

Contribution of Muslim Physicians to the Field of Medicine

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The history of Islam bears testimony to the fact that the Muslim scholars were not unaware of the emphasis laid down on health and medicine by the Prophet (Peace be upon him). Muslim scientists were aware of the then existing medical knowledge. They grabbed that knowledge, refined its matter, and reshaped its contours. In addition, they added useful information based on their observations and experiments and elucidated the unrevealed mysteries of the medical science. This research paper aims at revealing the generous contribution made by some significant Muslim physicians to the science of medicine.

Key words: Medicine, physician, Al-Rāzī, *Al-Qānūn fi'l-Ṭibb*, plague.

The Greeks were mastering the field of medical science and research. After the fall of the Greeks, the Romans controlled the old Greek territories. A number of Greek scientists fled to Judishpar in Persia avoiding Roman torture. When Muslims conquered Byzantine, they saved the Greek knowledge, and later developed it further. Their contributions were most remarkable in the field of medicine and surgery. A number of great physicians and surgeons can be named like Al-Kindī (810-873 A.D.), ‘Alī b. Sahl b. Rabbān al-Ṭabarī (838-870 A.D.), Al-Rāzī (854-923 A.D.), Thābit b. Qurrah (836-901 A.D.), ‘Ali b. ‘Abbās (d. 994 A.D.), Ibn Sīnā (980-1037 A.D.), Ibn Zuhur (1094-1162 A.D.), Mūsā Khātimah al-Anṣārī (1323-1369 A.D.), Ibn al-Khaṭīb al-Salmānī (1313-1347 A.D.), Abū’l Qāsim al-Zahrāwī (936-1013 A.D.), Māsawīh al-Mārdīnī (925-1015 A.D.), Yūhanna b. Māsawīh (780-1857 A.D.), ‘Ammār b. ‘Ali al-Mawṣilī (d. 11th Century), Ibn ‘Isā (d. 1010 A.D.), Ibn al-Haytham (965-1039 A.D.), Khalīfah b. Abī al-Muḥsin (d. 13th Century), Ibn al-‘Aqfānī (d. 1348/49 A.D.), Ibrāhīm al-Shādhilī (d. 14th Century), Sinān b. Thābit (d. 943 A.D.), and many others¹.

A brief description of some influential Muslim physicians is given here.

1. ‘Alī b. Sahl b. Rabbān al-Ṭabarī (838-870 A.D.):

Born to a Jewish family in Marw (in Persia), he became a Muslim under the Abbasids’ rule. He was a man of profound medical wisdom. He is supposed to be the mentor of the great physician of all times, Al-Rāzī². His book “*Firdaws al-Hikmah*” (Paradise of Wisdom) is considered to be the first comprehensive work of Arabic medicine that integrated and compared the various medical

traditions of the time.³

Firdaws al- Ḥikmah (Paradise of Wisdom):

“*Firdaws al- Ḥikmah*” can be considered as the first encyclopedia of medicine. The book was not translated before, so it remained in obscurity in Europe. The book, in fact, gives an insight into the ancient Indian Medicine and Islamic Philosophy⁴. Its section on the Indian medicine provides valuable information on its sources and practices.⁵

Following a critical approach of research, the author has divided his compendium into seven parts.⁶ Seven sections of *Firdaws al- Ḥikmah* are as follows:

Part 1: *Kulliyāt al- Ṭibb* (Basis of medicine)

Part 2: Elucidation of the organs of the human body, comprehensive account of certain muscular diseases.

Part 3: Nutrition for health and preventive medicine.

Part 4: All diseases right from head to toe. This part is of profound significance in the whole book and comprises twelve papers.

Part 5: Description of flavor, taste and color

Part 6: Drugs and poison

Part 7: Deals with diverse topics and discusses climate and astronomy. Also contains a brief mention of Indian medicine⁷

Unlike his predecessors, he emphasized on the strong ties between psychology and medicine, the need for psychotherapy and counseling in the therapeutic treatment of patients. He highlighted mental illness as a specialty. In his chapter on mental illness, he described thirteen types of mental disorders including madness, delirium, and the damage of imagination and mind (*Fasad al-Khayāl wa’l- ‘Aql*). He wrote that the patients frequently feel sick due to delusions or imaginations and should be treated with wise counseling.⁸

Al-Ṭabarī described the Islamic code of medical ethics in his book stressing the desirable character traits of the physician and the physician’s obligations towards his patients, community and colleagues.⁹ He also studied child development and psychology, and is said to pioneer of pediatrics.¹⁰

Abū’l Ḥasan, al-Ṭabarī has mentioned communicable diseases in his treatise. He describes leprosy in the following statement:

“The hair of the eyebrows disperse, the voice vanishes, the nails contract, the tips of the fingers and the front part of the nose fall away, probably the life of the fetus is endangered by contagiousness if the illness made its abode in the sperm. This disease is considered to be a communicable disease. It can transmit to another by remaining close to a patient like itching, smallpox and other communicable diseases.”¹¹

2. Abū Bakr Muḥammad b. Zakariyyā Al-Rāzī (854-923 A.D.):

Abū Bakr Muḥammad b. Zakariyyā al-Rāzī (Latin: Rhazes) was a Persian

physician and a celebrated chemist and philosopher. Born in 854 C.E., in Rayy, he lived life in pursue of knowledge.¹² During his early years, he was more interested in alchemy, mathematics, philosophy, literature and music. Later, he learned medicine in Rayy and Baghdād.¹³ He made advances in the understanding of the mechanisms of fever, infection, allergic reactions and pediatrics.¹⁴ Ibn Nadīm, al-Birunī, al-Qaṭīfī and Ibn Khallikān give some information about his life. However, the most comprehensive biography of him is given by Ibn Abī Usaybiah (d. 1276 A.D.).¹⁵

He served as the chief physician in a Rayy hospital and then in Baghdad for some time. It is said that Rāzī was the director of ‘Aḍudī hospital. When he was asked to choose a site for the hospital, he placed the meat on various sites and chose that site where the least putrefaction of meat had occurred. However, Ibn ‘Abī Usaybiyah denies this legend with the argument that the hospital was founded by Prince ‘Aḍud Al-Dawlah in 980 A.D. more than half a century after Rhazes’ death. He died in 923 A.D.¹⁶ Iranians celebrate “Rāzī Day” on August 27 every year.¹⁷

Al-Rāzī was a prolific author. Over half of his 237 works treat medicine.¹⁸ His writings indicate that he used to put more emphasis on observational diagnosis and therapy. He focused on method and practice. He studied clinical cases and tried practical procedures for treatment. He did not make use of the known facts only, but also incorporated his own practical experiences and relied on his own clinical observations.¹⁹

Kitāb al-Manṣūrī (Treatise for the King Almansor):

One of the most well-known of his 56 medical texts was *Kitāb al-Manṣūrī*, a treatise on internal and clinical medicine. This is a classic of Islamic medicine, a review of the entire field of medicine.²⁰ This was dedicated to Manṣūr b. Ishāq, the ruler of Khurasān, whose patronage he enjoyed.²¹ In the Latin world, it is known as “*Liber medicinalis Almansoris*” (Almansor’s Book of Medicine) or “*Tractatus ad regem Almansorem*” (Treatise for the King Almansor). *Kitāb al-Manṣūrī* was translated by Gerard of Cremona in 1497.²² He divided the book in ten chapters according to the following plan:

First: Anatomy and physiology

Second: Temperaments

Third: Food and Simple Medicines

Fourth: Means of Preserving Health

Fifth: Skin Diseases and Cosmetics

Sixth: Diet of People on a Journey

Seventh: Surgery; Eighth: Poisons

Ninth: Treatment of Diseases

Tenth: Fever²³

Kitāb al-Jadrī wa’l-Ḥaṣbah(A Treatise on Smallpox and Measles):

This is a treatise on smallpox and measles, which is considered to be the

earliest medical text which distinguishes between these two infectious diseases. Its significance can be seen from the fact that this has been translated 14 times in Europe in Latin, French, German and English. He discussed the epidemiology, clinical manifestations, differential diagnosis, management and prognosis of both diseases.²⁴ The book contains 14 chapters divided as follows:-

- 1 Epidemiological factors (agent, host, environment)
- 2 Seasonal and personal distribution of the disease
- 3 Differential diagnosis of smallpox and measles
- 4 Ten procedures for the management of smallpox
- 5 Prevention of smallpox during the incubation period.
- 6 Eruption and its aggravating factors
- 7 Care of eye, throat, joints and other organs during the disease
- 8 & 9: Regimental Therapies
- 10 & 11: Aesthetic management of skin lesions
- 12 Diet planning
- 13 Management of bowel function
- 14 Prognosis²⁵

He mentions that persons who are thin and have hot and dry temperament are more susceptible to measles. And those who are thin and have a cold and dry temperament have an attack of measles and if they have smallpox, it remains benign. He is the first physician to differentiate between smallpox and measles. According to him, in smallpox the patient feels severe back pain which is mild or absent in patients of measles. On the other hand distress, syncope and anxiety are more common in measles while less common in smallpox.²⁶

In his treatise on smallpox and measles, he says:

“The eruption of smallpox is preceded by continued fever, pains in the back, itching in the nose and delirium in sleep. Then acute prickling is felt and this goes all over the body, the cheeks go red and eyes are inflamed. The patient has a sense of heaviness and general discomfort. He sneezes, yawns, feels pain in the throat and chest and breathes and coughs with difficulty. His mouth is dry and he has a headache, feels sick, restless and troubles. Note that feeling restless, sick and trouble is more frequent in chicken pox. While pains in the back are features of smallpox, other signs are fever and marked reddening of the gums. When the pustules appear care must be taken first in the eyes, then the nose and ears. Very small white pustules coming up in contact with each other, hard and without fluid are dangerous and if the patient remains ill even after the eruptions, it is a fatal sign. When fever increases after the appearance of greenish or black pustules, and if there is palpitation of the heart, it is a very bad sign.”²⁷

‘Al-Ḥāwī fi’l-Ṭibb (A Comprehensive Book on Medicine):

This is the most widely known work of al-Rāzī. Translated into Latin in the 13th century; *Kitab al-Hawi* was repeatedly printed in Europe during the 15th and 16th centuries under the title *Liber Continens*.²⁸

This is an encyclopedia of clinical medicine. This is a compilation from various earlier sources of medicine like Hippocrates, Galen, Oribasius and Paul of Agina. This has made the book a valuable treasure of the history of medicine. This is not a mere collection of earlier writings, but also a critical analysis of them with the correction of erroneous assumptions based on Rāzī’s own clinical observations.²⁹

Rāzī compiled the book in 23 volumes, two of which are further divided into two lengthy parts. Each volume deals with specific parts or diseases of the body. As he was a practicing physician, he added case histories along with his working notes.³⁰ He has meticulously documented the sources. His main interest is on therapeutics. For example, in the first volume of the book, he traced the exact effects of bloodletting on treating brain tumors. He divided the patients in two groups: one on whom bloodletting was done and the other on whom it was not done. He observed both groups and treated them.³¹ He found that those patients in whom bloodletting was done recovered but the other group contracted the disease. He documents his observations as follows:

“When the dullness (*thiqal*) and the pain in the head and neck continue for three and four and five days or more, and the vision shuns light, and watering of the eyes is abundant, yawning and stretching are great, insomnia is severe, and extreme exhaustion occurs, then the patient after that will progress to meningitis (*sirsâm*) ... If the dullness in the head is greater than the pain, and there is no insomnia, but rather sleep, then the fever will abate, but the throbbing will be immense but not frequent and he will progress into a stupor (*lithûrghas*). So when you see these symptoms, then proceed with bloodletting. For I once saved one group [of patients] by it, while I intentionally neglected [to bleed] another group.”³²

While commenting on the treatment of gout, al-Razi says:

“Where gout is accompanied by high fever, the recipe contains seeds that cause diuresis without giving out much heat, such as those of white colchicum, water melon and cucumber. These, in equal parts, are mixed with one third of a part of opium, and an oral dose of four dirhams (12g) of the mixture with the same amount of sugar is analgesic and effective within the hour. Where there is no high fever, the ingredients, in an oral remedy, are: colchicum, opium, borax, colocynth, ammi, aristolochia, and mountain thyme.”³³

His observations on palpitations are astounding. He describes the patients with palpitations in such an accurate way as if he was examining them today:

“I saw a patient with chronic mild palpitations on several occasions. It (palpitation) caused no ill effect on the patient.”.....“ Many healthy people have palpitations, young and middle-aged, without other clear symptoms. None of them reached old age. Some of them who had fainting died with or without fever. Those who had no fainting attacks died between the ages of 40 to 50 years.”..... “I also saw a man with palpitations and the pulse of his great artery could be felt with thrill by placing the hand on his chest. His pulse could be visualized everywhere on his body. It lifts the flesh up. He did not benefit from bloodletting. He stayed three years like this.”..... He seemed to have responded to an emergency call to see a physician colleague. He wrote: "He had a variety of irregular pulses without fever. I told him that he suffered from blockage of the artery that goes to the lung. I asked him about shortness of breath. He denied it first, then shortness of breath started, became weak, fainted and died like the death of patients with heart disease.”³⁴

The book is excellent in its contents, however, it has limitations. The organization of the matter is poor which makes it difficult to be comprehended by most physicians. And the size is also enormous which makes it inaccessible to most people.³⁵

3. ‘Alī b. al-‘Abbās al-Majūsī (d. 999 A.D.):

