Review article:

Arab and Muslim contributions to Medicine and Research – A Review

Ahmad W[1], Rabee K[2], Zulkifle M[3]

Abstract

The accomplishments in the development of knowledge by medieval Arab civilization have been termed by some scholars as mere translation and preservation of Greek knowledge. It is alleged that the original works of Arab were only the preservations and duplications. They had no curiosity for learning and thus their insights, intuitions and cognition were immature. And it is assumed that investigations and inquiries are the achievement of recent periods.

This study intends to investigate the knowledge expansion in the perspective of research in field of medicine by the Arabs. There are many renowned scholars who had made such irresponsible comments regarding Arabian diligence. For instance E.G. Brown comments "its long recognized importance, lies not in its originality, but in the fact that in the long interval which separated the decay of Greek learning from the Renaissance, it represented the most faithful tradition of ancient wisdom, and during the dark ages was the principal source from which Europe derived such philosophical and scientific ideas as it possessed". Thus such paradigm statement was largely propagated by the scholars who had limited access to the Arabic literature. In contrast the fact is that initial Arabian contribution in the knowledge was the golden period of Arabs. The investigation based upon the reliable classical and historical literature revealed that the Arabs emphasized on research and rational thinking as their important tools of growth and development in medicine as could be observed in Al-Razi statement "any physician who is dependent only on his experimentation and neglect literary knowledge and hypothesis then he may be a failure".

Hence, an attempt is made to explore and highlight the Arab endeavors in original medical innovations which made them the sole source of many learning scholars. They had excelled in many innovations like bed side clinics, differential diagnosis between small pox and measles, concepts of mobile clinics, pharmacy, emergency facilities, midwifery, separate pediatrics facilities and advancement in the fields of psychiatry, cardiology, ophthalmology etc

Keywords: Arab contributions; medicine; research; originality; rationality.

Bangladesh Journal of Medical Science Vol. 16 No. 03 July'17. Page : 339-353

Introduction

Research and meticulous inquiry are the indispensable part of Arab medicine. Since they were influenced by the blessed Quran and Ahadith they grew more cognizant and conscious. In Quran Allah says "We will show them our signs in the horizon and within themselves [(1)]." The verses like this inspired the individuals to look and think the correspondence between planets, stars and corporal body, and even between the material and spiritual world. The eccentric sect of Ismaili, authoritatively mandated their missionaries to incite their inquisitiveness with queries such as why a man has seven cervical vertebrae, twelve dorsal vertebrae and each finger has three joints and likewise [(1, 3)]. And it is of immense association that the number of joints of both hands is equal to the number of permanent teeth, number of days of lunar month and number of words in Arabic alphabets. Correspondingly, it is again and again observed that number of four, seven and twelve had

1. Wasim Ahmad, Lecturer, Dept of Kulliyat, National Institute of Unani Medicine, Bengaluru, INDIA
2. Khaiser Rabee , Medical Officer, Govt Primary Health Centre, Ramanathapuram, TN, INDIA
3. Mohd Zulkifle , Head, Dept of Kulliyat, National Institute of Unani Medicine, Bengaluru, INDIA

Correspondence to: Dr. Wasim Ahmed, Lecturer, Dept of Kulliyat, National Institute of Unani Medicine, Kottigapalya, Magadi Main Road, Bengaluru- 560091. India, E-mail: drwasimkulliyat@gmail.com

demonstrated its noteworthiness in universe. Thus, natural properties are four in numbers (*Hararat, Burudat, Rutubat* and *Yubusat*), primary constituents are four (*Nar, Ma, Hawa* and *Arz*), Humours are again four (*Dam*, *Balgham, Safra* and *Sauda*) and seasons are four. Planets and zones each are seven in numbers. Twelve marks of zodiac and twelve months of year and so on [2,3]

Contrary to the fact it is assumed that from the period of Greek and Roman medicine, there was nothing new in medicine until the renaissance. Extremity and audacity are up to this degree that the period from decay of Greek learning to renaissance is referred as "Dark Ages". If it is agreed then who transferred this wisdom and who served and orchestrated this treasure to be enriched and enshrined? E. G. Brown said that the genesis of science and creation of knowledge is an important topic for research and investigations, but apart from this whether the Arab scholars did more than the send out treasures and whether they added some original stuff over eight hundred years? Unluckily this is not an easy question before going to an exact answer of this question it requires a lot of rigorous and untiring labour[2, 3].

