Review article:

Critical Evaluation of Avicennian Cardiac Drugs in the Contemporary Research Syed Ziaur Rahman¹, S. M. Mubashir¹, S. H. Zahid Jamal¹

Abstract:

Lots of clinical and experimental research work had been done to screen the cardiac drugs mentioned by Ibn Sina (980-1037) for their efficacy and safety. Similarly, annotated bibliography of his other works such as major philosophical work (Kitab Shifâ), major medical work (Qanun fil Tibb), minor collective works on logics, poetry, physics, psychology, chemistry-magic, mathematics, music, astronomy, metaphysics, Quranic exegesis, mysticism, ethics, politics, prophecy, etc. and critical editions in almost all languages had been prepared and arranged, which includes publications and references in all major languages. But, to the best of our knowledge, no critical descriptive study has ever been done so far to evaluate the scientific report on all 63 cardiac drugs mentioned in his another famous work, Kitab-al Advia Al Qalbia. There is a need to comment on these drugs on the basis of clinical and experimental study regarding the utility of Ibn Sina's cardiac drugs. Some of these drugs could be found safe without any reported adverse reactions. Such drugs with safe profile need to be further explored, to select promising and accessible drugs. If toxic effects are reported, then the flagging of such drugs and its present position in clinical utilization should be delineated. The present paper deals and discusses the cardiac drugs described by Ibn Sina in the contemporary research after extensive literature review and meta-analysis. The present work, therefore, provides a useful resource to enable a thorough assessment of the profile of Ibn Sina's Cardiac drugs that have cardioprotective activity.

Keywords: Ibn Sina, Avicenna, Cardiac drugs, Advia Qalbia, *Risalahal-Adwiyah al-Qalbiyah*

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Introduction:

AbūʿAlī Ibn Sīnā (980-1037AD) genius polymath of his times. He was regarded as most significant thinker and writer of medieval age indeed of entire history. He wrote around 250 books, including 150 on philosophy and 40 on medicine. The Book of Healing and Canon of Medicine was standard medical texts at many Medieval European Universities and remained in use as late as 1650. His another booklet, Risalahal-Adwiyah al-Qalbiyah (A tract on Cardiac Medicine) was the first systematized book on individual cardiac drugs, in which he discussed 63 cardiac drugs claimed to be beneficial for heart ailment as well as for psychiatric ailments1.

Avicenna's description of cardiac diseases and their psychiatric impact was logically presented perhaps for the first time in the history of medicine. Avicenna was the first to describe carotid sinus hypersensitivity, which presents with vasovagal syncope. He was a pioneer in pulsology and the first correct explanation of pulsation was given by Avicenna, after he refined Galen's theory of the pulse. Besides, he discussed the action of available drugs on the heart in details and mentioned their indications and contraindications. In conclusion, Avicenna made important contributions to cardiology².

Cardiac diseases are the important cause of morbidity and mortality in the world. Despite of tremendous development in the field of cardiology,

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Ischaemic Heart Disease is still posing a challenge to medical fraternity. It is a general perception that concept of cardiac diseases did not exist in old literature. Contrary to it, concept of cardiac disease prevailed since ancient period. Most of the Unani Scholars enumerated the full description of cardiac diseases in their treatises. *Risalah al-Adwiyah al-Qalbiyah* is one of the important lexicon written by Ibn Sina which encompasses all the aspect of cardiac diseases including drugs and their pharmacological actions.

As per the introductory part of the tract, it reveals that it was written at the instance of al-Said Abu al-Hasan in whose house Ibn Sina stayed after he was freed from the imprisonment in Fardjan Fort. According to Qifti and the writer of Tatimma Siwan al-Hikma, this treatise was composed when Ibn Sina came to Hamadan after the year 405AH/1014 AD³.

"The treatise on cardiac drugs" or "Risalah al-Adwiyah al-Qalbiyah", is one of Avicenna's important medical books on simple and compound medicines used in the treatment of cardiac diseases. He compiled this book in 16 chapters. First 13 chapters are dedicated to basic discussions about conditions related to heart and some cardiac disease. In these chapters, Avicenna describes the physiological mainly cardiac causes of different emotional states and application of pharmacotherapy to manage them. Chapter 14 consists of 63 detailed monographs on simple cardio-active drugs and their therapeutic effects. Final chapters appertain to compound cardiac remedies⁴.Before Ibn Sina, no physician had dealt with drugs for heart ailments in an independent work. Ibn Sina had not only laid the foundation of arranging simple drugs by describing only cardiac medicines but had given the proof of his intellectual ingenuity and medico-technical creativity by selecting the most important organ, the heart and its novel association with psyhe.

