Medical Education in Islamic Civilization

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Abstract

The practice of medicine was considered a noble profession by Muslims. Before being allowed to practice one should have acquired a wide experience in medicine and should have been well trained and disciplined. Students were asked to be in close contact with patients in order to apply the theory they had learned by attending hospital rounds and seminars.

The evolution of medical teaching passed through different stages, beginning with training in the mosque and progressing to medical schools. After developing and undergoing transformation, these schools formed the nucleus of universities which exerted great influence on the formation of universities in Europe.

Great libraries were attached to those schools. Students were well cared for; well-furnished and equipped hotels attached to these centers of learning were built. Residential quarters for students were built for the first time in history.

Medical practice was governed by specific legislation and students had to sit for examinations before being licensed.

A code of professional ethics also was introduced to regulate medical practice.

Key words: *Medical education, mosque, "Bimāristānāt" (hospitals), licensing examinations, Islamic civilization*

Medicine was considered by the early Arabs and Muslims to be a noble profession. They laid down rules and regulations governing its practice. Wide experience and good training, together with an ethical code of behavior towards patients, were required. They defined medicine's role to be, "to preserve health when present and to bring it back when it is absent." This concept covers both the preventive and the therapeutic aspects of medicine.

Many factors helped the progress of learning the art of health care. Islamic traditions from the start were in favor of medical practices. They emphasized the importance of bodily cleanliness and the need to seek treatment for every disease. This is explicit in the words of the Prophet (PBUH),

"Science is twofold: Theology and Medicine;"[1]

also,

"He (Allāh) created illness and He created the medication."[2]

Caliphs bestowed high honors on eminent and competent physicians, encouraging construction of hospitals and other health institutions with generous endowments of financial support.

It is impossible to discuss medical education in Islam and to cover the entire subject in one paper. The volumes of scientific and medical discoveries by so many eminent physicians which went into the foundation of present day medicine would take far too long to review.

For this reason I shall confine myself to discussing:

1. Development of the medical institution.
2. Great men who helped to establish medical education.
3. Methods of education and licensing.
4. The influence on European awakening and

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medical learning.

Development of the medical institution

Medical education has passed through different stages, starting at the mosque and culminating in the medical school or university.

Learning at the mosque

Not only did mosques serve as holy places for worship but they also were used for education. At first Islamic teachings and related subjects were taught by the "Shaikh". Later on, other disciplines including medicine were added, and other tutors had to participate. The period between the second and third centuries Hijrī (H) was the climax of teaching in mosques. Each had a reference library attached to it for the use of students and practitioners. Many mosques were actively engaged in this training and famous physicians are known to have been mosque tutors. 'Umar 'ibn Manṣūr al-Bahadrī (762-824 H) taught medicine at 'Ibn Ṭūlūn mosque.[3] Al-Baghdādī (1162-1231 A.D.), who made the revolutionary anatomical discovery that the human lower jaw was made of one bone, taught at al-Azhar mosque.[4] Among the well known mosques which became famous were the Grand Mosque of Cordoba in Andalusia, built in 786 A.D., the Omayyad Mosque at Damascus and al-Zaytūnah Mosque in Tunisia built in 732 A.D.

Houses of wisdom – libraries

The primary aim in establishing such houses was for the collection and protection of books. These houses were owned either privately by learned men or by the state, and were built close to schools, mosques or hospitals. The first such house was the Abbasid House of Wisdom, established during the time of Caliph Hārūn al-Rashīd. He invited scholars from the "Barmak" family and collected the treasures of knowledge of Greek, Persian and Indian origin.[5] This house later developed into an academy of science during the time of Caliph al-Ma'mūn, who was a patron keen on promoting learning and spreading education. It was there that the active translation into the Arabic language of the great ancient legacies of Greece, Persia and Egypt, was started. Al-Ma'mūn employed Ḥunayn ibn Ishāq of Ḥirah (died 873 A.D.) to perform this great task. Ḥunayn was the most productive among the translators and had an excellent command of Syriac and Greek. He gathered around himself a team of diligent associates to carry out great and important task.

Another group was provided by the city of Harran who translated Greek works into Arabic. Of these transformers, the most famous were Thābit ibn Qurrah (836-901 A.D.), who wrote "al-Dhakhīrah fil-Ṭibb", and his son, Sinān, who later was in charge of medical examinations.

