

Cardiovascular Medicine Islamic Heritage : Concepts and Contributions

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Abstract

Ibn Cena (1020 A.D.) described the anatomy of the human heart, ascending aorta and the inferior vein, and postulated anastomoses of the arteries with the veins in the extremities to keep the blood in circulation and suggested the presence of interatrial communication during the earlier stages of life. Abu Sahl Masihi (1027 A.D.), elucidated the vena caval drainage into the right ventricle and the presence of the semilunar valves in the aorta. Ali Husain Gilani (1048 A.D.) reported on the presence of 11 cardiac valve cusps. Alauddin Qarshi Ibn An-Nafis (1200 A.D.) highlighted the pulmonary circulation, at least three centuries ahead of its recognition in Europe, and reported its function of 'purification' (oxygenation) of blood. Ibn Cena's *al-Adwiyat al-Qalbia* included several effective drugs for cardiovascular diseases, such as sumbul (*N. Jatamansi*), which has been proven to be an effective anti-hypertensive agent. Several investigators from Arabian countries and the Indian subcontinent have since continued their pursuit and have published pioneering data on the efficacies of reserpine (anti-hypertensive), ajmaline (anti-dysrhythmic), peruvoside (anti-failure), phyllembin (adrenergic) and calophyllolide (anti-thrombotic). These concepts and contributions constitute a major segment of the historical profile of cardiovascular medicine, and the published monographs from some of the Muslim scholars are living monuments of their contribution to modern cardiology. (JPMA 35 : 288, 1985).

Introduction

The contributions of the Muslim scholars, aptly described as the Islamic Medical Heritage, although remains undisputed but their impact seems to have eclipsed because of lack of follow-up contributions by the contemporary Muslim scientists and physicians. It is not eluding to think of the glories of the past, but it is misleading to believe that those contributions were the final word, static and lasting. The contributions of Ibn Cena (1020 A.D.) and Ibn-an. Nafis (1280 A.D.) and Masihi (1030 A.D.) in the field of medicine are so well known that repetition is considered unnecessary. However, their contributions, in the field of cardiovascular medicine and surgery and their impact on the developments of modern cardiology is described here.

Concepts: Cardiac Anatomy and Physiology

While it is noteworthy that Muslim physicians have contributed overwhelmingly to major cardiovascular drugs including those for hypertension, cardiac failure and cardiac arrhythmias; these stalwarts have also contributed significantly to the concepts about the structure of the heart and circulation¹⁻⁸

Ibn Cena contributed to the concept of the circulation (980 A.D.) in the monograph *Canon*, and described the anatomy of the heart, ascending aorta and the inferior vein. He explained communications in the limbs, between the branches of arteries anastomosing with tributaries of the vena cava, and through this arrangement the blood continued to circulate ('Daur').

Ibn Cena did not support the concept of oozing of blood through pores or septum, but he was convinced that a communication (foramen ovale) existed in infancy between the atria.

Abu Sahl Masihi (1027 A.D.), a contemporary of Ibn Cena, provided insight into the structure and function of the heart valves. Masihi described the opening of the vena cava into the right side of the

heart, origin of the pulmonary artery from the right ventricle carrying the smoking vapour', i.e., unoxygenated blood, into the lungs, through membranous valves (semilunar) within the pulmonary trunk. He elucidated about the origin of the aorta from the left ventricle, with one way semilunar valves (aortic cusps), carrying the 'special air' or the oxygenated blood to the body.

Ali Husain Gilani (948 A.D.) another commentator of the Canon, deliberated on the valves of the heart and numbered these as eleven. It is known now that there are three aortic, three pulmonary, three tricuspid and two mitral valve cusps. Gilani described the course of the aortic root as rising from the left ventricular outflow tract, its elasticity during cardiac cycle and the patency of the aortic valve, which in his vivid description, and it is true, while open resembles the Greek letter sigma (S), and when closed looks like the figure of a triangle, and will not allow any regurgitation of blood.

Alauddin Qarshi fbn an-Nafis (1200 A.D.) highlighted the lesser or the pulmonary circulation, at least over three hundred years before its recognition in Europe¹⁻³. Ibn an-Nafis, in bold contrast to Galen, Jolinos (1030 A.D.) or Ibn Cena, published his account that the pulmonary artery flows into the pores of the lungs, mixed with the 'air' (oxygen) till its last drop is purified (oxygenated), then passes into the pulmonary veins to reach the left ventricle, containing the vital spirit or oxygen.⁴⁻⁵

Thus, in essence, these four great Muslim clinicians, contributed significantly to the knowledge of the anatomy and physiology of the heart, its vessels and valves and the pulmonary circulation. This information was apparently enough for the management of cardiovascular ailments in those periods of human civilisation, and also founded the basis of cardiology.