The treatise is not confined to medicine only. Nine of its chapters deal with psychology which give details about pneuma (*Ruh*), its kinds, seat, and its extrovert and introvert states. The remaining ten chapters relate to medicine. The book is of great value from the standpoint of therapeutics as it throws light on such drugs that are used to tone up heart and thereby treat maladies of mood and personality. Ibn Sina extended the list of cardiac drugs after observing his own experience and taking lead from Galenic Medicine. Before, Ibn *Sina*, no physician had dealt

with drugs for heart ailments as an independent work. Ibn Sina had not only laid the foundation of Pharmacology of Cardiac system, but gave a lead to discuss Pharmacotherapy of Cardiac ailments. He provided proper understanding about the anatomy, physiology, mechanism of contraction and relaxation, the concept of pathophysiology of heart diseases, the parameters of diagnosis and its management. He also suggested various psychical states such as anger, anxiety, joy, grief, vindictiveness and other feelings are governed by the structure of heart, constituents of blood and other humours as well as pneuma. He was probably the first physician, who correlated heart with psychological states.

In the second chapter, he described simple and compound drug remedies of heart diseases, but before that, he gave a general classification of drugs to indicate the group to which each of the described cardiac drugs belonged. These categories consist of stimulants, diuretics, and cooling agents. In this book, 63 simple and 17 compound drugs in the form of electuaries, crushed medicaments, pills, tonic and syrups derived from the vegetable, mineral and animal kingdoms are discussed explaining how they act on the heart among other things, through mentioning their place in the aforementioned classification. Furthermore, he described the dosage and strength of each drug and application techniques⁵.

Among the diseases of the heart mentioned in this treatise are: difficult breathing or "Tawahhush", palpitation or "Khafaqan", syncope or "Ghashy"5,6 and heart weakness or "Za'af al-qalb". Moreover he has described the relation of some psychological diseases like depression, stress, and anxiety to cardiovascular function. He adds that: "Because the heart is the chief and noble organ, it is necessary that the physician should treat it after careful consideration and with a firm will. It is necessary that he should have faith in the success of his course of treatment. The temperament of the patient is considered of fundamental importance in the treatment of heart diseases and if there is any disharmony or imbalance of any kind, it should be treated".

In the words of Avicenna, "the heart is the origin of vital spirit (Pneuma)" which "itself is the source of emotional states such as happiness, grief, fear and anger". Therefore, the quantity and quality of vital spirit plays an important role in existence of such mental states. In other words, large amounts of vital spirit, its moderate viscosity and excessive

glitter can give rise to extreme happiness whereas small quantities of a viscose vital spirit can cause grief and unhappiness. A large amount of vital spirit itself originates from moderation in blood volume and viscosity and thus, happiness. Moreover, a viscose, turbid and very hot-tempered blood can result in grief while a thin and hot blood induces anger via their effect on the vital spirit7. Avicenna also made a connection between the ability of remembrance and the heart. Accordingly, cardiac drugs mostly improve memory and mental function. As an example, in a monograph dedicated to emblicmyrobalan he stated, "Since it is a beneficial cardiac drug due to its cleansing effects, emblicmyrobalan strongly improves memory and mental ability"8.

Generally, drugs with following effects are beneficial for the treatment of heart diseases:

- 1. Exhilarants e.g. saffron (*Crocus sativus* L.)
- 2. Attenuant agents (drugs which decrease the viscosity of blood) e.g. common rue (*Rutagravolens* L.)
- 3. Fragrant drugs e.g. cinnamon (*Cinnamomum zevlanicum* Blume.)
- 4. Antidotal agents e.g. zedoary (*Curcuma zedoaria* (Bergius) Roscoe)
- 5. De-obstruents e.g. white behen (*Centaureabehen* L.)
- 6. Astringents e.g. thorny bamboo (*Bambusa arundinacea* Retz.)
- 7. Anger-inducing drugs e.g. pot marigold (*Calendula officinalis* L.)
- 8. Drugs having specificity or "khasiyyat" i.e. not acting because of a general property.