‘Alī b. al-‘Abbās is known in Europe as “Haly ‘Abbās”. He was a Persian, a court physician to the Saljūq Sultan, ‘Aḏud al-Dawlah.³⁶ He lived in Baghdād and was placed as the director of Aḏud Dawlah Hospital.³⁷ He is the author of “*Kitāb Kāmil al-Sinna ‘at al- Ṭibbiyah*” (the Complete Book of the Medicine Art) which is also known as “*Al Kitāb al- Malikī*” (The Royal Book). This is a very systematically organized and comprehensive book. The Europeans know it by the name of “*Liber regius*” or “*Pantegni*”. The book is ornamented with a critical survey of the earlier sources of medicine like Galen, Hippocrates and Rāzī.³⁸

Kitāb Kāmil al-Sinna ‘at al- Ṭibbiyah (the Complete Book of the Medicine Art):

Al-Majusi began his medical encyclopedia with a critical survey of his sources, which included Hippocrates and Galen as well as al-Razi. The book is divided into two volumes. Each volume contains ten chapters. The first one deals with theory and the second one with practice.³⁹

The chapters of the first book cover the following topics:

- 1 Historical sources and the general principles of elements and humors
- 2 Anatomy of the homogeneous parts (bones, blood vessels, cartilage, membranes, hair, etc.)
- 3 Anatomy of the heterogeneous parts (brain, eyes, nose, lungs, heart, kidney, etc.)

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- 4 The three faculties (natural, animal, and psychical), causes of death, and sense perception
 - 5 The six 'non-naturals', being air and winds, movement and rest, eating and drinking, sleeping and waking, evacuation and retention (including bathing and coitus), and emotions
 - 1 Classification and causes of diseases
 - 2 Symptoms of diseases and diagnosis from pulse, urine, fevers, sputum, saliva, and perspiration
 - 3 Visible external diseases, including fevers, tumors, superficial conditions (smallpox, leprosy, scabies, lice, etc.), wounds and lesions, animal and insect bites and stings, and poisons
 - 4 Causes and symptoms of internal afflictions (headache, epilepsy, eye diseases, digestive disorders, etc.)
 - 5 Warning signs of the onset of diseases, of severe and long illness, of death, or recovery, and of the crisis of a disease.⁴⁰
The second book had 10 chapters on the following topics:
 - 1 The general principles of hygiene, dietetics, cosmetics, and therapy
 - 2 Therapy with simple drugs
 - 3 The treatment of fevers and swellings
 - 4 Treatment of skin diseases and burns, bites, and poisons
 - 5 Therapy for diseases of the head, eyes, ears, nose, and mouth
 - 6 Therapy for diseases of the respiratory organs
 - 7 Therapy for diseases of the digestive organs
 - 8 Therapy for diseases of the genitalia and reproductive organs
 - 9 Surgery, including bloodletting, cautery, the setting of fractures and dislocations, and surgery of the parts of the body in order from top to bottom
 - 10 Recipes for compound medicaments.⁴¹

The Royal Book was dedicated to 'Aḍud al-Dawlah Fana-Khusraw, the ruler of Persia and Iraq from 949 to 983 A.D., and the founder of hospitals in Baghdād and Shirāz.⁴² There is no firm evidence that he ever left Persia to work elsewhere. The Complete Book of the Medical Art is the only treatise known to have been written by him.⁴³

4. Abū 'Alī, Ḥusayn b. 'Abd Allāh, Ibn Sīnā (980-1037 A.D.):

Abū 'Alī, Husayn b. 'Abd Allāh known in the west as "Avicenna" was a physician and a philosopher, and one of the renowned intellectual figures of the Middle Ages. He was born near Bukhāra, of a Turk mother and a Persian father. He was a precocious student. After learning the *Qur'ān* by heart at the age of ten, he studied the 'Isagoge of Porphyry and the propositions of Euclid Logic. Philosophy and medicine were his subjects of interest. He wrote numerous treatises and the most influential of them was "*Al-Qānūn fi'l-Ṭibb*"

(The canon of medicine) which remained a basis for teaching medicine in Europe into the 17th Century, and the “*Al-Shifā*” (Healing), known in Europe as the *Sanatio*.⁴⁴

In the East, he was more recognized as a philosopher than a physician, however, in the West, he was able to earn the title of “*Prince of Physicians*”.⁴⁵ He was a prolific writer and served a number of princes as a physician. He traveled widely and lived in many places in Persia, including Merv, Iṣfahān, Kazwin, and Hamdān, where he died. His last days were spent in pious exercises and repentance.⁴⁶

“*Sīrat al-Shaykh al-Ra’īs*” compiled by a student of Ibn Sīnā, ‘Ubayd Juzjānī, is a biography of him. This is translated by William E. Gohlman with the title “The Life of Ibn Sina: a critical edition and annotated translation”, published by State University of New York Press in 1974.⁴⁷