For this inquiry additionally a blend of qualification is required commonly not found in an individual. It means for a man who dare to investigate should possess scholarly knowledge of Greek, Latin, Syrian, Arabic, Persian and Sanskrit. And he should have the knowledge and interest in medicine, plentiful of time, hungriness, habituated reading, great eagerness and passionate to labour [2, 3].

Those who are well familiar and have deep insight of the past knowledge of evolution of sciences can express and can comments, in better and accurate way with full freedom on the growth of present day knowledge. Contrary to those who are restricted to their own period and become satisfied seeing the same condition which is surrounded by incidence of present day knowledge. It is the call of times to dive into the works of earlier physicians now. George Sarton said those who ever recognized the evolution of science, the same considerate and expresses much better proper and independently rather than those confined their own period and are content to the same environment and who get hold by the scholarly events of this era [4].

Salient Facts

In Kitabul Miyah, Abu Sahl Masihi expressed his view in a different way; he appreciated and also condemned the work of earlier physicians, who after gaining the treasure and getting skilled could not add anything more in the treasure of earlier physicians. Since it was not due to the art had been completed or the authentication was not needed rather they had preferred the concise and presented ordinary instead of detail with excellence. Ancient scholars proposed the dogmas and doctrines but they were insincere and careless towards filling the gap in knowledge, facilitation, investigation, authentication and classification. This great task could not have been accomplished without teamwork, as the period of an individual and strength are not sufficient to make refinement, classification, documentation and validation of this great treasure. Whatever endeavours are made in this regard caused the reinforcing of earlier treasures by the receipt in the completion of the scattered materials organized and documented[5].

This whole story is expressed in a single aphorism of Hippocrates in *Kitabul Fusool ma Kitabul Alamat*, *"life is short, art is long, time is fallacious, experiment is risky, fate is impending, then oh friend make haste for the completion of arts*[2]*."*

The works of the Arab scholars is based on interpretation of the then existing knowledge of which human intellect could be built. Consequently, they became successor of all the knowledge of Egypt, Greek, Rome and Persia. Furthermore, they endeavoured to bring great knowledge from India[6]. Arab scholars' translated many of the books of medicine, astrology, mathematics, physics, stories and history from Sanskrit into Arabic. In the subject of medicine several books were translated if it would not have happened otherwise little work would have come up. In the period of Abbasid, Baghdad was the most central place of scholars, physicians, traders and visitors from all over the world. The credit goes to Yahiya Bramica welcomes the Indian physicians to Baghdad, and he deputed Yahiya bin Khalid for the reception of research groups that included *Manka, Bazikar, Qaleerfal* and *Sandbaz*[6]. And even they had worked hard in bringing out the several drugs from India[6]. After the Abbasid era, it was supposed that Islamic scholars made available the base on literature, medicine, pharmacy and biography. They had significantly relied upon Indian literary sources and the references may be seen in *Al-QanoonFil Tibb* by Ibn Sina, *Kitab-ulMulki* by Majoosi, and *Al-Hawi* by Razi. Books were regarded with the intuitions of Indian physicians for depiction of illnesses and their standards of treatment and so on[6]. It has been observed that whenever the physicians of various countries of Abbasid era failed to treat then they called upon Indian physicians for expert opinion [6].

The Arab researchers had passion to learn and disseminate the knowledge in various disciplines[6]. Their zealousness on obtaining wisdom can be seen from the popular sayings;

"خذواالحكمة ولومن السنته المشركة"

"Acquire the wisdom even if it is in the dialect of non-believers[6]." Whereever the Arabs invade they gave careful consideration on necessity premise for the libraries. Like, when Khalifa Haroon Rasheed (170-193) came in to power he was influenced with the language of philosophy and logic. At the time of victory of Anqara and Amooriya cities of Rome, he took hold of libraries and ordered for shifting them to the capital for translation and assigned Yuhanna Ibn Massviyah for this task[6]. Therefore, the Baghdad became the centre of excellence, as congregation of sages, origin of scholars and place of translators in the dynamic era of Mamoon Rasheed[6]. The collection, organisation and compilation of literary treasures from various civilizations took place in Baghdad where many families like Hunayn Ibn. Ishaq, Bakhteshu, Sabit and Masir Joya Basri were involved in this task[2]. They concentrated on summarization and interpretations and laid emphasis to prove the concepts by their experimentation and observation on the basis of existing literature which were available to them. So many books and statement of Hippocrates, Galen and other philosophers were critically analysed and after judicious audit they prepared justified text as well as rectified the errors.