Exhilarants are important cardiac medicines that can equilibrate the viscosity, warmness and quantity of vital spirit in order to treat heart diseases. These drugs act with several mechanisms including:

- 1. Increasing the amount of vital spirit and expanding its volume e.g. wine
- 2. Increasing the glitter of vital spirit e.g. pearl and silk
- 3. Preventing the consumption of vital spirit e.g. Chebulic myrobalan (*Terminalia chebula* Willd. ex Flem.)
- 4. Making the temperament of vital spirit well-balanced e.g. rose water
- 5. Toning the vital spirit e.g. basil (*Ocimum basilicum* L.)
- 6. Preventing gases originated from black bile to approach the vital spirit e.g. bogloss (*Anchusaitalica* Retz.)

thought-provoking issue this Another in book is specificity or "khasiyyat". It is a pharmacodynamical concept that describes a drug action that cannot be explained by four qualities of traditional medicine. In other words, it is a mechanism of drug action other than hotness, coldness, moistness and dryness. For example, scammony (Convolvulus scammonia L.) resin, has hot and dry temperament but it induces expulsion of the yellow bile, which itself is hot and dry, from the body and this is contradiction. Many cardiac exhilarants act in such way. Such specific action are due to the form (Surah Naviyah) as each object is defined not only by its substance and substantial qualities of hot, cold, dry and wet (the aristotelian 'hyle') but also by its form (cf. Aristotelian 'hylomorphism')

Accumulating excessive black bile in cardiovascular system is a major risk factor for heart diseases. So drugs like common polypody (Polypodiumvulgare L.) and dodder (Cuscuta epithymum Mur.) which eliminate black bile from cardiovascular system are of value in management of such diseases. On the other hand, to improve blood flow in capillaries such as the small branches of coronary arteries, the body needs yellow bile. Yellow bile is hot and dry and has the ability to reduce the viscosity of blood. If the level of the yellow bile in the blood is lowered for any reason, the blood viscosity will increase, and as a result, blood flow will decrease.

In some cases cardiac drugs act through inducing anger. These kinds of drugs tone the heart by abrupt warming of blood and make it thinner. Pot marigold is a typical example for this. The use of fragrant drugs such as lemon balm (*Melissa officinalis* L.) and cinnamon, as cardiac tonics to alleviate heart diseases is another interesting issue. In fact, aromas are intensely harmonious with the vital spirit and thereby, can tone it.

Avicenna's book would be a precious source of novel hypotheses for further researches on psychosomatic aspects of cardiovascular diseases as well as phytopharmacological studies on cardioactive medicinal plants.

Aims of the Study:

The aim of the present study is to make a comprehensive notes of all publications done in any language on each 63 cardiac drugs described by Ibn Sina in his monograph *Risalahal-Adwiyah al-Qalbiyah* (Treatise on Cardiac Drugs) and to evaluate critically all 63 drugs by clinical and investigational parameters singly or in combination

of these 63 drugs.

Methodology:

To fulfill the objective of the above project, we did thorough critical literature review of scientific works of all 63 cardiac drugs using following methods:

- 1. Reference management software (RMS) for making online bibliography and list of references,
- 2. Literature search through various search engines,
- 3. Field work and
- 4. Communication with experts.

Soundness of the methodology and techniques to be employed therein:

Literature reviews are important information sources for any researcher while doing metaanalytical study with limited time to keep up with the rapid increase in primary research. However, their validity depends on their methodological present soundness. The work reviewed research articles both clinical and non-clinical (experimental) works of cardiac drugs mentioned by Ibn Sina. Apart from these two main reviews, we also included review articles, case-reports and suggestions by other scholars. In our study, authors' positions, structured papers published in indexed journals were more important and reliable. These reviews would adhere to structured scientific principles similar to what was used for primary research articles.

Data extraction technique would be based on the current software that would help in making bibliography and for preparing list of references. This meta-analytic review is more reliable for accessing all possible databases. Just to give an example, reference management tool 'Software Mendely', can access at least 20,000 databases including all main database such as PubMed, Cochrane, Embasse, University Libraries, etc.

The reliability of the sources on which the research is based:

Reference management software (RMS) is widely used by researchers in the health and natural sciences. Librarians are often called upon to provide support for these products. Studies suggest that RMSs software such as EndNote, CiteULike, RefWorks, Mendeley, and Zotero, in terms of features offered and the accuracy of the bibliographies that they generate. RefWorks generated the most accurate citations. The other RMSs offered contrasting strengths: CiteULike in simplicity and social networking, Zotero in ease

of automated importing, and Mendeley in PDF management. Ultimately, the choice of a RMS should reflect the user's needs and work habits.