***Al-Qānūn fi’l-Ṭibb* (The Canon of Medicine):**

This is considered the most famous single book in the history of medicine. This has been translated into Latin a number of times, and once in Naples in 1491 CE into Hebrew. It was considered the most important medical source in the West for 500 years⁴⁸

Avicenna is most remembered for this monumental medical encyclopedia. This is a book of more than a million words in five volumes. The first volume in sometimes called “*Al-Kulliyāt*” and was often copied and circulated from the rest of the Canon because it contained general medical principles.”⁴⁹

1: This describes the four humors and four temperaments, along with general anatomy and physiology. The discussion of anatomy is aided by diagrams of certain body parts. He dedicated a chapter to blood pressure and discovered the causes of bleeding and hemorrhage. He discovered the cerebella vermis and the caudate nucleus. He provided useful information on the optic nerves, iris, and central and peripheral facial paralyses.

2: This describes about 700 preparations of medications, their properties, mode of action and their indications. This volume is called “*Materia medica*”.

3: This deals with the function of diseases of each organ from head to toe.

4: This covers diseases that affect the whole body like fevers.

5: This is on the preparation of compound drugs.⁵⁰

Along with the classification and description of diseases, this also outlines their causes, hygiene, simple and complex medicines, and functions of body parts. It asserts that tuberculosis is contagious: a fact later disputed by Europeans, but which subsequently proved to be true. It also describes the symptoms and complications of diabetes. This distinguishes Mediastinitis from Pleurisy and recognizes the contagious nature of Phthisis and the spreading of disease by water and soil. It gives a scientific diagnosis of Ankylostomiasis and attributes it to an intestinal worm. In the words of Dr. Ostler it has remained “a medical bible for a longer period than any other work.”⁵¹

Campbell stated that Ibn Sīnā surpassed Aristotle and Galen by the presentation of his book, “*al-Qānūn*.”⁵² Like al-Rāzī, he also successfully treated mental disorders some 900 years before Freud (1856-1939) in the 19th century.⁵³

Ibn Sīnā introduced new drugs for cardiac diseases in his treatise “*Al-‘Adwiyah al-Qalbiyyah*” (Cardiac Drugs). His treatise was found by Hakim A. Latif of Ṭibbiyah College, Aligarh Muslim University.⁵⁴

Kitāb al-Shifā (The Book of Healing):

Over 220 works have been written by him on the subjects ranging from metaphysics to medicine. His “*Kitāb al-Shifā*” (The Book of Healing) is considered to be the largest encyclopedia of knowledge composed by one person in the medieval period. The *Kitāb al-Shifā* consists of four books devoted to logic, natural philosophy, mathematics and metaphysics. The “*Kitāb al-Najāt*” (The Book of Deliverance) is a shorter synopsis of the *Shifā*, while the “*Kitāb al-ishārāt wal’l-tanbīhāt*” (The Book of Directives and Remarks) represents the last major philosophical work of Ibn Sīnā.⁵⁵

Ibn Sīnā was aware of the presence of microorganisms even before the invention of the microscope. He called them “*al-Ajthām, al-Khabīthah*” (foul foreign earthly bodies) in his treatise “*Qānūn*”. Rom Landau states:

“Ibn Sīnā was the first to state that bodily secretion is contaminated by foul foreign earthly bodies before getting the infection.”⁵⁶

He introduced the method of quarantine as a measure of limiting the spread of contagious diseases.⁵⁷ He also discussed the contagious nature of tuberculosis and sexually transmitted diseases and the transmission of diseases through water and soil.⁵⁸

5. Abū al-Qāsim, Khalaf b. ‘Abbās, al-Zahrāwī (936-1013 A.D.):

Abū al-Qāsim, Khalaf b. ‘Abbās, al-Zahrāwī, a Spanish Arab physician known in the West as Albucasis, was born in the city of al-Zahra in southwestern Spain and spent most of his life in Cordoba. He studied medicine there and became a court physician to the Caliph of Cordoba, Ḥakam II (d. 976).⁵⁹

Abū al-Qāsim developed a range of surgical instruments, such as scalpels and the surgical needle, and introduced the use of dissolvable catgut for internal stitches. His most significant work was a 30 volume encyclopedia entitled “*Kitāb al-Taṣrīf*” which completed in 1000 A.D. and covered a range of medical subjects from dentistry to nutrition including surgery. *Kitāb al-Taṣrīf* influenced European physicians for more than 500 years after his death.⁶⁰

Kitāb al-Taṣrīf li man ‘ajīza ‘an al-ta‘līf (The Book of enabling him to manage who cannot cope with the compilations):