Libraries became numerous in the capitals and large cities. In 891 A.D., more than 100 libraries existed. In Baghdad, al-Najaf Library contained about 40,000 volumes. In Andalusia, al-Ḥakam II founded a library in Cordoba. Of the privately owned libraries, 'Alī ibn Yaḥyā al-Munajjim (died 274 H/888 A.D.) had in his palace a rich library called the Treasure of Wisdom, that was open to all.[6] A large library also was present at Bukhārā, which Ibn Sīnā made use during his early youth; the "Fāṭimiyyah" dynasty established the House of Knowledge library in Cairo.[7]

Thus, books became plentiful, both translated and original works. They laid the foundation for the great works that followed and later became texts and reference books for medical students.

This was the situation in the Islamic World at a time when, according to the German author Hunke, the monasteries in the West had only 12 books, joined together by chains for fear of loss or theft.[8]

House of science

A step forward in the development of educational institutions was the establishment of houses of science where lectures were delivered. The oldest example of such a place was al-Mūṣilī House in Iraq (240-323 H).[9] During the last quarter of the fourth Hijri century, one of the Buwayhid's kings established a similar house in Baghdad called Dār al-'Ilm. He supplied its library with many books and devoted it to scholars. According to the historian al-Maqrīzī, al-Ḥakīm established in Egypt Dār al-Ḥikmah in 395 H, which became the greatest scientific center independent of a mosque.[10]

Theoretical medical schools:

At first, tutors taught groups of students they selected in a building they themselves owned or that was donated by wealthy people keen on learning and eduction. The oldest known school of this kind was built by al-Aṣbaḥānī (died 406 H.) at Neisabur.[11] Another famous school was established in 1230 A.D. by the oculist al-Dakhwar who was an instructor at the Great Nūrī Hospital in Damascus, and was named al-Dakhwariyyah after him.[12] This school continued to function even after his death. Among those who taught there was 'Imād ul-Dīn al-Dūniserī who also established the Dūniseriyyah school.[13]

Private medical schools were owned by famous physicians such as al-Rāzī, in Ray and Ibn al-'Ash'ath, in Mūṣil; hence, they attracted many students. In some instances distinguished medical students became chiefs of hospitals after practicing there. For example, Ibn al-Tilmīdh who was one of the most outstanding physicians of the first half of the 12th century, became the chief of the al-'Adūdī Hospital.[14]

By the middle of the 5th Hijrī century, the state

took over and education was made free to all, irrespective of creed, race or sex. The first to build such a government school was al-Wazīr Niẓām-ul-Dīn (408-486 H) who built a school in the towns of Iraq and Khūrāsān.[15] Al-Niẓāmiyyah School, named after him, was built in 459 H/1067 A.D. in Baghdad and was the greatest school.[16] In 460 H/1067 A.D. al-Mustanṣariyyah school was built by Caliph al-Manṣūr in Baghdad. It was very magnificent and had a very rich library. Private discussions between pupils and their tutors used to be arranged at their homes. Al-Juzmānī tells us that he used to listen to Ibn Sīnā reading al-Shifā' in his home and others used to read al-Qānūn at night only as Ibn Sīnā was busy during daytime.[17]

Practical medical schools - hospitals

Medicine is both a practical and experimental science. For this reason there was an urgent need to keep students in close contact with patients. A hospital with a rich medical library fulfilled this need and served as a convenient place for medical students to acquire both theoretical and practical teaching by clinical observation at the bedside. Hospitals were few, but from the ninth century onwards, hospital services and public medical care were promoted, and they spread all over the Islamic world. Max Meyerhoff mentioned that at least 34 such institutions were present between Persia and Morocco.[18]

These hospitals, or "Bimāristānāt", as they were called, were modeled after the one in Jindi-Sapur. Later, great improvements both architectural and administrative were introduced. They were built by caliphs, sultans, princes or wealthy people.

The following is a brief description of some of those important teaching hospitals:

Al-Muqtadirī Hospital was built in Baghdad by Caliph al-Muqtadir billāh in 306 H. on the advice of Sinān. Among its tutors and famous physicians were Yūsuf al-Wāṣilī and Jibrīl 'Abdullāh ibn Bukhtishū'. The latter taught medicine there for 30 years.