Contributions: Cardiovascular Medicine With regards to the description of cardiovascular diseases by the historical Muslim clinicians, it is interesting to note that several facets of cardiac ailments including shortness of breath (dyspnoea) and swelling of limbs (oedema), khafaqan (cardiac dysrhythmia) were lucidly described by Ibn Cena in the Canon of Medicine. The principles of management of cardiovascular diseases published by the Arab scholars greatly influenced the principles of cardiotherapy during the Renaissance period in Europe. Ibn Cena published a special chapter entitled 'Tract on Cardiac Drugs', this included 63 cardiac drugs, sub-classified into 17 categories. Some of these medicines included citrus, lavender, polypodium, cinnamon, zingiber, bambusa, camphora, coriander, thymus, mentha, iris, sumbul (jatamansi), pistacia and asparagus.

The drugs from Ibn-Cena Tract rapidly crossed the international borders to Greece, Spain and other parts of Europe. These drugs have an assortment of action on hypertension, cardiac failure and dysrhythmias. One of these, sumbul (Nardostachys Jatamansi) was a famous anti-hypertensive agent and was fully adapted in the European hospitals during that period. Modern research workers have continued to analyse and study the efficacy of this drug. This product originates from Veleriance, a plant which grows in the Himalayas at 4000 m. Jatamansone is a ketone and acts centrally to lower blood pressure⁹. The anti-hypertensive effects of Jatamansone have been clinically tested and found fairly effective. Jatamansone also has significant antiarrhythmic activity, comparable with that of quinidine.

During the zenith of the Islamic Empire, several reputable universities were harnessing experts in the field of medicine; these included Nizami and Mustansaria Universities in Baghdad, and those at Nishapur, Damascus, Cairo, and Toledo (Spain). During the 11th Century, the university of Salerno, Italy, was the melting pot for the Greek, Arabs and the Jews scholars who disseminated science and technology to Europe¹⁰. In Salerno, Latin and Arabic were the media of instruction, and the teachers included Abu Bakar al-Riquiti; and books included Al-Qanoon (IbnCena), Al-Taiseer (Ibn-Zuhr), Al-Kulliyat (Ibn-Rushd), Al-Havi (Al.Razi). Optical Thesaurus (Al-Hazen), Al-Maluki (Abbas 1127) and Ten Treatise on Eye (Hunain Avicenna 1030), Al-Havi 1958, Al-Zahrawi 1966, Al-Hakmah 1928). The Archbishop of Canterbury, England visited the Salerno Hospital during the 11th century and then built a similar general hospital in Canterbury, ushering the adaptation of Greco-Arabs concepts of medicine. Between 1000-1300 A.D. Islamic Medicine convincingly spilled over into Europe and favourably

influenced the Renaissance.

Abu al-Qasim alZahrawi (966 A.D.) has contributed to the knowledge of the arteries, their elasticity and changes with age and Al-Razi (901 A.D.) advocated venesection fervently for the management of certain blood dyscrasias. Gul Baba from Turkey contributed extensively to the knowledge of botany and medicinal plants during the 17th century.

Following the pioneering works by the earlier Muslim scholars, the Muslims in our subcontinent have to a great extent carried out the light of the Islamic medicine, and have tested and used the products and formulas inherited. These include: cardiac glycoside-peruvoside, isolated from *Thevitia Neriifolia* Juss, which is effective for congestive cardiac failure; alkaloids of *Rauwolfia Serpentina*, including the well known anti-hypertensive reserpine, and the newer and very effective anti-dysrhythmic agents- ajmaline, serpajmaline and anti-dysrhythmic agent *acocus calamus*. In addition, calophyllolide, a naturally occurring coumarin derivative from *calophyllum inophyllum*, has been used as an effective anticoagulant agent for coronary and peripheral thrombo-embolic episodes.

Ajmaline, a tertiary indolin base was first isolated, from the Indian plant, *rauwolfia serpentina*, by Salimuzzaman Siddiqui (1932), and named after Hakim Ajmal Khan (ajmaline) a pioneer of Tib in India, who had extensively used products of *rauwolfia*, as anti-hypertensive and cardiac sedative.

Ajmaline is a member of a second group of *rauwolfia* derivatives which has no sedative, hypnotic, or hypotensive effects. It has been found to have potent anti-arrhythmic properties and extremely successful in the treatment of arrhythmias associated with Wolff-Parkinson-White syndrome.

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