Reference management is one of the most complicated aspects of being a researcher. The tedium of formatting references based on a variety of citation styles has made the reference manager an essential tool for scholars at all levels. The variety of reference manager available makes it difficult to know which tool to select. Although there are a number of reference manager on the market. Reference managers serve a variety of functions:

- 1. Import citations from bibliographic databases and websites
- 2. Gather metadata from PDF files
- 3. Allow organization of citations within the reference manager database
- 4. Allow annotation of citations
- 5. Allow sharing of the reference manager database or portions thereof with colleagues
- 6. Allow data interchange with other RM products through standard metadata formats (e.g., RIS, BibTeX)
- 7. Produce formatted citations in a variety of styles
- 8. Work with word processing software to facilitate in-text citation

The originality of the work

To the best of our knowledge, no critical descriptive study has ever been done so far to evaluate the reports on all 63 listed cardiac drugs mentioned by Ibn Sina in his book, *Al-Advia Al Qalbia* especially in the areas of clinical and non-clinical (experimental) areas, their effectiveness and availability in the market. The pharmacology of these drugs has to be established using modern methodology and techniques in order to assess their value.

Observation:

Both empirical and theoretical work of all 63 listed drugs is spread over in the form of clinical, experimental and theoretical research work for the last millenary. This includes in vivo / in vitro experiments, review articles, case-reports and propositions by many scholars, scientists, physicians and researchers. This meta-analytic review is more reliable as it accessed all possible databases including translation of classical manuscripts in different languages.

Translations of Risalah Advia Qalbia:

The original work of Ibn Sina is in Arabic language

and available at Mashhad (Iran), Istanbul (Turkey), Leiden (The Netherlands), Escorial (Spain), British Museum Library (England), Raza Library Rampur (India) and Bankipur Library (India). But this work was translated into many languages. Many authors provided a list of translation of these original manuscripts in different languages^{9,10}, but not the whole complete list as given below:

The first translation was done in Latin (1482). The other translations are as follows:

- First translation in Latin by Arnold of Villanove (d. 1310 or 1313 A.D.) was carried out in 1312 and published under the title "Cardiac Remedies, the VerbusCardis". Second was in 1482 ("De Medicines Cordialibus"). Another translation was rendered into Latin by Alpagus in 1520 AD and was published under the title "Medicumenta Cardialis".
- 2. Turkish translation with the title "Buyuk Truk Filosof vetibustadi Ibni Sina Sasiyetiveeserlerihakkindatelkikba" published in Roman script from Istanbul (Turkey) in 1937. The collection includes the following three works of Ibn Sina: "Al-Adwiyah al-Qalbiya", "Hai b. yaqzan" and "Risalah fi Mahiya al-Huznwa Aasbabihi".
- 3. A facsimile reproduction of the text of the manuscript (preserved in Tashkent) with translation and commentary by H. Hikmatullaev in Uzbek published from Tashkent in 1966 AD.
- 4. 'Tafrih al-Qulub' the name of Persian version and done by Indian physician Hakim Ahmadullah Dehlavi. The copies of these manuscripts preserved in four libraries of India viz Nizamia Tibbiva College (Hyderabad), Asafiya Library (State Government Manuscripts Library and Research Institute, Hyderabad), Salarjang Museum Library (Hyderabad) and Ibn Sina Academy of Medieval Medicine and Sciences (Aligarh). Two Persian versions are extant in the Tehran Libraries of Majlis (scribed in 1057 AH/1647 AD) and Milli Malik (scribed in 1071AH/1660AD), but the names of their translator are unknown.
- 'Daruha-yiqalbi' A Persian translation of Al-Adwiat al-Qalbiyya of Ibn Sina by Hakim Muhammad BaqirMusavi, physician of Sultan HusaynSafavi, edited with Introduction and

- Notes by S. Hussein Razavi Burqa, I, Tehran 2004.
- 6. Arabic text was published by Astanah-i Quds-i Radawi, Mashhad (Iran).
- 7. O. C. Gruner, the famous physician translated it (De ViribusCardis) into English and incorporated it into his *A Treatise on the Canon of Medicine*, published by Luzac & Co. London, 1930 (pages 123 to 125, and 534 to 552)
- 8. Hakim Abdul Lateef. KitabulAdviya Qalbiya (Urdu Translation), Iran Society Calcutta, 1954
- Hakeem Abdul Hameed. Avicenna's Tract on Cardiac Drugs and Essays on Arab Cardiotherapy (English). Karachi, Hamdard Foundation, 1983
- 10. Hakim Mohammad Said. Greco-Arab Conepts on Cardiovascular Diseases (English). Karachi, Hamdard Foundation, 1983
- 11. Hakim Syed Zillur Rahman, Persian translation of al-Adwiyah al-Qalbiyah of Ibn Sina. Stud Hist Med Sci. 1993; 12(1-2):43-57
- 12. Hakim Syed Zillur Rahman, RisalaAdviya Qalbiya (Persian), Muslim University Press, Aligarh, 1996. It is critically edited text of Persian translation of KitabulAdviya Qalbiya by an Indian physician, Hakim Ahmadullah Khan. The edition is based on three Indian extant manuscripts as mentioned above.

