognosis and diagnosis of diseases for better and more effective treatment was also explained (For additional information on development of pharmacy see: LaWall, 1927: Pp.19-27).

Methods of extracting and preparing medicines were brought to a high art by the *saydalani*, and their techniques of distillation, crystallization, solution, sublimation, reduction and calcinations became the essential processes of pharmacy and chemistry. The significant role of the Muslims in developing modern pharmacy and chemistry is memorialized in the significant number of current pharmaceutical and chemical terms derived from Arabic: drug, alkali, alcohol, aldehydes, alembic, and elixir among others, not to mention syrups and juleps. They invented flavorings extracts made of rose water, orange blossom water, orange and lemon peel, tragacanth and other attractive ingredients (Isaacs, 1990: P. 342 & 263).

## 8. Al-Razi's Contribution to Pharmacy

Al Razi was a Hakim, an alchemist and a philosopher. He made immense contribution to Arab medicine and some of his works in medicine include *Kitab al-Mansoori*, *Al-Hawi*, *Kitab al-Mulooki* and *Kitab al-Judari wa al-Hasabah*. He was the first in Islam to write a book based on home medical (remedial) advisor entitled *Man la Yahduruhu Teb* for the general public. In his book *Mnafi' al-Aghthiyah*, al-Razi followed a pattern that had been introduced earlier by Galen but in it, al-Razi attempted to correct several errors made by Galen himself (Al-

Ghazal, 2008). His book, *Kitab al-Mansoori*, consisted of ten volumes and dealt exhaustively with Greco-Arab medicine. Some of its volumes were published separately in Europe.

Al-Razi's *al-Judari wal Hasabah* was the first treatise on smallpox and chicken-pox, and was largely based on his original contribution: It was translated into various European languages. This book established his credentials as being the first person to draw clear comparisons between smallpox and chicken-pox. His other book *Al-Hawi* was the largest medical encyclopedia written during that period. Apart from providing all important information on each medical subject that was available from Greek and Arab sources, he concluded it by giving his own remarks based on his experience and views. A special feature of his medical system was that he greatly favoured cure through correct and regulated food. By combining this with his emphasis on the influence of psychological factors on health, he also tried proposed remedies first on animals in order to evaluate in their effects and side effects. He was also an expert surgeon and was the first to use opium for anesthesia ( Nasr, 1968: Pp. 184-229).

Al-Biruni provides the best survey of al-Razi's works from the medieval period in an epistle written about 1037. It sheds light on concealed sides of al-Razi's life and his contributions as a prolific author and compiler to pharmacy and medical therapy. In his book, *Shukuk 'ala Nazariyyat jalinus*, al-Razi expressed doubts about the correctness in many medical, physiological and therapeutic concepts, theories, and procedures as stated by Galen and which were blindly accepted and transmitted by his followers and later compilers and commentators (For details see: Campbell, 1926).

Al-Razi introduced many useful, progressive, medical and psychological ideas at the professional level. While launching scathing tirade against charlatans and fake doctors who roamed the cities and the countryside selling their nostrums and 'cures', al-Razi concurrently warned that even highly educated doctors did not have the answers for all medical problems and could not cure all sicknesses or heal every disease. He called upon practitioners to keep up with advanced knowledge by continually studying medical books and expose themselves to new information. He further classified diseases into three categories: those which are curable; those that can be cured; and those which are incurable. On the latter, he cited advanced cases of cancer and leprosy which if not cured, the doctor should not take blame (Browne, 1962: Pp. 5-16).

Al-Razi wrote *Man la Yahduruhu Teb* for the general public and dedicated it to the poor, the travellers, and the ordinary citizens who could consult it for treatment of common ailments when the doctor was not available. This book occupies special significance in the history of pharmacy since books on the same theme continued to appear and has found acceptance by readers to the present century. In this book he described diets and drugs that could be found practically every where in apothecary shops, the market place, in well-equipped kitchens, and in military camps. Thus, any intelligent mature person can follow its instructions and prepare the right recipes for good results. Some of the illnesses treated are headaches, colds, coughing, melancholy, and diseases of the eye, ear, and stomach (Wasty, 1962: Pp. 25-60).

