

The Importance of the Pulse as Presented in *Al-Qanun f'it Tibb* by Ibn Sina (Avicenna): A review

İBN SİNA'YA GÖRE AL-KANUN F'İT TİBB'TA SUNULAN NABZIN ÖNEMİ

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Summary

Ibn Sina (Avicenna) is chiefly recognised for his contributions to medicine through his life-work *Al-Qanun f'it Tibb*. In this work, Ibn Sina dedicates a large chapter to the teaching of the pulse. According to Ibn Sina, the pulse was a major part of the clinical exam and often led the way to diagnosis.

The physicians could not assist the nature unless they heard its voice. In order to reach *Sophia* the western Galenic physician like the Islamic *hakim* had to be literally in touch with nature (1).

To Ibn Sina the system of circulation, as recognised later by William Harvey, was unknown. How then did he describe the origin of the blood and why was the pulse of such an importance for the diagnosis and the state of the patient?

The aim of this essay is to explore Ibn Sina's theories on the pulse as put forward in his chapter on the pulse in the first volume of *Al Qanun f'it Tibb*. An emphasis will be made on his theories about the origins of the pulse and the reason for its relative importance in the clinical examination.

Key Words: Avicenna, Pulse diagnostics, Medical history, Clinical examination

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Özet

İbn Sina (Avicenna), önemli kitabı *Al-Kanun f'it Tibb* sayesinde tıbbı katkısıyla tanındı. Bu çalışmada, İbn Sina nabız öğretimine geniş bir bölüm ayırır. İbn Sina'ya göre, nabız tanı için yol göstericidir.

Hekimler, nabızın sesini duymazlarsa doğaya yardım edemezlerdi. *Sophia*'ya ulaşmak için Batının galenik hekimleri, İslam hekimleri gibi tam olarak doğayla ilişki içinde olmadılar (1).

Daha sonra William Harvey tarafından tanımlanan dolaşım sistemi, İbn Sina'ya göre bilinmiyordu. O halde o, kanın kaynağını nasıl tanımladı ve neden hastanın durumu ve tanı için nabız böyle bir önemdeydi?

Bu denemenin amacı, İbn Sina'nın *Al-Kanun f'it Tibb*'ın birinci cildinde nabızla ilgili bölümde ileri sürdüğü nabız üzerindeki teorilerini araştırmaktır. Bu çalışmada nabızın kaynağı ve klinik muayenede göreceli öneminin nedeni hakkındaki teorilerine vurgu yapılacaktır.

Anahtar Kelimeler : İbn Sina, Diyagnostik nabız, Tıp tarihi, Klinik muayene

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Ibn Sina and *Al-Qanun f'it Tibb*

Ibn Sina was born in the village of Afsaneh in Asia Minor in year 980A.D. He was an ardent reader and learnt to master many sciences. During his life he wrote books treating many different sciences including philosophy, medicine, poetry, astronomy, theology, geometry, philology, music and the Arabic language. Medicine, he believed is not one of the difficult sciences (2). His medical skills were soon famous. He collected his medical observations and knowledge in his work of a lifetime, *Al-Qanun f'it Tibb* or "Code of Laws". Judging from this dogmatic title, it seems like Ibn Sina

wished or predicted his work to become an universally accepted textbook of medicine. In the first pages of this work he even suggests that: Every follower of my teachings who wishes to use them profitably should memorise most of this work, even though he do not quite understand it all (3). The whole work was in fact written in a simple and straight forward language, aimed at teaching medical students. Contributing to the accessibility of the text is Ibn Sina's apparent love of grouping, classifying, categorising and arranging diseases, symptoms, drugs and treatments. According to Shah: Avicenna's mode of presentation does give the

impression of concepts being true for all times (4). *Al-Qanun f'it Tibb* contains traces from many ancient civilisations such as Hindu, Chinese, Persian and Greek (5) and is by many considered to be an epitome of all medicine known to humans up until Ibn Sina's time (6-9).

Al-Qanun f'it Tibb is divided into five volumes which treat different aspects of medicine. The first two books treat the basics of physiology, anatomy pathology, hygiene, treatment of disease and therapeutics. The third and fourth books contain treatments of different diseases while the last and fifth volume takes up the preparation and compositions of drugs (10,12).

The Principles in *Al-Qanun f'it Tibb*

Ibn Sina based his medicine on what we recognise as the antique Greek medical teachings. In his chapter on the Pulse this is evident since he often cites, criticises and compares his teachings with that of the Turkish borne Greek philosopher and physician Galen (131-210 A.D.). Like the Greek physicians he builds his medicine on the principles of elements, humours, qualities, temperaments and faculties.

The Greeks believed that everything on earth was derived from intermixtures of the four elements of water, fire, air and earth. As Ibn Sina explains: *They are the primary components of the human body throughout all its parts* (3). To these elements were prescribed four opposite qualities; heat, dryness, moisture and cold. Each element carried two of the qualities; fire was dry and hot, air was moist and hot, water was cold and moist and earth was cold and dry. These qualities were believed to be present in different compositions in each human organ, some qualities weighing more than others in different organs. For example the liver was considered moist and hot, brain; cold and moist and heart; hot and dry. The four qualities, in equilibrium, made up the temperament of a particular organ. Further the temperaments of different organs made up the overall temperament of each individual. Ibn Sina defines the temperament as: *that quality which results from the mutual interaction and interpassion of the four contrary primary qualities residing within the elements* (3).