Al-'Adūdī Hospital built in Baghdad by 'Adūd al-Dawlah (949-993 A.D.), one of the Buwayhid kings. It was opened in 372 H. and its staff totalled 24 physicians, among whom were the oculist al-Dakhwar, the surgeon 'Abū al-Ḥakam and the orthopedic surgeon 'Abū al-Salt. Ibn Butlān, the famous physician, received education there. Ibn Khillikān, the historian, praised this hospital as it contained the best equipment and supplies.[19]

The great Nūrī Hospital was built in Damascus in 594 H/1154 A.D. by Sultan Nūr-il-Dīn Zinkī after collecting a ransom from one of the kings of the Crusaders. Its staff was not less than 20, and Ibn al-Muṭrān, the physician to the court of Saladin, was among them and was a pupil of Ibn al-Tilmīdh.[20] It had a large library which contained 10,000 volumes.[21] Al-Dakhwar, the oculist and chief physician in Damascus and Egypt, taught medicine there.[22]

Al-Manṣūrī al-Kabīr, also called Dār ul-Shifā' or Māristān Qalawūn, was built in Cairo in 683 H.[23] It was considered the greatest hospital and medical school in the history of Egypt. Among its famous medical teachers were Rukn-ul-Dīn ibn Qubī' (died 738 H), who was of Tunisian origin, 'Umar ibn Manṣūr al-Bahadrī (died 824 H) also taught at ibn Ṭūlūn Mosque, the oculist 'Abd ul-Wahhāb ibn Muḥammad al-Shāmī of Cairo (died 851 H), and Madyan bin 'Abdul-Raḥmān al-Qūsūnī who was chief physician of the hospital and of Egypt.[24]

Eminent physicians who influenced the progress of medical education

Among those who influenced these developments in the early times of the Abbasids was Ḥunayn ibn 'Isḥāq al-'Ibādī (died 260 H/873 A.D.). During the time of al-Ma'mūn he was engaged in translation and composition, in addition to his practice as a physician and oculist. He was not only the most famous, but also the most productive of the translators. He contributed to developing the Arabic language into a scientific language. At the same time he independently composed books on ophthalmology, dentistry and dietetics. Ḥunayn established a solid foundation for medical laws and ethical codes governing practice, as well as curricula for teaching.

Ḥunayn's contribution is great. One of his well known works is "Kitāb al-Mudkhil-fil-Ṭibb". "An introductory Manual on Basic Problems of General Medicine, Pharmaceutics and Uroscopy." His book, "Masā'il-fil-Ṭibb Lil-Muta'allimīn" (medical questions/problems), which was completed by his pupil Ḥubīsh, and generally known as "Masā'il Ḥunayn," was primarily written for medical students. It became widely circulated as a reference text to students and to the "Muḥtasibs" who were government officers in charge of examination, supervision and control of medical practitioners.

Medical education in Islam is greatly indebted to Ḥunayn and influenced by him. On ophthalmology, his Ten Dissertations on the Eye, " 'Ashr maqālāt fil-'īn," and Questions on the Eye, are two important contributions. In the former, in which he follows Galen, he describes the optic nerve, the brain, and discusses the etiology, symptomatology, diagnosis and treatment of eye diseases.

'Abū Bakr Muḥammad ibn Zakariyyā al-Rāzī, known otherwise by medieval medicine as Rhazes, was born at Ray, in Persia, and was probably the most eminent and most original of all the muslim physicians. Though like many other physicians, he followed Galen and other Greek masters in many fields, he was the first to refuse to surrender blindly to the authority of doctrines and speculations of Galen. This is evident in his book, "al-Shukūk 'alā

Jālinūs" (Doubts on Galen's Writings), in which he discussed his own views and accepted those which could be logically and experimentally proven.[25]

Of his many monographs, the most famous is his treatise on smallpox and measles, which was translated to Latin in Venice in 1565, and to English by the Sydenham Society in 1848.[26] Praising this work, Neuberger says, "On every hand and with justice it is regarded as an ornament to the medical literature of the Arabs."[27]

Al-Rāzī was a great medical educator. As a tutor, he would discuss the subject to his pupils and make it easy for them to understand. His fame attracted students from nearby as well as remote areas. It was as a clinical observer that al-Rāzī excelled. In his book, "al-Murshid, he stressed the importance of bed-side observations, compiling data, recording results of experiments, reporting failures as well as successes, and consulting with other physicians. His wide experience and vast knowledge allowed him to master both the theoretical and practical aspects of medicine.