For case in point, Ibn Abi Al-Ash'ash along with translation divided the book of Galen in sections and chapters. He also wrote commentaries and marginal notes on the said books for comprehension. The practice of marginal notes was introduced by him. They provided a shape of discipline to the medicine. Ibn Juljul also added the marginal notes to the reputed treatise of Dioscorides which was against the custom in those days[6,7]. Likewise Arabs are credited to introduce the arrangement of assessment and evaluation of physicians to check and control the malpractice by quack. For this purpose physicians were appointed like renowned chief physicians, Sinan bin Sabit in Baghdad and Muhazzabuddin in Egypt, who appraised the ability of physicians and certified them for practice. In the field of pharmacy there were a lot of pharmacists but adulteration was common. It was made mandatory to qualify the examination for getting certificate and licences for trade in pharmacy. Zakriya bin Taifoori was the first man who explored the adulteration of drugs in Baghdad. Furthermore, they had categorised the physicians and pharmacists according to their skilled approach for deputation with army, and some of them were appointed as court physicians. These physicians were getting salary and other allowances. Whilst others were private practitioners categorised according to their skills; *Jarrah* (surgeon), *Fassad* (phlebotomist), *Kahhal* (oculist), *Asnani* (dentist), gynaecologists and some of them were specialist to treat the insanities. The inference to this expertness and specialisation are not due credited in present era. The oculists were engaged to intervene in ophthalmological diseases and treated the *Ma'i Azraq* (cataract) with *Aqadhil Ain* similar to the present cataract operations[6]. The famous group of women were made public by their clinical skills including Hufaid bin Zahr Al-Undulusi and her daughter. Both were scholars of Tibb and they had great proficiency in the treatment of various gynaecological disorders. Both were appointed as gynaecologist in the court of Mansur Al-Undulusi[6]. Zainab Tabiba Bani Awad got the expertise in various medical procedures and intervention of surgeries in many types of ophthalmological diseases[6,7]. Abul Hasan Ali bin Al Hazm Ibn Al Nafees Al-Qarshi (607-687 H.) compiled an independent book on anatomy apart from *'SharahTashreeh Al-Qanoon'*. He was the first person to challenge the long-held contention of the Galen on pulmonary circulation and gave the correct description of it. He said the movement of blood is not like tide as earlier scholars believed, and the blood passes from right ventricle to lungs where the air mixes with it and then it comes from lungs into left ventricle through *Al-Waridur Rewi* (pulmonary vein). Cardiac muscles are nourished by its own *Aueyatul Ikliliyah/At-Tajiyah* (coronary arteries) not by the blood present in the ventricles. He also clarifies that there is no passage between the ventricles. This great achievement was hidden till 19th century. Muhiuddin Al tatawi Misri (1896-1945) discovered during his research work entitled as Ad-Dawratur Rewiya Tab'anlil Qarshi in Farai Boragh University in Almaniyah in 1924. He announced Ibn Nafees as the father of pulmonary circulation. It is mentioned in the manuscript entitled as *Shareh Tashreehul Qanoon* which is present in Berlin library. Since his guide was unable to understand the Arabic language then the same manuscript was sent to Max Meyerhof who was in Cairo admitted and supported the revelations of Muhiuddin Altatawi Misri. Again Max Meyerhof wrote a book on Ibn Nafees (XIIIth Cent.) and history of lesser circulation in English language in 1935 [8,9]. Later his guide L. Binet has

corroborated in his book *'En marge des Congress'* 1947 and then renowned historian George Sarton also discussed the credit of Ibn Nafees in his treatise *'Introduction of the history of Sciences'* [8]. The other historians like Aldo Mieli and Edward Coppola were of the same opinion that Ibn Nafees is the real discoverer of pulmonary circulation[10].