Cardiac Drugs in Formulations

In Unani Medicine, although the general preference is for single drugs, compound formulations are also used in the treatment of various complex and chronic disorders¹¹. Ibn Sina's cardiac drugs are used in various formulations such as 'Dawaul Misk Motadil Sada', 'Safoof Daroonaj', 'Khamira Abresham Sada', 'Khamirah Aabresham Ood Mastagi Wala', 'Khamirah Aabresham Sada', 'Khamirah Aabresham Sheerah Unnab Wala', 'Khamirah Gaozaban Ambari'. Gaozaban Ambari Jadwar Ood Saleebwala', 'Khamirah Gaozaban Ambari Jawahar Wala', 'Khamirah Gaozaban Sada', 'Khamirah Khas', 'Khamirah Marwareed', 'Khamirah Marwareed Ba Nuskha Kalan', 'Khamirah Marwareed Ba Nuskha Khas', 'Khamirah Sandal Sada', 'Khamirah Sandal Tursh Warq-e-Tila Wala', 'Khamirah Yaqoot', 'Khamirah Yashab', 'Khamirah Zamarrud', 'Khamirah Zehar Mohra'. In Greco-Arab system of Medicine (Unani), there is a school of thought that asserts that Unani drugs

should be used in formulations to make them more potent, efficacious and safe.

Scholars like Mursaleenet. al. and Khurshid A Ansari, et. alcompiled a list of a few formulations based on Ibn Sina'scardiac drugs^{12,13}. We found a few publications on scientific relevance of these formulations compared to these submitted. Below is a list of publications on drug formulations.

Research Articles on Cardiac Formulations:

- 1. Mohanty I, Gupta S K, Arya D S. Antiapoptotic and cardioprotective effects of an herbal combination in rats with experimental myocardial infarction. International Journal of Integrative Biology, 2007; 1(3): 178.
- Tajuddin, Nasiruddin M, Ahmad N. Cardioprotective effect of Unani formulation in rats. Indian Journal of Traditional Knowledge. 2007; 6(4): 663.
- 3. Goyal S, Siddiqui M K, Siddiqui K M, Arora S, Mittal R, Joshi S, Arya D S. Cardioprotective effect of 'KhamiraAbresham Hakim ArshadWala' a Unani formulation in isoproterenol-induced myocardial necrosis in rats. *Exp Toxicol Pathol*, 2010; 62(1): 61-74.
- 4. Ahmad S, Singh M, Parveen R. Validation of Cardio Protective Activity of Standardized Extracts of Unani Medicinal Plants Listed in Ibn-e-Sina's Treatise, Planta Medica, 2013; p. 102
- 5. Bafna, P.A. and R. Balaraman, 2005. Antioxidant activity of DHC-1, an herbal formulation, in experimentally-induced cardiac and renal damage. Phytother Res., 19(3): 216-21.
- 6. Mohanty I, Gupta S K, Arya D S. Antiapoptotic and cardioprotective effects of a herbal combination in rats with experimental myocardial infarction. International Journal of Integrative Biology, 2007; 1(3): 178.
- 7. Tajuddin, Nasiruddin M, Ahmad N. Cardioprotective effect of Unani formulation in rats. Indian Journal of Traditional Knowledge. 2007; 6(4): 663.
- 8. Goyal S, Siddiqui M K, Siddiqui K M, Arora S, Mittal R, Joshi S, Arya D S. Cardioprotective effect of 'KhamiraAbresham Hakim ArshadWala' a Unani formulation in isoproterenol-induced myocardial necrosis in rats. *Exp Toxicol Pathol*, 2010; 62(1): 61-74.
- 9. Ahmad S, Singh M, Parveen R. Validation of

- Cardio Protective Activity of Standardized Extracts of Unani Medicinal Plants Listed in Ibn-e-Sina's Treatise, Planta Medica, 2013; p. 102.
- Ahmad Sayeed, ShabanaRehman, Aftab M Ahmad and, Khalid M Siddiqui, et .al. Khamiras, a natural cardiac tonic: An overview. Journal of pharmacy &bioallied sciences 2010: 2. 93-9.