In his book, "Mihnat al-Ṭabīb," he stressed the importance of learning anatomy and physiology, as well as reading books of ancient, famous physicians. He also showed how a physician should proceed with examination of his patient by first defining his condition and ailment, its etiology, and under what subdivsion it falls, followed by treatment and prognosis.

Like ibn Sīnā, he is famous for making a very clear differential diagnosis between colitis and renal pain; between kidney stones and bladder stones, in addition to other conditions such as pneumonia, pleurisy and meningitis.

His book, "al-Mansūri" (Liber de Medicina al-Mansorem), is very famous and was translated to Latin.[28] It played a great role in Western medical teaching. The "Ninth Treatise" (Nonus .al Mansoris), was part of the curriculum in European universities. In 1558 the dean of Montpellier University used it as a medical reference and text.[29] By far the largest and most important of his works is "al-Ḥāwī," or Continens, which contains a summary of all aspects of medicine. It was compiled after his death by his pupils from the unfinished notes and papers which he left behind. It contains clinical data, case histories, symptoms of diseases, treatments and results.

Al-Rāzī was not only a physician, but also a chemist. He believed only in experiments and facts observed from a reliable knowledge of chemistry. In his book, "Sir-rul-'Asrār" (Secretum, Secretorum), he classified chemical substances and described different apparatus and instruments such as beakers, flasks, water and sand baths, furnaces, filters and sieves, etc. Procedures such as distillation, filtration, crystallization, evaporation and amalgamation were also described.[30]

Al-Rāzī avoided hypocrisy in his life and condemned quackery in medical practice.

His books were utilized as reference and medical texts and were translated into Latin. For over three centuries they influenced medical education and practice in the Islamic world and Europe.

'Alī ibn al-'Abbās al-Majūsī, (died 994 A.D.) known in Europe in the Middle Ages as "Haly Abbas", was a native of Ahwāz, not far from the once great medical school of Jundi-Sapur. His work, "al-Malakī," or "Kāmil al-Ṣinā'ah al-Ṭibbiyyah" (Liber Regius), is a well organized book, and is most readable on science and the practice of medicine. It was the most popular text until the "Qānūn" of ibn Sīnā appeared. It excels on the practical side, while al-"Qānūn" excels on the scientific side of medicine.

Al-Malakī is divided into 20 discourses. Each is subdivided into many chapters. The second and third of these discourses dealing with anatomy, have been published with a French translation by Dr F.D. Koning (Leyden, 1903) in his "Trois Traite's d'Anatomie Arabes" (pp. 90-431). The nineteenth discourse is devoted to surgery.[31]

Al-Majūsī was critical of some Greek and Arabian physicians. He finds Hippocrates too concise, and thus sometimes obscure, and Galen too diffuse. He criticises Oribasius and Paul of Aegina for omitting or inadequately dealing with anatomy, surgery, natural philosophy, humoral pathology and etiology of disease. He believed that ibn Sirapion had ignored surgery and had omitted many diseases, and that "Continens" was of enormous size, while "al-Mansūrī" was unduly concise.[32] Constantine Africanus (died 1087) translated this book to Latin and attributed it to himself.

It is worth quoting what he said about the importance of regular attendance by medical students at hospitals: " . . . that he should constantly attend the hospitals and sick-houses, pay unremitting attention to the conditions and circumstances of their inmates in the company of the most astute professors of medicine; inquire frequently as to the state of the patients, and the symptoms apparent in them, bearing in mind what he had read about these variations and what they indicate of good or evil. If he does this he will reach a high degree in this art."[33]

'Abū al-Qāsim ibn'Abbās al-Zahrāwī, known to medieval Europe as Albucases, or Alsahravius, was born in al-Zahrā', Spain, in 936 A.D. He was the leading representative of Arab surgery. His book, "al-Tasrīf Li-man 'ajaza 'an al-Ta'līf," is the largest medical and pharamaceutical encyclopedia written in Andulusia and the only one of its kind until the end of the tenth century. It is comparable in its size and completeness to "al-Malakī," but more refined and practical. While in other medical works surgery was not clearly and fully discussed, here it was represented in great detail and was completely in-

tegrated in scientific medicine. Illustrations and drawings of about one hundred surgical instuments, many of which were invented by al-Zahrāwī himself, are included in this book.