This was a medical text whose section on surgery was the most famous. It was the most comprehensive and systematic treatment of surgery and the first to include illustrations of surgical instruments, more than two hundred, many of which he himself had invented.⁶¹ The initial volumes of this compendium deals

with general principles, elements and physiology of humours and the rest deals with systematic treatment of diseases from head to foot. The last volume deals with all aspects of surgery. It was the first textbook of surgery with illustrations of instruments.⁶²

Al Zahrāwī was the founder of surgical anatomy. He valued anatomy as an important aid in the practice of surgery.⁶³ He emphasized that the knowledge of anatomy and physiology is essential before understanding surgery. He says:

“Before practicing surgery one should gain knowledge of anatomy and the function of organs so that he will understand their shape, connections and borders. He should become thoroughly familiar with nerves, muscles, bones, arteries and veins. If one does not comprehend the anatomy and physiology one can commit a mistake which will result in the death of the patient. I have seen someone incise into a swelling in the neck thinking it was an abscess, when it was an aneurysm and the patient died on the spot.”⁶⁴

The first volume contains information on the elements and mixtures, the compounding of drugs and the anatomy. The second volume contains the sections on diseases and their symptoms, and instructions for their treatment. The next twenty three volumes deal with *materia medica*, the preparation and uses of drugs, pills, ointments, plasters and so on. The twenty sixth volume is on diets for the sick and many of the healthy, arranged according to diseases. The twenty eighth volume is on the improvement of medicines, the burning of mineral stones and the medical uses thereof. The twenty ninth volume is on the naming of drugs in various languages, how one can be used in place of another, the stabilization of drugs, compounded and otherwise, the explanation of the compound names occurring in medical books, and weights and measures. The thirtieth volume is on the surgery which is the most famous part of the book. It is evident from it that the author was a working doctor and a practical physician. He revived the art of surgery as taught by the ancients.⁶⁵

He describes many operative procedures and instruments which did not appear in earlier writings. Some examples are the tonsil guillotine and its use, the concealed knife and its case for opening abscesses, the trocar for paracentesis, true scissors, the syringe, the lithotrite, and his design of vaginal speculum, the use of animal gut as suture material, the description of thrombophlebitis mirans, the well-illustrated account of the reducing table for extending limbs in order to reduce dislocations or displaced fracture ends, and the formula for a kind of plaster casing.⁶⁶

Abū al-Qāsim drained abdominal ascites and testicular hydroceles with goose quills, as well as with silver, bronze or copper tubes. For urinary retention, he described J shaped catheters for the male bladder. For irrigation of the bladder, he referred to a syringe with a plunger, made of silver or ivory, combined with a long urethral pipe. He also described a funnel shaped silver or bronze pipe

combined with a camel's bladder or spherical bag of parchment used to squeeze fluid through the urethra or to administer enema.⁶⁷

In addition to iron cauterization, Abū al-Qāsim described and illustrated the following steel items: bone osteotribes, bone drills, bone and dental scrapers, dental extraction forceps and files, a tonsil scissor (or guillotine), and a bone saw; the drill and saw had wooden handles.⁶⁸

In particular, he emphasized the importance of high quality steels for dental extraction forceps, tonsil guillotines, dental chisels and files, and for fine drills to pierce and break up bladder calculi impacted in the proximal urethra.⁶⁹

Abū al-Qāsim identified scissors with sharp or blunt tipped blades for eye surgery or circumcision respectively and a form with C-shaped blades for tonsillectomy.⁷⁰

Abū al-Qāsim used to amputate as high as the knee and elbow joints for dangerous bites from marine scorpions, vipers, and venomous spiders, for which he employed cautery to control hemorrhage. He advised tight bandaging above and below the line of section, by means of which assistants pulled the soft tissues up or down as desired. He also recommended the use of a broad scalpel, a saw and cauterization or styptic powders for bleeding.⁷¹

6. 'Alā al-Dīn, 'Alī b. Abī Ḥazm, Ibn al-Nafīs (1213-1288 A.D.):

Abū'l Ḥassan, 'Alā al-Dīn, 'Alī b. Abī Ḥazm, Ibn al-Nafīs, was born in Damascus. He was a physician who worked in Cairo at the Naṣrī and the Maṣūri hospitals and made remarkable contributions to medicine.⁷² Ibn al-Nafīs and Ibn Abī 'Usaybiah were contemporaries but the later did not mention Ibn al-Nafīs in his treatise on the biographies of notable physicians of his time.⁷³