Ancient Greek medicine added the four humours to the elements as a link between the elements and the human body. They recognised the humours by observing layers in blood and noted four different layers which he identified as phlegm, bile, black bile and sanguineous humour. They also initiated the idea, which was later developed by Galen, that imbalance in the humours would cause morbidity. The humours were also assigned qualities: blood was cold and moist, black bile was cold and dry, yellow bile was cold and moist and phlegm was cold and moist. For example blood letting was practised to get rid of the heat in fever (12). In spring it was even practised on healthy people since they were believed to have a predominance of this humour because of the warm weather. The blood, bile and phlegm were thought to be produced in the liver from chyle, the breakdown product of nutrients in food. The chyle then reached the liver through the portal system where it was transformed into these humours. Black bile was believed to add up later produced in the spleen and the stomach from waste products. If accumulated in the brain, black bile was believed to cause melancholy, while accumulation in any other organ would give rise to cancer (13).

Further, the elements gave rise to faculties. Shah describes the faculties as seen by Ibn Sina as the powers and drives of the body (14). Ibn Sina believed there were three faculties namely; natural, vital and animal. An example of the natural faculty is the reproductive system (11). Shah further interprets Ibn Sina's "animal faculty" as what we know as the nervous system and the vital faculty as vital force (4).

The Art of Diagnosis

The art of diagnosis had a different concept from what it has today. Ibn Sina and medics at his time put greater emphasis on the patient as a whole than on the disease (3,11,14). The human body and soul were thought to constitute a microcosm in the macrocosm of stars and planets (8). The macrocosm affected the microcosm in different ways throughout the year. Thus the time of the year, the month, season, climate and weather were important in the diagnosis of the patient. Also humours and

temperaments were considered and led the way to treatment. As Shah points out: the dominance of each humour [was] recognised by colour and age and temperament of the patient, nature of food, tempo of activity and prevailing season (4). This made the history part of the medical encounter extremely important and the history of the patient could take very long. Galen is known to have talked for hours with his patients (14).

In turn, the clinical examination was based upon a small but important number of investigations: examination of the pulse, urine and stools and sometimes palpation of the abdomen. The former three were thought to mirror the state of humours inside the body and were thus imminent for the diagnosis. Their importance is suggested by another contemporary Persian physician, Ar-Razi, in the following quote from Robinson: *If he inspects the urine or feels the pulse he is supposed to know what the patient has been doing* (15). Amongst these the pulse was the most significant for the diagnosis since it was the only investigation that was dynamic and not static (11).

Diagnostic Value of the Pulse

Sphygmology, or the science of the pulse, were in the days of Ibn Sina an integral and essential part of the clinical examination. In fact often the diagnosis and the following treatment would depend on the pulse of the patient. A complete pulse examination could take as long as three hours to perform (16).

The art of sphygmology was most probably born in China, where feeling of the pulse was known as early as the 6th century B.C. (17). Hippocrates however did not practice the art. In fact the first Greek to adopt the art is thought to have been Praxagoras, a disciple of Hippocrates, from the Island of Kos (18). Later Galen developed the pulse-lore by devoting a number of works on the subject (5). We have not found any information on when the art reached the medics of Persia. If not earlier, they were most probably practising the art at the time of the school of translators at Jundi Shapur when much of Galen's work was translated into Arabic. It is however very likely that they were practising it even earlier because of the close contacts Persia had with the Chinese through the

Silk Route. Ibn Sina wrote one book on the subject and dedicated the largest chapter of his first volume of the *Al-Qanun f'it Tibb* on the Pulse, suggesting its importance in the clinical exam.

The Concept of "Circulation" in *Al-Qanun f'it Tibb*

Ibn Sina defines the pulse as such: *The pulse is a movement in the heart and arteries (the receptacle of the breath) which takes the form of alternate expansions and contractions, whereby the breath becomes subject to the influence of the air inspired* (3). In approaching the above passage, we must understand Ibn Sina's view on circulation. At this time Galen's theory of circulation was widely accepted by the Arab medics. They believed that the blood was produced in the liver and from here transported through the inferior vena cava to the right side of the heart. Then proceeded through the pulmonary artery to supply lungs and through vena cava superior to supply the brain and the rest of the tissues with nutrients. The veins were believed to carry the nutrients because of the darker colour. The veins and the right side of the heart and the arteries and the left side of the heart were thought of as separate systems with no connections in-between (19). In the left chamber Ibn Sina believed the breath was produced and carried by the arteries: *Allah created the left side of the heart, and made it hollow in order that it should serve both as a storehouse of the breath and as the seat of manufacture of the breath* (3). The breath was by Ibn Sina considered to be celestial and luminous (4): *Now He produced the breath out of the finer parts of the humours, and out of igniety* (3). Hence the arterial blood was lighter and warmer than the venous blood (19).