Al-Taṣrīf became famous in European universities in the Middle Ages after it was translated by Gerard of Cremona in 1187. It was the reference book for surgery in Italy and France right into the 18th century. Guy de Chauliac in his book, "Chirurgia Magna," which he completed in 1363, made quotations from al-Taṣrīf.[34]

According to Springle, al-Zahrāwī is said to be the first who described the operation for the removal of bladder stones transvaginally, and that the operation of lithotomy was devised by him.[35]

Besides his great contributions to surgery, he trained midwives in order to achieve competence and skill when they carried out their duties. He also enriched Arabic pharmacopia by devoting a large part of his work to medicinal treatment.

'Abū 'Alī Husīn ibn 'Abdullāh ibn Sīnā (980-1037 A.D.), known in the Latin West as Avicenna, was called the Chief Master, Shaikh, Rayyis, or "al-Mu'allim al-Thānī", the second teacher (after Aristotle). During his period, Islamic medicine reached its peak. His writings influenced the development of Islamic medicine for many centuries. He was less clinically oriented than al-Rāzī, but more scientific and philosophical in his approach.

By far the largest and most famous of all his medical works is "al-Qānūn", which is composed of five books. Because of its systematic arrangement, encyclopaedic character, and the reputation of its author, it replaced the earlier works of al-Rāzī and al-Majūsī. It also formed half the medical curriculum of European universities as a textbook until 1650 A.D.

The superiority of Muslim culture and productivity continued throughout the tenth century, and by the middle of that century Islamic medicine had reached its golden age, a period which had begun about a century earlier.

Al-Ḥasan ibn al-Haytham (354-430 H./965-1039 A.D.), also known in the medieval West as al-Hazen, settled in Cairo, becoming one of the al-'Azhar teachers until his death. His fame is recognized because of his works on mathematics, astronomy and optics.

Another physician who is famous for his work on surgery was ibn al-Qūf, a native of Kerak in southern Jordan. In his book, "al-'Umdah fil-Jirāḥah," a manual on surgical art, he gave a comprehensive description of many surgical operations and treatment of bodily injuries. He also gave a good explanation of the function of the capillaries and the action of valves in the veins and in the heart chambers.

In Moorish Spain the twelfth century produced many distinguished physicians. Ibn Rushd of Cordoba, otherwise known in medieval Europe as Averros, was more famous as a philosopher than as a physician. Among his many original contributions was that smallpox can infect only once. He wrote a famous book, "al-Kulliyyāt fil-Ṭibb," known in the Latin West as "Colliget," which is a well composed work.

Ibn Zuhr, known as Avenzoar of Seville, came from a family of famous physicians in Andalusia, and was an extremely able clinician in internal medicine. He wrote a famous book called "al-Taysīr fil-Mudāwāt wal-Tadbīr." He described the operation of tracheostomy, the procedure for removal of kidney stones and feeding through a nasogastric silver tube.

Another famous scholar of Cordoba of Jewish origin was "Mūsā ibn Maymūn," known as Maimonides. He later became court physician to "Ṣalāḥ ul-Dīn" (Saladin) in Egypt.

Ibn al-Bitār of Malaga, who lived in the 13th Century, was a great botanist and can be considered the second after Discorides. His works on materia medica have been made known in Europe by Sontheimer and Leclerc.[36]

In the extreme eastern part of the Islamic world near Damascus, Ibn al-Nafīs was born in 1210. He is famous for describing the pulmonary circulation, long before Harvey. Ibn 'Abī 'Uṣaybi'ah was born in Syria and practiced medicine for some time in Cairo. He is famous for his large biographical work, " 'Uyūn al-'Anbā' fī Ṭabaqāt al-'Aṭibbā'," on the physicians who had preceeded him. It proved to be a vital source for historians and researchers.

In North Africa, ibn al-Jazzār of al-Qirawān, was famous for applied medicine, while in Egypt medicine flourished and many great works were produced by distinguished physicians, amongst whom were ibn al-Nafīs, ibn Maymūn, al-Tamīmī, ibn Buṭlān and ibn Raḍwān.

Spain and North Africa played the main role in the transmission of Islamic medicine into Europe. In Toledo, men like Gerard of Cremona and Michael Scott conveyed this knowledge to Christian Europe. Constantine Africanus, by translating many books into Latin, introduced this to Salerno in Sicily. The crusaders also helped transmission of this voluminous heritage.