Ibn al-Nafīs was a unique scholar in the science of medicine. He studied medicine under Muḥadhdhib al-Dīn al-Dakhwar. He wrote excellent books in medicine like "*Kitāb al-Shāmil fil Ṭibb*" (The Comprehensive Book on Medicine), "*Kitāb al-Muḥadhdhab Fi'l-Kuhl*" (The Well-Arranged Book on Ophthalmology) and "*Sharḥ al-Qānūn*" (Commentary on the *Qānūn* of Ibn Sīnā), owing to this work, he is considered by some as "*Second Ibn Sīnā*".⁷⁴

In addition, he wrote theological, philological, judicial and philosophical works, as well as commentaries on several Hippocratic writings and on the "Questions of Medicine" by Ḥunayn b. Ishāq. His epitome of the Canon of Avicenna (*Mujiz al-Qānūn*) was famous in antiquity.⁷⁵

Ibn al-Nafīs is remembered for his remarkable achievement of explaining the 'pulmonary circulation' or 'the lesser circulation'. This was first brought into light by Muḥiyyī al-Dīn al-Ṭanṭāwī in 1924 as a part of his doctoral thesis entitled "The Pulmonary Circulation according to al-Qurayshī" and presented it before the medical faculty of Freiburg.⁷⁶

In the volume III of "*Sharḥ Tashrīḥ Ibn Sīnā*" (Explanation of the Dissection of Avicenna), Ibn al-Nafīs said:

“The blood after it has been refined in this cavity (i.e., the right ventricle), must be transmitted to the left cavity where the (vital) spirit is generated. But there is no passage between these two cavities, for the substance of the heart is solid in this region and has neither a visible passage, as was thought by some persons, nor an invisible one which could have permitted the transmission of blood, as was alleged by Galen. The pores of the heart there are closed and its substance is thick. Therefore, the blood after having being refined, must rise in the arterious vein (i.e., pulmonary artery) to the lung in order to expand in its volume and to be mixed with air so that its finest part may be clarified and may reach the venous artery (i.e., pulmonary vein) in which it was transmitted to the left cavity of the heart. This, after having been mixed with the air and having attained the aptitude to generate the (vital) spirit. That part of the blood which is less refined is used by the lung for its nutrition.”⁷⁷

Ibn al-Nafis in the above passage correctly defined the lesser circulation and denied the existence of foramina between the two ventricles as thought by Galen.

Ibn al-Nafis also corrected Avicenna in the function of coronary vessels. In his commentary on the Canon of Avicenna, he said:

“His (Avicenna’s) concept that the blood in the right ventricle feeds the heart is absolutely wrong, for the supply of the heart is from the blood circulating in the vessels, which are distributed in the body of the heart.”⁷⁸

7. Abū Ja‘far, Aḥmad b. ‘Alī, commonly known as Ibn Khātimah (1323-1369 A.D.):

Born in Almeria in the Muslim controlled southern Spanish kingdom of Granada, he was a legal scholar, a poet and a physician. He was the author of at least three dozen works, among them is the description of and remedy for the plague. His treatise entitled “*Taḥṣīl Gharaḍ al-Qāsid fī Taḥṣīl al-Maraḍ al-Wāfid.*”

The tract’s format is a series of 10 questions with answers. In question 8, he seems to reconcile the medicine with the Islamic teaching on contagion. In his treatise Ibn Khātimah admitted that the breath of the infected person can also “infest the air” around him. Although he insisted in his treatise that the plague was contagious, he had to admit also that Allāh directed the disease to the chosen victim.⁷⁹

Ibn Khātimah stated that man is surrounded by “minute bodies” which enter the human system and cause diseases.⁸⁰ In his tract, he stated that:

“... the immediate cause (of plague) is usually the corruption of the air which surrounds people and which people inhale.”⁸¹

He stated that this process could be recognized by its foul vapour.”⁸²

**8. Lisān al-Dīn, Abū ‘Abd Allāh, Muḥammad b. al-Khaṭīb,
al-Andalusī (1313-1375 A.D.):**

He was born in Loja about 50 kilometers from Granada in 713 A.D. His father was in the service of the Sultan Abū al-Walīd Ismā‘īl. In addition to writing an important history of Granada, he composed a number of medical treatises. These include a general work on therapeutics, a book of hygiene, a treatise on plague, and a didactic medical poem.⁸³

In his treatise on the plague, he stated how infectious disease can be transmitted through bodily contact and through garments, vessels and earrings. He observed that women and children are more susceptible to plague because of their humoral makeup. He also noted that those who remained isolated from the disease did not contract it. He suggested that the cause of disease is neither ‘miasma’ nor divine will. He also said that those who had been exposed to the plague and lived seemed to have acquired a certain resistance or immunity. He also distinguished the bubonic plague from the pneumonia one, and declared pneumonic plague to be more infectious. He condemned those who ignored contagion and forbade flight and called them “murderers”.⁸⁴