MD and PhD Theses

From our literature review, we found 14 theses of MD (Unani medicine) and 1 thesis of PhD student (Pharmacy) completed their research work as partial fulfillment of their degrees. These theses are mainly on compound formulations and given below in chronological order.

- Alam M M. Zightud Dam Qawi Ka Tahqeeqi Mutala Aur UskeIlaj Mein Safoof-e-Khashkhash Aur Sharbat-e-Buzoori Motadil Ki Ifadiyat Ka Jaizah, Department of Moalejat, A.K. Tibbiya College, Aligarh Muslim University, Aligarh, 1991
- Siddiqui M A. Khafqan Ka Tahqeeqi Mutala Aur UskeIlaj Mein Khamira Abresham Sada Ki Ifadiyat KaJaizah (MD Thesis), Department of Moalejat, A.K. Tibbiya College, Aligarh Muslim University, Aligarh, 1994
- Ahmad. Iflas-E-Qalb Mein Badranjboya, Abresham Kham Moqarraz AurBisfaij Fostaqui Ki Ifadiyat KaTahqeeqi Mutala (MD Thesis), Department of Moalejat, A.K. Tibbiya College, Aligarh Muslim University, Aligarh, 1997
- Rahman A. Zightuddam QaviIbtidai (Essential Hypertension) Mein Itriphal Kishneezi Ki Ifadiat KaTahqeeqi Mutala (MD Thesis), Department of Moalejat, A.K. Tibbiya College, Aligarh Muslim University, Aligarh, 1999
- Manzar J. Saqoot-E-QalbImtilai KaTahqeeqi Mutala Aur UskeIlaj Mein Khamira Abresham Sada WaJawahar Mohra Ki Ifadiat KaJaiza (MD Thesis), Department of Moalejat, A.K. Tibbiya College, Aligarh Muslim University, Aligarh, 2000
- Faiyaz M. Zof-e-Qalb KaTahqeeqi Mutala Aur UskeyIlaj Mein Amla, Gul-e-Gauzaban, Qust Sheerin Aur Sharbat Ansul Ki Ifadiat Ka Jaiza (MD Thesis), Department of Moalejat, A.K. Tibbiya College, Aligarh Muslim University, Aligarh, 2003

- Mohsin M. Therapeutic Evaluation of Qalbeen in Ischaemic Heart Disease (MD Thesis), Department of Moalejat, A.K. Tibbiya College, Aligarh Muslim University, Aligarh, 2004
- 8. Aftab B. Clinical Evaluation of Hypertension with Special Reference to Bekh-e-Asrol, Kishneez Khushk and Filfil Siyah (MD Thesis), Department of Moalejat, A.K. Tibbiya College, Aligarh Muslim University, Aligarh, 2005
- 9. Bhat M D A. A Study of Cardiac Dysrhythmia with Special Reference to Khamira-Marwareed (MD Thesis), Department of Moalejat, A.K. Tibbiya College, Aligarh Muslim University, Aligarh, 2007
- 10. Ahmad S. Evaluation of *Khameera Sandal Sada* in the Management of *Zaghtuddum QaviIbtidai* (MD Thesis), Department of Moalajat, National Institute of Unani Medicine, Bangalore, 2007
- 11. Arif M. A Clinical Study on Primary Hypertension and a Comparative Evaluation of Qurs-E-Dawaush Shifa with Amlodipine in Its Management (MD Thesis), Department of Moalejat, A.K. Tibbiya College, Aligarh Muslim University, Aligarh, 2008
- 12. Rather S A. Study of *SuqooteQalbImtilai*and Therapeutic Evaluation of *Safoof Daroonaj*in its Management (MD Thesis), Department of Moalajat, National Institute of Unani Medicine, Bangalore, 2011
- 13. TariqueMahmood, Pharmacological studies on *Bombyxmori* L. (Abresham) and its combinations in the treatment of cardiovascular diseases (PhD Thesis), Integral University, Lucknow, 2015
- 14. Siddique Ahmad, Scientific Study of Some Advia-e-Qalbia of Ibn Sina (MD Thesis), Department of Ilmul Advia, Faculty of Unani Medicine, A.K. Tibbiya College, Aligarh Muslim University, Aligarh, 2016
- 15. Sana Nafees, Scientific Study of Some Unani Cardio-vascular drugs (MD Thesis), Department of Ilmul Advia, Department of Ilmul Advia, Faculty of Unani Medicine, A.K. Tibbiya College, Aligarh Muslim University, Aligarh, 2018

Dissertation

From our literature review, we found 12 scholars from Pharmacy discipline (M. Pharm) completed

their dissertation work as a part of their research works. These dissertations are mainly on single drugs.