Therefore the pulse was imperative in diagnosing the state of the breath. The Greeks had something similar calling it "pneuma" however it is above the scope of this essay to investigate whether these were exactly the same or not and if thus this was a Greek or Persian invention. What is certain is that it played a central role in Ibn Sina's medicine as a cause of disease. The breath, equalling the Arabic "rooh or nafs" (3) was responsible for the energy, vitality and heat of the patient. It was composed from a combination of the elements and through the

arteries it reached and mixed with the different temperaments of the patient's body. Thus a medic could foresee the diseases of a patient if he knew the composition of the elements in the patient's breath as well as the balance of the qualities of each organ composing the temperament (11).

Origins of the Pulse

Ibn Sina believed the pulse to be produced by a number of factors that he designated as "essential" or "non-essential". Among the "essentials" as outlined in the *Al-Qanun f'it Tibb* were the vital power of the heart, producing the expansion.

When Ibn Sina refers to the power of the heart he does not mean the heart as a pump or engine of the circulation, but rather the heart as a source of production of the breath giving rise to the vital power, that in turn carries the energy producing the expansion. The non-essential factors were further categorised into natural, non-natural and preternatural. The natural factors were the factors humans were born with like age, sex, and temperament. Meanwhile the non-natural factors were those that were affected by our way of life; exposure to hot atmosphere, hot baths, vigorous exercise, food or wine, different medicines. The preternatural factors, neither natural nor unnatural were factors like emotional status, secretiveness (= hiding emotions), habits of patients, hot intemperaments and decompositions occurring in the fluids of the tissues. The occasion of the exam and the environment were extremely important:

The pulse should be felt at a time when the patient is not in a state of excitement or anger, or affected by exertion, or under the influence of the emotions, or in a state of satiety (which renders the pulse heavy), or of hunger; nor must it be a time when the usual habits are neglected or new ones are being formed (3).

Techniques of Pulse examination

According to Ibn Sina every pulse beat comprises two movements and two pauses. Thus, expansion: pause: contraction: pause. When it came to the examination of the pulse there were certain techniques which had to be followed. The wrist was considered the best place to feel the pulse.

There was a special technique for feeling the pulse. If the palm be turned upwards the pulse will appear wider, less high and less long, especially in thin persons. If the hand be palm down, the pulse seems higher, longer, and narrower (3).

Ibn Sina's Characteristics of the Pulse (3)

Ibn Sina put much effort in characterising the pulse of one wrist. He identified ten features:

I. Amount of diastole estimated in length, breadth and thickness.

If all three were decreased, the pulse was defined as small.

If all three were increased, the pulse was known as large.

II. Quality of impact imparted to the finger of the observer at each beat.

III. Duration of cycle or of time occupied in each movement.

IV. Consistence of the artery.

V. Emptiness or fullness of the vessel between the beats.

VI. The feel - whether hot or cold.

The remaining features concern the investigation of several consecutive beats:

VII. Duration of time occupied by pauses between two successive beats.

VIII. Equality or inequality of force of successive beats.

IX. Regularity or irregularity; orderliness or disorderliness.

Under this ninth feature, which Ibn Sina classes as one of the more difficult features, he claims that in order to recognise this feature fully one must be trained in the art of music. His poetical resemblance of the pulse to music is indeed worth citing: *For one must now see to the musical character of the pulse. For in the art of music sounds are juxtaposed in orderly relations of loudness and softness which keep on repeating at regular intervals; rates of utterance vary-some sounds coming close to one another, and others being further apart;*

the attack may be abrupt or gentle, sharp or dull. The notes may be sounded clearly or be indefinite; they may be strong or weak; the volume may be full or "thin". The rhythm of the sequence of the sounds may be regular or irregular (3).

The tenth and last feature was:

X. Metre, Rhythm, Harmony;

This last feature, refers to the total period of a pulse and the relation between the total period of beat and the total period of pause.

Conclusion/Discussion

The teaching of Ibn Sina reached Europe after being translated into Latin in the 11th century. It was then studied for 600 years (4), if not more. Up to the 1650's it was included in the curriculum as the main medical textbook for medical student at the University of Montpellier (12). The pulse theory of Ibn Sina is also known to have influenced the Ayurvedic medicine (6), which still practices palpation of the pulse thoroughly.

What made this medicine live for so long? To answer this rather puzzling question, Shah made an experiment exposing his patients to the Unani doctors and the Hakims, to diagnose their conditions by feeling the pulse. He came to the conclusion that: while health and disease as states of the body are reflected in the pulse, it was not possible to diagnose more than a few diseases simply by feeling the pulse. He then speculated on the reason why the Unani medicine has managed to stay alive for such a long time despite its apparent weaknesses. Shah claimed that it is their taking of a comprehensive history of patients, make naked eye observations, prescribe simple treatments and offer explanations which, by force of reason, that are accepted by even many educated patients (4). More than in the 1960ths, when Shah wrote his work about Ibn Sina, medicine today is about high technology, and the modern diagnostic procedures have contributed to create lack of direct physical contact in the patient-doctor-relationship. Perhaps is a direct physical examination an important part

of the art of medicine, which is about seeing the patient as a whole person.

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