These names mentioned above are only a small selection of famous physicians who promoted and developed the progress of medicine, both as a science and as a practice.

In addition, Arabs enriched medical knowledge in allied medical studies like pharmacy, pharmacology, chemistry and botany. Ibn Ḥayyān, for example, was a leading figure in chemistry, and Ibn al-Bīṭār in pharmacology and botany.

Islam encouraged learning, and women had the same rights and opportunities for acquiring

knowledge and culture as men. At the mosque, women were allowed to listen to the "Shaikhs" and tutors in different disciplines. Islamic teachings stressed to women to observe modest behavior and dress; nevertheless, the teachings allowed a female nurse or physician to see and treat every part of sick patients, including males.

However, we find far fewer women practising medicine than men. Women played two roles in Islamic medicine, some practised first aid and nursing during military actions, like 'Umaymah al-'Affariyyah, al-Rubī' bint Mi'wāz, 'Um Salīm, 'Um 'Ayman and others. Another group were actually practising physicians, like Zaynab of Awd, Rufaydah al-'Aslāmiyyah, Ku'aybah bint Sa'd al-Aslāmiyyah, the sister of al-Ḥafiz ibn Zuhr, who treated the women of al-Manṣūr, and the daughter of Shihāb al-Dīn ibn al-Sayigh, who replaced her father after his death and became the chief of al-Manṣūrī Hospital.

Methods of learning and licensing

Each student had to study the essential books of famous physicians like Galen, Hippocrates, Hunayn, al-Majūsī, al-Rāzī and Ibn Sīnā, in anatomy, physiology and pathology. Al-Taṣrīf, by al-Zahrāwī was a reference text for surgery. Ibn 'Abī 'Usaybi'ah, in his classes of physicians, talking about himself says, "I began reading the books of Jalinus . . . etc."[37]

Al-Rāzī, in an article entitled "Mihnat al -Ṭabīb" in his book al-Manṣūrī, praises the physician who reads books and perseveres in continuous medical education. He requires that a medical student should be able to understand what he reads and that he should be of a certain mental standard suitable to study medicine. The good doctor is the one who excels in both the theoretical and practical aspects of medicine. He believe that competence and skill were gained by experience and hence he had more faith in physicians in urban areas where there were more people and more diseases.

Administration and teaching staff

There was a chief physican, like the dean, selected from a group of distinguished physicians. He was assisted by the chiefs of surgery, ophthalmology, etc., and he had the privilege of choosing the teaching staff. Demonstrators, a grade of staff created by the Arabs, and assistants, were used to help in teaching and repeating what was given by the master.[38]

Student and choice of subjects

It was not difficult for any student to join a school or a hospital. He had to choose his teacher and was equally free to change him. To study surgery he had only to attach himself to a famous surgeon at a hospital.

The choice of subjects was also left to the student as there was no compulsory curricula. This does not mean that discipline was lacking; on the contrary, this freedom was under the control of the chief and governed by rules and regulations related to learning and examination.

Students often traveled from one place to another (as we do nowadays), to learn at the hands of famous tutors and physicians. The actual process of training required regular attendance at seminars in mosques and listening to discussions at hospitals, libraries or lecture halls. Some seminars, as we previously mentioned, were arranged in private homes after finishing hospital rounds. Bedside teaching and clinical experience were stressed. "When a patient came to the clinic, he was first examined by the student, then by the immediate instructor, and if the case proved difficult, al-Rāzī used to speak."[39]

After watching how their teacher examined and treated patients, and listening attentively to him and discussing the case, the pupils were requested to document their experience.

Experimental trial of drugs on certain patients was allowed on condition that no ill effect occurred to the patient. Should this have been the case, the practitioners were penalized.

True university life had been known in the Islamic world centuries before Europe. In Cairo, al-'Azhar was founded in the 10th Century, and the Nizāmī School in Baghdad in the 11th Century. In Andalusia a university was established in Granada during the reign of 'Abū Yūsuf al-Ḥajjāj (1333-1354 A.D.). In these and other universities medicine and other subjects were taught.

A prototype of a university campus with its different buildings, similar to what we know of today, was established in a place called Talamankah, near Madrid.[40] All the facilities needed for a comfortable student life were made available, i.e., free lodging, lighting, carpets, bathrooms and medical treatment. In addition, students had a monthly payment. Those whose time would allow and who needed more money were allowed to do outside work. Libraries facilitated lending books.