The Arabs are credited to several initiatives for novelty. They employed the sedatives in medicine like *Al-Banj* (Hyosamus albus Linn) and *Alzawan/ Ash-sheelam* (Calvicip purpuria). They discovered the vinegar preparation techniques. French scholars found that Arabs were the first who practiced *Kaviyat* (cauterization) in surgery as it is still in vogue. They described the nail clubbing sign in case of *Maslooleen* (tuberculosis). They explained the treatment of jaundice and *Hawa-e Asfar*. They recommended large amount of opium in insanities, explained to arrest the bleeding by applying the ice fomentation, discovered the interventions of surgery in shoulder dislocation and cataract, stated the procedure of lithotripsy. Even they wrote the monograph on several topics of medicine which were not covered by earlier scholars like on leprosy by Yahiya Ibn Massviyah were the first to elaborate it precisely. And Razi was the first to distinguish between the small pox and the chicken pox[6]. French scholars recognized that Arabs were the founders of pharmacy and they were the first to emphasize the thought of documentation of herbs and shrubs. Saboor bin Sahl (255 *Hijri*) wrote the first pharmacopeia in the Abbasid period and it became the source of all pharmacopeia preparations in hospitals and practice. Then Aminud Daula bin Tilmiz (560 *Hijri*) wrote another one where in he described the shelf life of drugs[6]. Arab scholars laid the foundation of modern chemistry with their experimentation and knowledge. The first man who was engaged in translation of much literature belonging to school of Alexandria into Arabic language was Khalid bin Yazid, then Jafar Al-Sadiq (140 *Hijri*), followed by others like Jabir, Kindi and Razi. They prepared a lot of chemical compounds which were the precursors of modern chemistry. The French scholars credited Arabs in the preparation of *Maul Fizzah* (silver water), *Zaituz Zaj* (Alum), *and Mauz Zahab* (gold water). They invented *Butasa, Ruh-e Naushadar* (Ammonium Chloride) and its salt. *Hajre Jahannam (Natratul Fizzah), Sulemani (Chloride Zibaq/*Mercury*), Rasib al-Ahmar* (oxide of *Zibaq/* Mercury*), MilhutTarteer, Milhulbarood* (*Natratul Butasa* - Gun powder salt: Sulphuric acid + Coal + Iron particles), *ZajulAkhzar* (*Kibritatul Hadeed*), *Al-kuhul, Al-Koh'l*, *Zarneekh* (Arsenic Sulphide), *Boraq* (Borax) etc[6]. Even they are the first to explain the description of *Taqteer* (distillation), *Tarsheeh* (sieving through a thick cloth or a piece of a paper), *Tas'eed* (sublimation), *Tabal'ur* (crystallization) and *Tazweeb* (the process of melting medicines by heating). They also compiled books in refutation of earlier chemistry. The first book on this subject was of Yaqub Al-Kindi (died 873AD)[6].

When the sense of honour of Italian, French, German and English men awaked, they inclined to arrive at Spain to learn from all the fields of learning. *Muntakala* said in the historical backdrop of arithmetic, all French mathematicians attained the ability and information from the Arabs over the hundreds of years. After deduction to this, *Dokarimuna* translated *Ma'arif* (all the fields of information) into Italian. He mulled over astronomy, medicine, philosophy in Talitala and translated the works of Majusi, Razi and Ibn Sina into Latin. Additionally Leonard Albizi duplicated mathematics, algebra from Arabs. *Arnold Atteela Nuti* interpreted astronomy, physics and medicine. The other English men who translated Arab works were Father *Belarud*, *Morle* and *Ascot*. A renowned scholar, Roger Bacon acquired *Ma-'arif* (all fields of knowledge) in chemistry, philosophy and mathematics based on Arabic literature. Similarly the *Fenleu* who got recognition in optics gained most of the knowledge from treatises of Al-Hasan Al-Basri on optics[11].

Certainly French men duplicated from Arabs like the Arabian scholars replicated from others and deduced from them fresh philosophy, astronomy, physics, mathematics, optics, chemistry, medicine, pharmacy, geography, agriculture and horse husbandry. Furthermore they got the techniques of paper technology, gun powder, sugar, clay pot, drug composition and cloth manufacturing, cultivation of the silk cocoon, varieties of grains, plants like rice, sugarcane, saffron, cotton, spinach, pomegranate and fig, transcribed the concept of leather tanning and their drying techniques. Again when the people of Spain banished the Moors they migrated to 'Fas' island and the same art missed from Undulus. Afterwards, England returned to this art and tanning leather even it is known as *Moracco wa Corduton* attributed to Marrakesh and Qurtuba[11].