M. Pharm Dissertation Theses

- 1. Cardioprotective activity of *Terminaliabelerica* in isoprenaline induced myocardial necrosis in Rats by Firoj Alam (2011) under the guidance of H.H. Siddiqui
- Cardioprotective activity of Nehumbonucifera rhizomes in isoprotenerol induced myocardial necrosis in male wistar rats by Rahul Singh (2011) under the guidance of H.H. Siddiqui
- 3. Cardioprotective activity of *Boerhaviadiffusa* roots on isoproterenol induced myocardial necrosis in rats by Vipra Tomar (2011) under the guidance of H.H. Siddiqui
- 4. Cardioprotective effect of alcoholic extract of *Cyprus rotundus* Rhizome on isoproterenol induced myocardial necrosis in rats by Syed Mehdi Raza (2011) under the guidance of H.H. Siddiqui
- 5. Cardioprotective effect of *Nardstachys jatamansi* by isoprenaline induced myocardial infarction in Rats by Ameena Khatoon (2011) under the guidance of H.H. Siddiqui
- 6. Cardioprotective activity of *Delphinium* denudatum Wall. in isoprenaline induced myocardial necrosis in Male Wistar Rats by Amrita Shukla (2011) under the guidance of H.H. Siddiqui
- 7. Evaluation of cardioprotective effect of *Coleus forskohlii* against isoprenaline induced myocardial infarction in Rats by Farogh Ahsan (2012) under the guidance of H.H. Siddiqui and Tarique Mahmood
- 8. Effect of *Tinosporacardifolia* (Guduchi) root extract on cardiotoxicity in streptozocin induced diabetic rats by Arshiya Shamim (2014) under the guidance of H.H. Siddiqui and Tarique Mahmood
- 9. Evaluation of cardioprotective effect of leaves of *Eclipta alba* against isoprenaline induced myocardial infarction in Rats by Priya Pathak (2012) under the guidance of H.H. Siddiqui and Tarique Mahmood
- 10. Evaluation of cardioprotective effect of Silk cocoon (Abresham) against isoprenaline induced myocardial infarction in Rats by Ritesh Kumar Srivastava (2012) under the guidance of H.H. Siddiqui and Tarique Mahmood

- 11. Evaluation of cardioprotective effect of *Tinosporacardifolia* against isoprenaline induced myocardial infarction in Rats by NehaKesarwani (2012) under the guidance of H.H. Siddiqui and Tarique Mahmood
- 12. Effect of ethanolic extract of *Terminaliachebula* R. against isoprenaline induced Cardiotoxicityby Asma Parveen (2013) under the guidance of H.H. Siddiqui and Tarique Mahmood.

Projects on Ibn Sina's Cardiac Drugs

- "Meta-analytical study of cardiac drugs described by Ibn Sina (980-1037) in the contemporary research", sanctioned by INSA, New Delhi (Fund value Rs. 4,56,000 for 2017-2019, SZ Rahman (PI)
- 2. "Comparative study of Nanoformulation of Khamira Abresham with its traditional formulation against myocardial necrosis and associated ailments" sanctioned by Ministry of AYUSH, Govt. of India (*Fund value of 44 Lacs INR*; Principal Investigator Dr. Tariq Mahmood, Lucknow, India)

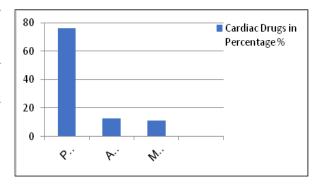
Conference and Seminars on Ibn Sina's Cardiac Drugs:

- Many papers were read on Ibn Sina's Cardiac Drugs during the International Seminar on Life and Contributions of Ibn Sina held at Ibn Sina Academy, Aligarh during October 25-27, 2014 (Organising Secretary, Hakim Syed Zillur Rahman).
- H.H. Siddiqui & Tarique Mahmood, "Status of cardiac drugs used by Avicenna", International Conference on Cardiovascular Research Convergence, AIIMS, New Delhi, 17-18 Feb.2012