Al-Razi followed the same method in his book *Bur as-Sa'ah*, in which he prescribed remedies to cure ailments in one hour, or at least in a short time, so that the patient did not need frequently to call on his doctor and to pay larger fee. In his other book, *Mnafi' al-Aghthiyyah*, dealing with diets, their uses and disadvantages, al-Razi followed a pattern that had been introduced earlier by Galen. In it, al-Razi attempted to correct several errors made by Galen and to introduce new data missed by the latter.

Nevertheless, Ibn Masawayh, another physician, had also written on quick remedies to cure ailments, and according to al-Razi, Ibn Masawayh did more harm than good in his exposition of the subject. In order to do away with these misgivings, al-Razi undertook the writing of a comprehensive study, *Mnafi' al-Aghthiyyah* which is of immense interest not only to pharmacy and medicine but to the history of the culinary art as well. Laying emphasis on specific matters and general regulations for healthy living, al-Razi discussed breads, waters, dairy products, fruits, vegetables, spices, meats, and fishes. He provided detailed explanation on detail their kinds, methods of preparation, physical properties, and therapeutic modes of action, and pointed out when they were useful and when not (For further information see: Shahine, 1971).

Al-Razi devoted four out of his famous book *al-Mansuri*'s total of ten treatises, to diets and drugs, medicated cosmetics, toxicology and antidotes, amelioration of laxatives, and compounded remedies, all of which are of pharmaceutical interest. *al-Hawi fit-Tibb* is al-Razi's largest medical encyclopedia, which encompassed all fields of contemporary medical knowledge. Apart from incorporating sections related to 'pharmacy in the healing art', materials arranged in alphabetical order, compounded drugs, pharmaceutical dosage forms and toxicology, it also included several medical recipes and tested prescriptions that influenced 'medical therapy' in Islam and in the West during the Middle Ages (Eigeland, 1976).

Thus, the development of professional pharmacy, as a separate entity from medicine, started in Islam in Baghdad. This first clear-cut dichotomy between the two professions, and the recognition of the independent, academically oriented status of professional pharmacy materialized in Baghdad and Al Razi was one of the few pharmacists who added very valuable contributions to medicine and pharmacy while most of Europe was still living in the dark ages. Andalusia under the spell of Islamic rule gained from the Arab Islamic and pharmacy

system and extended this branch of valuable human knowledge by making its own contribution. From Andalusia this knowledge and experience spread to other parts of Europe.

## 9. Role of Andalusia

Spain first prospered under the rule of the Umayyads, who established a dynasty there after they had lost the caliphate in the East to the Abbasids. At first, the culture of the Umayyad court at Córdoba was wholly derivative. Fashions, both in literature and dress, were imitative of those current in the Abbasids' newly founded capital of Baghdad. Scholars from the more sophisticated lands to the east were always assured of a warm reception at the court of Córdoba, where their colleagues would listen avidly for news of what was being discussed in the capital, what people were wearing, what songs were being sung, and—above all—what books were being read (Lunde, 2008).

Islam, with its tolerance and encouragement of both secular and religious learning, created the necessary climate for the exchange of ideas in Andalusia. The court of Córdoba, like that of Baghdad, was open to Muslims, Jews and Christians alike, and one prominent bishop complained that young Christian men were devoting themselves to the study of Arabic, rather than Latin—a reflection of the fact that Arabic, in a surprisingly short time, had become the international language of science, as English has today. Islamic culture in Spain began to flourish in earnest during the reign of 'Abd al-Rahman II of Córdoba, as Arabic spread increasingly among his non-Muslim subjects, especially in the cities, leading to a great flowering of intellectual activity of all kinds.

In a courtly society, the tastes and predilections of the ruler set the tone for society at large, and 'Abd al-Rahman II, passionately interested in both the religious and the secular sciences, was determined to show the world that his court was in no way inferior to the court of the caliphs at Baghdad. To this end, therefore, he actively recruited scholars by offering handsome inducements to overcome their initial reluctance to live in what many in the lands of the East considered the provinces. As a result, many scholars, poets, philosophers, historians and musicians migrated to al-Andalus, and established the basis of the intellectual tradition and educational system which made Spain so outstanding for the next 400 years (Lunde, 2008).

Another result was that an infrastructure of public and private libraries, mosques, hospitals and research institutions rapidly grew up and famous scholars in the East, hearing of these amenities, flocked to the West. They in turn attracted students of their own; in the Islamic world it was not at all unusual for a student to travel thousands of miles to study at the feet of a famous professor.