The system of an academic year and yearly final examinations was not known. Lectures were also not limited by time but were governed by the hours of prayer and by the time chosen by the tutor. In order to refer to original works they encouraged learning other languages, as medicine depended on its Greek and Syriac heritage.

Examination and licensing

During the early days of the Islamic State, it was customary for anyone who wanted to practice medicine to read a medical book, or attach himself to a famous physician. Once he felt he was competent enough, he could practice without any examination.

However, according to al-Ṭabarī, in his "Paradise of Wisdom," an examination did exist around the year 850 A.D.[41] Eighty years later, during the reign of al-Muqtadir, it was officially required because a case of malpractice came to his notice 295 H./931 A.D. He thereupon issued an order that none should practice medicine unless he satisfied Sinān ibn Thābit, with the exception of a few physicians of good standing and fame, and hence about 860 had to take the examination. A board of examiners was formed and a bureau for issuing lincenses was established.

In his article Mihnat al-Ṭabīb, al-Rāzī outlined the steps of the examination. If the student passed the theoretical part he would then be examined in the practical part. He should be knowledgeable in anatomy, physiology, astronomy and pharmacology. In the latter subject he stressed the knowledge of effects of drugs and herbs on the human body. In the practical part, the student had to know all about urine and pulse; he should be able to differentiate between different diseases (differential diagnosis) and be well acquainted with the causes and management of fevers.

The student also had to write a paper on a subject he wanted to take as a career, e.g., surgery, general medicine, ophthalmology, orthopedics, etc. It was either written by the student himself or by a famous physician. He should know its contents in addition to general medicine and his subspecialty, e.g., the oculist had to learn the "Ten Discourses of Ḥunayn ibn 'Ishāq", the orthopedic surgeon had to know the details of every bone and how to put back a fracture or a dislocation. The surgeon was examined in anatomy and surgery; they made sure that he had read the books of Galen, Hippocrates, al-Rāzī, Ibn Sīnā, al-Majūsī and al-Zahrāwī. The surgical student should know how to treat competently and skillfully fractures and tonsillitis, how to break urinary stones, how to incise abscesses and excise dead tissue, in addition to a general knowledge of treating different ailments. Surgeons were also required to have a set of surgical materials and instruments.

Another way of examination was to recite verbatim without difficulty, certain books in front of the examiner before being licensed to be a physician. Al-Rāzī also specified certain qualities he required the practitioner to have; he should be able to treat with one medicine many conditions; he should be clean and have clean garments; his hair neatly groomed; he should be pleasant and in control of his temper; answer questions of patients and render his professional services to the poor, rich, learned and illiterate alike. The family doctor must consent courteously to a request for consultation and another opinion, even if that disagreed with his own recommendations.

He must be cautious in prescribing potent drugs and remedies to pregnant women. Ibn Raḍwān added that a physician should keep the secrets of his patients and that he should treat friend and foe alike.

The influence on western medical learning and education

If one compares the organization of Islamic universities in the Middle Ages with their counterparts in the West which were present in the 12th and 13th Centuries, he can find similarities which could not be accidental. The subject material was similar, the methods of organized learning, the relationship between the teacher and his pupils were also similar whether in Baghdad or Oxford.

Islamic influence on European medical teaching is seen in staff organization and attaching hospitals to medical schools. Principles of examination and licensing were also adopted. Pope Clement V (1309), agreed that the examination of students should include the material of the books of al-Rāzī and Ibn Sīnā. Al-Qānūn and al-Manṣūrī were on the curricula of Vienna University until 1512 and of Fankfurt University until 1580.[36] We also notice that the curriculum of Lovan University (1617) depended on the books of al-Rāzī and Ibn Sīnā. "Al-Qānūn" continued to be taught at Montpelier University until the middle of the 17th century.

Arabic surgery influenced Spanish, Italian and French surgeons up to the 14th century, and Arabic ophthalmology continued to be superior for two more centuries.[43]

Conclusion:

This is a brief review of the great medical contributions in the organization and development of medical education by some of the most eminent physicians and scholars in Islamic Medicine. They were influential in raising the standards of medicine in such fields as programming, teaching, examination and licensing as well as in propagation of public and private libraries, directing the attention to their importance; and last but not least in codes of medical ethics.

More knowledge will be revealed when more research and studies are made of the huge number of manuscripts which lie scattered in various libraries throughout the world.[38]

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