He defended the theory of infection in the following way:

“To those who say, How can we admit the possibility of infection while the religious law denies it?, we reply that the existence of contagion is established by experience, investigation, the evidence of the senses and trustworthy reports. These facts constitute a sound ground. The fact of infection becomes clear to the investigator who notices how he who establishes contact with the afflicted gets the disease, whereas he who was not in contact remained safe, and how transmission is effected through garments, vessels, and earrings.”⁸⁵

Other than these famous personalities of Islamic medicine, there were many others who contributed valuable work in this field. Al-Kindī (810-873 A.D.) wrote books on poisonous foods, fever with its classification, treatment of hemoptysis, leprosy, hydrophobia, and mental depression. Thābit b. Qurrah (836-901 A.D.) described the diseases of hair and nails in his book, “**Al-Dhakhīrah**”. Ibn Zuhur (1094-1162 A.D.) was the first to discuss intestinal phthisis (tuberculosis), pharyngeal paralysis and middle ear inflammation. Ismā‘īl al-Jurjānī (d. 1036 or 1040 A.D.) wrote “**Dhakhīrah Khwārizm Shāhī**” (Treasures of the Shāh of Khwārizm), a voluminous book written in the Persian language just as *al-Qānūn* was written in the Arabic language. Ibn Rushd (1126-1196 A.D.) wrote “**Kitāb al-Kulliyāt**” which was an encyclopedia of medicine in the west (*Liber Universalis de medicina*).⁸⁶

Al-Mārdīnī (925-1015 AD) was the first to use anesthetics for inducing sleep in patients before operation. Sa‘īd b. Hibat Allāh (1044-1101 A.D.) wrote “*Kitāb Khalaq al-Insān*”, one of the earliest books on obstetrics, Yuhannā b. Māsawih (980-857 A.D.) wrote the first book on ophthalmology, “*Kitāb Daghi al- ‘in*”(Disorders of the Eyes). ‘Ammar b. ‘Ali al-Mansib (d. 11th Century) wrote on the anatomy of the eye, description of eye diseases and their treatment, including six methods of contract operation.⁸⁷

Conclusion:

The above description claims evidently that the early Muslim period (7th – 15th Century) was a golden era in the history of medicine and surgery. Some renowned physicians of medieval era and their glorious works can be listed like ‘Alī b. Sahl b. Rabbān al-Ṭabarī (838-870 A.D.) who is the author of *Firdaws al- Ḥikmah* (Paradise of Wisdom). Abū Bakr Muḥammad b. Zakariyyā Al-Rāzī (854-923 A.D.) authored *Kitāb al-Manṣūrī* (Treatise for the King Almansor), *Kitāb al-Jadrī wa’l-Ḥaṣbah* (A Treatise on Smallpox and Measles) and *Al-Ḥāwī fi’l-Ṭibb* (A Comprehensive Book on Medicine). ‘Alī b. al-‘Abbās al-Majūsī (d. 999 A.D.) is the author of *Kitāb Kāmil al-Sinna ‘at al-Ṭibbiyah* (the Complete Book of the Medicine Art). Abū ‘Alī, Ḥusayn b. ‘Abd Allāh, Ibn Sīnā (980-1037 A.D.) wrote *Al-Qānūn fi’l-Ṭibb* (The Canon of Medicine) and *Kitāb al-Shifā* (The Book of Healing). Abū al-Qāsim, Khalaf b. ‘Abbās, al-Zahrāwī (936-1013 A.D.) penned *Kitāb al-Taṣrīf li man ‘ajiza ‘an al-ta’līf* (The Book of enabling him to manage who cannot cope with the compilations). ‘Alā al-Dīn, ‘Alī b. Abī Ḥazm, Ibn al-Nafīs (1213-1288 A.D.) is the author of “*Kitāb al-Shāmil fil Ṭibb*” (The Comprehensive Book on Medicine), “*Kitāb al-Muhadhdhab Fi’l-Kuhl*” (The Well-Arranged Book on Ophthalmology) and “*Sharh al-Qānūn*” (Commentary on the Qānūn of Ibn Sīnā), owing to this work, he is considered by some as “Second Ibn Sīnā” Abū Ja‘far, Aḥmad b. ‘Alī, commonly known as Ibn Khātimah: (1323-1369 A.D.) wrote a treatise entitled “*Taḥṣīl Gharāḍ al-Qāsid fi Taḥṣīl al-Maraḍ al-Wāfid.*” Other than these a number of Muslim physicians provided immense services in the field of medicine. This provides great inspiration for the Muslims to regain their glorious position in science and technology, a position which they claimed convincingly for many years.

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