For Europe and Western civilization the contributions of Islamic Spain were of inestimable value. Islamic Spain then became a bridge by which the scientific, technological, and philosophical legacy of the 'Abbasid period, along with the achievements of al-Andalus itself, passed into Europe.

During the reign of 'Abd al-Rahman III (912-961), Islamic Spain began to make its own contributions. 'Abd al-Rahman III was passionately interested in both the religious and the secular sciences. Scientists of Islamic Spain also contributed to medicine, the Muslim science par excellence. Interest in medicine goes back to the very earliest times (the Prophet himself stated that there was a remedy for every illness), " and although the greatest Muslim physicians practiced in Baghdad, those in al-Andalus made important contributions too. Ibn al-Nafis, for example, discovered the pulmonary circulation of blood (Cawbell, 1926: Pp. 69-77).

During the tenth century in particular, al-Andalus produced a large number of excellent physicians, some of whom studied Greek medical works translated at the famous House of Wisdom in Baghdad. Among them was Ibn Shuhayd, who in a fundamental work recommended drugs be used only if the patient did not respond to diet and urged that only simple drugs be employed in all cases but the most serious. Another important figure was Abu al-Qasim al-Zahrawi, the most famous surgeon of the Middle Ages. Known in the West as Abulcasis and Al-bucasis, he was the author of the *Tasrif*, a book that, translated into Latin, became the leading medical text European universities during the later Middle Ages. Its section on surgery contains illustrations of surgical instruments of elegant, functional design and great precision (Cawbell, 1926: Pp. 69-77).

Islamic Spain made contributions to medical ethics and hygiene as well. One of the most eminent theologians and jurists, Ibn Hazm, insisted that moral qualities were mandatory in a physician. A doctor, he wrote, should be kind, understanding, friendly, and able to endure insults and adverse criticism. Furthermore, he went on, a doctor should keep his hair and fingernails short, wear clean clothes, and behave with dignity.

As an outgrowth of medicine, Andalusian scientists also interested themselves in botany. Ibn al-Baytar, for example, the most famous Andalusian botanist, wrote a book called *Simple Drugs and Food*, an alphabetically arranged compendium of medicinal plants, most of which were native to Spain and North Africa, and which he had spent a lifetime gathering. In another treatise Ibn al-'Awwam lists hundreds of species of plants and gives precise instructions regarding their cultivation and use. He writes, for example, of how to graft trees, produce hybrids, stop blights and insect pests, and make perfume.

## 10. Conclusion

Islamic contribution to medicine and pharmacy is tremendous. This contribution was made available to humanity when bulk of contemporary of world population, especially in Europe was living in 'dark ages' and it was Islam that unfolded the secrets of healthy living to Europe through Islamic Spain or Andalusia. On the one hand, the Islamic scholars translated Greek classics, preserved them and conducted research in the realm of medicine and pharmacy at a time when rest of the world had almost lost original Greek texts. It was through Arabic translations into Latin and other languages that the ancient heritage passed on to Europe. The Arab scholars not only translated the Greek medical classics but contributed their own wealth of knowledge to enrich different fields of medicine, pharmacy as well as other sciences as well. Islamic rule in Andalusia played notable role in disseminating Arab knowledge about medicine, pharmacy and other sciences to Europe and through Europe to the rest of the world.