Video Talks on Ibn Sina's Cardiac Drugs:

Y. TzviLangermann at Bar Ilan University gave a talk in Rio de Janeiro on July 2017, which he posted to Youtube in the name "Exhilirants, Illuminants and the repair of the pneuma: Ibn Sina's al-Adwiya al-Qalbiyya (https://www.youtube.com/watch?v=Sdb157K4Src). In another video, he discussed Ibn Sina's book on drugs appertaining to the heart; the heart is the seat of the spirit (ruh, pneuma) which is responsible for our emotions. Degraded spirit causes sadness, the medications suggested here restore happiness. The manuscript contains a Hebrew translation with numerous glosses

(https://www.youtube.com/watch?v=g6wkLFyJTAE).



Cardiac Drugs as Single Ingredient

As reported earlier in the text, the treatise, *Risalah Advia-e-Qalbia* has a description of 63 cardiac drugs. Among 63 drugs, 48 are of plant origin (76.19%), 8 are of animal origin (12.70%) and 7 (11.11%) are of the nature of minerals (including 2 metals).

A large number of experimental research works, literary reviews have been reported and published in various journals and books on these 63 drugs. The present study has discussed all these experimental works in detail and in the light of modern parameters. From pharmacological point of view, drugs effective on heart do not act only on heart per se but on the whole cardiovascular system. The cardiovascular system, also called the circulatory system or the vascular system is an organ class system that permits blood to circulate and transport nutrients, oxygen, carbon dioxide, hormones and blood cells to and from cells in the body to provide nourishment and help in fighting diseases, temperature and pH, and maintain homeostasis.

The present review of 63 cardiac drugs mentioned by Ibn Sina for the treatment of Amraz Qalb consisted of drugs having either direct action on heart or on the whole cardiovascular system^{14,15,16}. These drugs were found to have their major action or role on heart or blood vessel, and on those used primarily for cardiovascular disorders as Mugavvi-e-Qalb, Mufarreh-e-Qalb, Muharrike-Qalb, Musakkin-e-Qalb, Mufatteh-e-Urooque, Mudir, etc. This includes the effect as antihypertensive and anti-hyperlipidemic. The above 2 properties Muqavvi-e-Qalb and Mufarreh-e-Qalb of 63 drugs could correlated with the mechanism of action as cAMP modulators, Na/K-ATPase Enzyme Inhibitors, peripheral β blockers, calcium channel blockers, autacoids, nitric oxide donors, potassium channel openers, centrally acting β receptor agonists, diuretics, in various diseases of cardiovascular system.

We analysed thoroughly and critically each 63 single drugs individually, which is not possible to provide here because of space. It needs 95 pages meaning thereby it is an exhaustive work prepared with notes, annotations and history.

In this study, we discussed cardiovascular activities of all 63 drugs mentioned by Ibn Sina in his treatise, *Al-Adwiat al-Qalbiyya*. A number of the most important suggested plants as well as their efficacy in clinical studies has been thoroughly evaluated. Major bioactive compounds identified from these plants are also discussed. Other scholars also tried to compile similar work¹⁷, but it was found either incomplete or focused only on medicinal plants¹⁸.

A total of 39 different plant parts and their extracts have been published to possess cardioprotection against doxorubicin or isoproterenol-induced myocardial infarction. Isoproterenol a beta-adrenergic receptors agonist causes severe stress in myocardium resulting in the infarct-like lesion and produced cardiotoxic effects by elevating the levels of cardiac biomarkers and causing changes in ECG. Plant-based medicines with their antioxidant, antiapoptotic, antihyperlipidemic, platelet antiaggregatory, anti-lipid peroxidation property provide substantial evidence for the management of Ischemia induced by doxorubicin and isoproterenol.

Conclusion

There is little doubt that Traditional Medicines have been utilized since antiquity in the health care. However, with the advent of the pharmaceutical industry early in this century, the popularity of traditional/herbal medicine declined, in spite of the fact that twenty five percent of all prescription drugs still contain ingredients isolated from plants. The resources now do exist which can help and assist for greater understanding of the ways in which herbs can facilitate health and restore balance in disease.

The findings in this study could help in identifying many 'lead drugs' that could work as a part of 'reverse pharmacology' especially those that showed the effect as β antagonist, Angiotensin II Blocker, Calcium Channel Blocker (CCB) and digoxine like activities.

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