



## Editorial

### Avicenna's contribution to mechanisms of cardiovascular drugs

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Ibn Sina (Avicenna), Persian famous and influential scholar of Islamic Golden Age lived between 981-1037 A.D. He was a genius especially in medicine and philosophy. He wrote more than a hundred books and treatises dealing with philosophy, medicine, astronomy, geometry, philology, and art (1). His works are written mostly in Arabic, the lingua franca of the Islamic civilization. Although his medical masterpiece, "The Canon of Medicine", drew unprecedented attention to itself during the Middle Ages and after that, his other worthy works should not be overlooked.

"The treatise on cardiac drugs" or "*Kitab al-Adviyt ol-Qalbiye*", 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 causes of different emotional states and application of pharmacotherapy to manage them. Chapter 14 consists of 83 detailed monographs on simple cardioactive drugs and their therapeutic effects. Final chapters appertain to compound cardiac remedies (2). This book has two Latin translations by Arnaldo de Villanova (d. 1310) under the title "*De Medicines Cordialibus*" and Alpagus in 1520 (3).

Some of the heart's diseases mentioned in this book are difficult breathing or "*tawahhush*", palpitation or "*khafaqan*", syncope or "*ghashy*" (4, 5) and heart weakness or "*za'af al-qalb*".

To understand Avicenna's perspective on human body, some crucial concepts should be cleared.

The human body is composed of quadratic humors i.e. blood, phlegm, yellow bile and black bile. Each humor has two specific qualities: Blood is hot and moist, phlegm is cold and moist, yellow bile is hot and dry and black bile is cold and dry. An adequate equilibrium in the amounts of these humors is needed to maintain a healthy state of body and mind (6).

Spirits are material objects that perform every somatic and mental action in human body. There are 3 types of spirits:

1- Animal spirit which originates from the heart and penetrates into whole body through arteries. Its role is control and maintaining aliveness and contractions of heart and arteries.

2- Natural spirit which originates from liver and passes into other organs through veins. It controls the generation of fetus and its growth and development. The natural spirit also regulates digestion process and its conversion to different organs.

3- Sensual spirit which initiates from brain and penetrates to other organs by means of nerves. It controls sensations and movements.

In the words of Avicenna, "the heart is the origin of vital spirit" 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.

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 emblic myrobalan he stated, "Since it is a beneficial cardiac drug due to its cleansing effects, emblic myrobalan strongly improves memory and mental ability" (2).

Generally, drugs with following effects are beneficial

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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 (*Ruta graveolens* L.)
- 3- Fragrant drugs e.g. cinnamon (*Cinnamomum zeylanicum* Blume.)
- 4- Antidotal agents e.g. zedoary (*Curcuma zedoaria* (Bergius) Roscoe)
- 5- Deobstruents e.g. white behen (*Centaurea behen* 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"

Exhilarants are important cardiac medicines that can equilibrate the viscosity, warmth 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 (*Anchusa italica* Retz.)

Another thought-provoking issue in this 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.

Accumulating excessive black bile in cardiovascular system is a major risk factor for heart diseases. So drugs like common polypody (*Polypodium vulgare* L.) and

dodder (*Cuscuta epithimum* 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 though, can tone it.

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

### Conflict of interest

The authors report no relationships that could be construed as a conflict of interest.

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