One of the renowned historian also said most of the Arabic words continues to exist today in French literature of physics and chemistry *Simt, Nazeeer, Samawat, al-muqantarat, asma-ulnujum, al-kuhul, al-kali, al-jabr, al-qutn, sharab, al-kemia*etc[11].

Razi had emphasized on observations and experimentations and his statements show his diligence on obtaining wisdom.

الاستكثار من قراة كتب الحكماء والاشراف على اسرارهم، نافع لكل حكيم عظيمالخطر"

"The extensive reading of the physicians' works decode the secrets and benefits the physicians tremendously"

"العمر يقصر عن الوقوف على فعل كل نبات فى الارض، فعليك بالاشهر، مماجمع عليه، ودع الشاذ، واقتصر على ماجربت"

"The normal age of man is not enough to know the functions of each and every plant therefore, agree to choose the famous one, desist from the rare and depend on your experience"

ماجتمع الاطبا عليه، وشهدعليه القياس وعضدته التجربه، فليكن أمامك، وبالضد"

"At the point where physicians agree, corroborate it and experience it then prefer the same and stay away from contradictions[12]."

Thus Razi relied exclusively on his own experiences. Throughout the survey of *Al-Hawi Fit Tib* he described the concepts and the way of treatment of all predecessor physicians but authenticated by his own experience. For instance, he says, in my observation the patients who vomit the food while eating feel nausea or pain and they are relieved with diarrhoea. For *Ishal*, he recommended *Arq Kasni* along with *Sibr* otherwise *Arq Kasni* or *Arq Bikh Karafs* along with *Arq Badyan*. And in between administrations of the said *Arqiyat*, *Khayar Shambar* to be added[13]. In one place he comments on the statement of Ighlooqan regarding the sadness and anxiety in relation to digestion of foods as doubtful (13). Likewise, in other place he shares experience on *Khafqan Sagheer* (palpitation). This is a chronic disease where the patient does not worry about it, neither has weakness nor fever so he says that in case of palpitation sheath of heart is filled with *Ghaleez Riyah* (thick flatus) causing *Ikhtilaj* (fasciculation) and patient becomes lean and thin[14].

In medical history Razi was the first physician who had explained the pathology, semiology and medical intervention for the diseases and he also provided the details of the day by day treated patients. He had great kindness towards patients and always worried to provide the best way of treatment[12]. A lot of adventurous stories are attributed to him. Some of the successful treatment stories are discussed in his book *'Kitab Al-Hawi Fit Tibb'* and *'Kitab Fi Sirr-it Tibb'*[12]. Ibn Abi Usaiba pointed out one more book entitled as *'Sifat Al-Bimaristan'* in which he illustrated the reports of the patients which he had treated in Bimaristan hospital[12]. But it can be strongly said that the diagnosis on the basis of signs and symptoms, prescription of medicine accordingly made him great skilled and few of them were at par to him[15].