## 11. References

- Al-A'sar , Y. H., (1972 ) "Lights of on History of Science: Famous physicians of the Western part of the Arab World", *Hospital Medical Practice* (Cairo), Vol. 2 .
- Al-Ghazal, Sharif Kaf, (2008), "The valuable contributions of Al-Razi (Rhazes) in the history of pharmacy during the Middle Ages", available at <http://www.islamicmedicine.org/alrazi3.htm>, retrieved on 17 July.
- Al-Okbi, M.D., (1971), "Lights on History of Science: Abu Al-Khasim Al-Zahrawi, the pioneer in surgery", *Hospital Medical Practice* (Cairo), Vol. 1.
- Aramco World*, (1991), (Riyadh), November/December.
- Aramco World*, (1982), (Riyadh), May/June.
- Black, M. Roth C., (1970 ), "Maimonides", in *Merit Students Encyclopedia*, Vol. II, New York: Crowell-Coiller Educational Co.
- Broawe,, A. G.,( 1962), *Arabian Medicine*, Cambridge: Cambridge University Press.
- Browne, E. G., (1962), *Arabian Medicine*, Lahore: M. Sirajuddin & sons.
- Campbell, D., (1926), *Arabian Medicine*, Vol. I, London: Paul, trench, Trubner and Co.
- Cawbell , David, (1926), *Arabian Medicine and its influence on the Middle Ages*, London: Kegan Paul, Frubner & Co.,Vol. I.
- David W., (2008), The Arab Roots of European Medicine, available at <http://www.saudiaramcoworld.com/issue/199703/the.arab.roots.of.european.medicine.htm>, retrieved on 12 July.
- Eigeland, T., (1976),"Islam in Al-Andalus", *Aramco World Magazine*, Vol. 27, No. 5, September/October.
- Haddad, S. I., (1942), "Arabian Contribution to Medicine", *Annals of Medical History*, Vol. 3.
- Hitti,, P. K., (1977), *History of the Arabs*, New York: St. Martin's Press.
- Isaacs, H. D.,, (1990) "Arabic Medical Literature", in *Religion, Learning and Science in the Abbasid Period*, Cambridge: Cambridge University Press.
- Khairallah, A. A., (1942), "Arabic Contributions to Anatomy and Surgery", *Annals of Medical History*, Vol. 3, No. 4.
- Keys , T.E. and Wakim , K. G., (1971), Contributions of the Arabs to Medicine", in *Proceedings of the Staff Meetings of the Mayo Clinic*, Vol. 28.
- LaWall , C. H., (1927), *Four Thousand Years of Pharmacy*, Philadelphia: J.B. Lippincott Company.
- Lunde, Paul, (2008), "Science in Andalus", available at <http://www.saudiaramcoworld.com/issue/200407/scienceinal-andalus-compilation.htm> , retrieved on 22 July.
- Nasr, S. H., (1968), *Science and Civilization in Islam*, New York: New American Library.
- Shahine, (1971), Y. A. *The Arab Contribution to Medicine*, London: The Longmans'.
- Syed, Ibrahim B., (2008), "Islamic Medicine: 1000 years ahead of its times", available at <http://www.islam-usa.com/im4.html> , retrieved on 15 July.
- Tschanz, David W., (2008), The Arab Roots of European Medicine, available at <http://www.saudiaramcoworld.com/issue/199703/the.arab.roots.of.european.medicine.htm>, retrieved on 12 July.
- Wasty, H. N., (1962), *Muslim Contribution to Medicine*, Lahore: M. Sirajuddin & sons.



The Canon of Medicine contained all Greek medical knowledge together with Arabic interpretations and contributions. Ibn-Sina wrote some 99 books dealing with philosophy, medicine, geometry, astronomy, theology, philosophy, and art. Important surgical treatises were written in the tenth and the eleventh centuries in Andalusia by Abu-Qasim al-Zahrawi, known in Europe as Abulcasis. In the fields of pharmacology and pharmacy Muslims made notable progress. Whereas these Eastern Muslims had initially used the Arabic alphabets as numerals, by the ninth century Western Muslims had invented and replaced them with the al-arqam al-gubariyah-1,2,3,4,5,6,7,8 and 9-based on a number of angles equal to the weight of each symbol (Kettani,1976, p.137). Prophetic Medicine: 'Prophetic Medicine' although popular amongst the masses of Muslims because of its doctrinal and theological contents was considered by most Muslim historians and physicians as distinct from scientific and analytical Islamic Medicine. Ibn Khaldun (1332-1406 AD) a well known medieval Muslim jurist, historian, statesman in his 'Muqaddimah' states: 'The Bedouins in their culture, have a kind of medicine which they base primarily on experience restricted to a few patients only, and which they have inherited from their tribal leaders and old women. In some cases it is correct, but Arab-Muslim patients' religious concerns also suggest the need for cultural competence and sensitivity on the part of health-care practitioners. Here, we emphasise how Islamic conventions might affect clinical care, and make recommendations to improve health-care access and services for Arab-Muslim refugees and immigrants, and Muslim patients in general. Download full-text PDF. Source: Department of Pharmaceutics, College of Pharmacy and Drug Manufacturing, Misr University of Science and Technology, 6th of October City 12566, Giza, Egypt. Electronic address: The main aim is to develop transcutaneous tenoxicam (TNX) loaded vesicles to control osteoarthritis (OA) without common side effects.