Razi's contribution in different fields of medicine are as (a) His writings on exclusive anatomy are *'Kitab Hai'atul Kabid', 'Kitab Hai'atul Ain', 'Kitab Hai'atul Unsayain', 'Kitab Hai'atul Qalb'* and *'Kitab Hai'atus Simakh'*. In his other book *Kitab Al-Mansoori* a section is devoted to anatomy[12]. (b) He discovered the laryngeal branch of recurrent laryngeal nerve. (c) He stressed on the compulsory knowledge of anatomy for the physician without which no remarkable achievement could be achieved. In the last stage of his life when he went blind with cataract, an oculist offered him to operate his cataract. Razi questioned him on his understanding of eye anatomy like the number of layers of cornea. When the oculist failed to respond, Razi refused "saying how one can operate without knowing anatomy"[15]. (d) In paediatrics, he was the first to introduce the separate paediatrics department. He differentiated paediatrics from gynaecology and wrote a remarkable book on paediatrics. The original work was destroyed but its translation in Latin (1481 AD); German, English and Italian (1959 AD) are available[15]. (e) He described the details of Hay fever occurring in spring season. He advised emetics to check the presence of toxins in foods and drinks. He discouraged the use of purgatives except in emergencies and gave preference to diet for health[14]. (f) In explanation of psychiatric diseases and their treatment he described that the mental diseases are not due to bad spirit, instead due to weakness of neurons and psychological defects[15]. (g) On *Iltihab Ghishaul Qalb Tadarruni* (tubercular pericarditis) he was the first to work on this, he says sometimes pericarditis may be tuberculosis with *Zabool* and palpitation. He narrates; I had a monkey which fell ill. On account of some commitments I was unable to attend it; meantime it was infected with pulmonary tuberculosis and died. On dissection, the viscera were found normal but the pericardium was filled with fluid which gushed on incision. Inference to this pan pericarditis may be due to *Sil* (tuberculosis) and further he says if body infected with *Sil* (tuberculosis) and *Zuban* with no apparent cause like high grade fever or hepatitis it may be understood that the temperament of the heart is changed. In *Sue Mizaj Qalb* with palpitation and syncope then treatment is same as it is in the other types of pulmonary tuberculosis[16.] (f) In Surgery, he advised the use of

antiseptics, he treated inversion uterus, hydro uterus, pseudo pregnancy, *Taqti-e Janeen* (cutting of death foetus) in dystocia. (g) He practiced the procedures of tracheotomy, tonsillectomy, lachrymal fistula, harelip, burns and necrosis[15].

Hakim Kabiruddin, a learned physician had said the knowledge of modern anatomy supports the earlier anatomical description and coincides in all status of extrinsic and intrinsic nature. Since the modern anatomy too is based purely upon observation, investigation and dissection. When we go through the statements of Arab scholars it is clear that their assessment was based on observation and dissection, as Gilani pointed out in his book *Kitab Shareh Al-Qanoon* that he had observed several times sagital suture which divides the head into two parts and was rarely extend in between the two eye brows[2].

The Arab scholars condemned the assumption and hypothesis in the field of anatomy. They hold only observations and investigations as the standard. Mulla Nafees (d.1449 AD), rectified a mistake of Qarshi (1213-1288 AD) in brain dissection and he said that conjecture and presumption are unacceptable but the perception should be on the basis of observation and dissection. Ibn Sina also asserted observation and dissection in anatomy[2].

Al-Baghdadi (1162–1231 AD), said, the book of *Kitabul Tashreeh* of Galen. There are a lot of difference between sayings and observations. Further he opined observation is most superior to hearsay, if observation is more appropriate and even the philosopher like Galen possessing high ranking errs then the precision should be credited[2].

Conclusion

After the illustration of various facts on the works of Arabs, it cannot be under estimated, and their contributions appeal to write their names with golden ink in the history. The present day scientific innovations and inventions have shocked and dazzled the world and these changes have not appeared abruptly! Neither the reflection of efforts is merely of past two hundred years? Nor the foundation of wisdom was laid by only European scholars it is amazing to see that a group of physicians quarrel even when they are unable to understand Ibn Khaldun had rightly pointed out that the Arabs were profound in all their art of knowledge and their thoughts were of long way[17]. Prof. Hitti and some other scholars said it is evident that we had outstanding illustrations of those grounds in which the Arabs put up innovative gifts for medieval Europe the investigations of Greek and Roman scholars; medicine, astronomy, mathematics and philosophy[18-20]. The statement of E.G.Brown is incorrect because the Arabian medicine is not perceived through Greek and Roman medicine but in real sense it is Arabian medicine what the Arabs had strived from amalgamation, translation and commentaries, review and criticism, interpretation, experimentation and observation, addition, inquiry, clearance of doubt and refinement of earlier medicines of Persia, India, Greek, Rome and Iraq. Prof E.G. Brown further authenticates the works of Arab translators; 1200 years ago Arabs were in touch with live practice that flourished Baghdad to Jundishapur, from Jundishapur to Ruha and Antakia (Antioch) and thence to Alexandaria. And this practice elucidates the most of the difficulty and obscuration in the Greek texts yet preserved to us. Lastly, the bedside clinics, and their observation and experimentation (which are found in the works of Razi) have important clues of their own which certainly invites analysis and research. On the basis of this discussion, even if we evaluate the innovations of the Arabian medicine at the minimum, I endeavour to say that Arab medical history should be studied in an organized and systemic way with deep concentrations.[3]. Hence I conclude with this famous saying,

كان الطب معدوماً فاحياه جالينوس وكان متفرقافجمعه الرازى وكان ناقصا "فكمله ابن سيناالبخارى"

"The medicine was in primitive stage, Galen gave the life to it; was scattered, Razi compiled it; and it was haphazard, Ibn Sina systematised it [11]."

References

1. Quran Sharif. Surah Fussilat, Ayah: 53
2. Wasti AAN. Tibb-ul Arab. Edn. I, CCRUM, New Delhi, 2010; p. 143,147-148, 221, 164, 257, 258, 260
3. Brown EG. Arabian Medicine. Edn. I, Cambridge University Press, London; 2012; p 112-113, 115-116, 114-115
4. Azmi KAS. Tibb Unani ka Irtiqa Islam ke Zarrien Ahde Wusta Mein. Jahan-e Tibb, 2008; 9(3): p14
5. Maseehi AS. Kitab-ul Mi'ah. Edn I, CCRUM, New Delhi, 2008; p24-25
6. Zeydan Jurji. Tareekh At-Tamaddunul Islami. Edited by Dr .Hussain Monis, Vol-III, Darul Hilal, Egypt, 2001; p 5,177, 206-207, 151-152, 153, 157-158, 187, 204-205, 203
7. Usaiba IA. Uyoonul Anba Fi Tabqatil Attibah. Urdu Translation, Vol-I, CCRUM, New Delhi, 1990; p 444-446, 243
8. Mazni SI. Rawa-i Tarikh al-Tibb wa al Atibba-al Muslimin : Mmawsu'ah lil-Ttibb fi Aasr Iizdihar Hhadarah al- Islam, Dar al- Kutub al- Ilmiyah: Lebanon 2006
9. Kadaan AN, Sagheer A. Medicine in Syria and Egypt in the Mamluk Period. History of Medicine Department, Institute for the History of Arabic Science, Aleppo University, Aleppo, Syria, p 11
10. Akmal M, Zulkifle M, Ansari AH. Ibn Nafees- A Forgotten Genius in the Discovery of Pulmonary Blood Circulation. Heart Views, Vol-11, No.1, March-May 2010; p 26-30
11. Tarabulsi N. Sannajatut Tarab Fi Taqaddimatil Arab. Edn. II, Darur Raid Beruit, 1982; p 442-443, 437
12. Usaiba IA. Uyoonul Anba Fi Tabqatil Attibah. Edited by Dr.Nizar Raza, Vol-I, Darul Maktabatul Hayat, Beruit, YNM, p 420-421, 416-417, 427, 423
13. Razi ABM. Kitab-ul Hawi. Urdu Translation, Vol-5, CCRUM, New Delhi, 1999; p 70,71
14. Razi ABM. Kitab-ul Hawi. Urdu Translation, Vol-7, CCRUM, Nw Delhi, 2000; p 34
15. Nadwi MRI. Azmat-e Razi. Edn-1, Ajaz Publishing House, New Delhi, 1995; p 55-56, 63-64, 65-66
16. Azmi KAS. Al-Hawi Al-Kabeer Fit Tibb ka Jaiza Ilmi wa Funni Nuqta-e Nazar se. Jahan-e Tibb, 2004; 6(2): 25-49
17. Khaldun ARI. Muqaddamah Ibn Khaldun. Edited by Fayumi IH, Al-Matba'atush Sharifiyah, Cairo, 1327 Hijri; p 536
18. Beg H. Surgical Principles of Ibn Sina (Avicenna). Bangladesh Journal of Medical Science. 2015;14(3): 217-220. DOI: http://dx.doi.org/10.3329/bjms.v14i3.22776
19. ARA Rashid. Increasing Muslim contribution to medical research; reviving a lost legacy. Bangladesh Journal of Medical Science. 2010; 09 (2): 64-67. DOI: http://dx.doi.org/10.3329/bjms.v9i2.5653
20. Hitti KP. Introduction. Descriptive Catalogue of the Garret Collection of Arabic Manuscript, Princeton University Press, London, 1938; p IV MTAIH