

AVICENNA'S CONTRIBUTION TO THE DEVELOPMENT AND PROGRESS OF MEDICAL SCIENCES

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ABSTRACT

Avicenna was born in the village of Belkh near Bukhara in Persia. He was a very famous philosopher, wiseman and an efficient physician. He wrote more than one hundred books on all aspects and sciences known in his time i.e. philosophy, wisdom, religion, mathematics, sophism, literature, poetry and medicine. In medicine, the most celebrated of them is "Al-Qanun fil Tibb", which surpassed other similar books on medicine and considered the biggest medical encyclopaedia of his time. Those orientalist who believe in Greek medicine consider this book as the only text book on the art of curing and recovery.

Avicenna (980-1037 A.D.) as known to the European is Abu Ali Al-Hussein ibn Abdullah ibn Sina, also called throughout the Arab-Islamic world by the name Al Sheikh Al-Raees (the old man and master), and was referred to as the third teacher of philosophy (after the first 'Aristotle' and the second 'Al-Faraaby).

He was born in a family belonging to Ismaelite sect in the village of Belkh near Bukkhara in Persia, By the age of ten, Avicenna was well acquainted with the Arabic language together with his mother tongue the

Persian, also knew by heart all the verses of the Holy Quran. During the next ten years, he was busy in studying Islamic legislations, philosophy natural sciences, mathematics and logic.

Later on, Avicenna became the pupil of the famous wiseman and philosopher Abi Abdullah Al-Natali, then memorised the famous book 'Esagohi' written by the Greek philosopher 'Phorphorius', then studied the works on mathematics and arithmetic by the Greek Euclides (300 B.C.) specially his famous book

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'Stoicheia,' also the book 'Megale Syntaxis' that famous astronomical volume written by the great astronomer Ptolemaeus the Alexandrian (2nd century A.D.), (this book was very popular to the Arabs under the name Al-Magesti).

Avicenna became interested afterwards in medical sciences and studied it under the Persian physician Al-Mansour Al-Hasan ibn Nouh Al-Qamari (a celebrated physician who wrote a book on the Art of Medicine in three parts, on internal diseases, external diseases i.e. dermatology and fevers).

He then studied under Abi Sahl Issa Al-Gergani (that famous physician who wrote a celebrated medical encyclopaedia 'The Hundred Book on the Art of Medicine' and died in 1000 A.D.). Avicenna at the age of 17 memorised the famous book on philosophy written by Al-Faraabi "The Philosophy of Plato and Aristotle", in which he found all solutions to his problems on the philosophy of metaphysics.

At the age of 18, Avicenna became very famous as a physician and was called by the Prince Nouh ibn Mansour of Khouasan (ruled from 976-997 A.D.) to cure him from his ailments and when succeeded, was appointed his private physician and was granted the right and liberty to read whatever books he wished in his palace.

When Avicenna reached the age of 20, he started writing medical and philosophical books as well as practising medicine in a place near the shores of the Caspian sea and during that time his father died. One year later, Avicenna completed the writing of his first book, and at the age of 22 he became very famous in his locality that the prince of Hamazan State (one of the Persian states) appointed him as his prime minister. But after a while, Avicenna's rivals conspired over him resulting in his arrest and put in prison, but could escape after sometime. He later became the court physician for Ali ibn Maamoun the governor of Khouarizm, and again escaped from there due to a plot organised by his rivals. After a long travel he reached the state of Gergan where he heard about the assassination of its charitable prince. Then left for Asfahan and got refuge to its prince Alaa El-Dine and became his personal physician.

Avicenna continued writing books mostly in Arabic with few in Persian language. He became the most prominent Islamic philosopher and his views considered as philosophy and art composed of two sciences... one dealing with matters of the actual existence of man while the other on what man has to do, so as to honour himself and become a reasonable scientist equivalent to the present world and to become extremely contented with the after life.

Avicenna's views about logic were very conservative as he followed those of Aristotle concerning causes of matter, thus, got in severe conflict with his contemporary philologists owing to clashes between his logical thoughts and their religious ones. In psychology, Avicenna mixed between the philosophies of both Aristotle and Plato, thus came out with a new concept which was widely accepted and concentrated on the immortality of the human soul which he considered as an element and not an image.

He also contributed to the field of metaphysics following the steps of all the philosophers of antiquity and his contemporaries, where he commented on the books of Platonius, the Egyptian philosopher (lived between 205–270 A.D.). He was very famous and established the Neo-Platonic philosophy, he also commented on the books of his pupil Phorphorius (the latter tried to reconcile between the thoughts and ideas of Plato and Aristotle by simplifying and explaining Plato's points of view on religious unity), and so Avicenna helped Moslems to reconcile between the traditional religious beliefs and of the Greek Philosophical ideas.

Avicenna's ideas on the belief in one God and that all existing life unites with him, found great approval in the Western Islamic World (North

Africa and Spain) specially through the efforts of Maimonides in Andalusia). Avicenna established a Unitarian sect of his own in which he reconciled between the elements of Islam and that of Plato and Aristotle, in other words between philosophy and religion through his interpretations of the verses of the Holy Quran with logical proofs he developed to ascertain the existence of prophecy, and its social necessity to the people to manage their affairs and ascertain for the facts of life.

Avicenna's personality was then considered unique and genius and as the wonder of his time owing to his brilliant ideas and abilities, and also because of his writings that showed his characters and scientific abilities since early age, and reached its peak in a short time that excelled in teaching, classification and inventions which survived in his scientific and philosophical heritage.

He used his deep philosophical studies and wide knowledge of logic in analysing all matters, then classifying them in arranged manner revealing his great scientific and philosophical mentality. He put down rules even on himself by which all physicians should not go beyond its limits and indulge themselves in philosophical matters. He also put philosophy before science...since science at his time was not so powerful to the extent it could do

without philosophy, while philosophy on the other hand could do without science. In his book 'The seasons' he could discuss his philosophy powerfully and trustworthy depending on philosophy, but going in its details, Avicenna went on explaining them on a pure scientific basis

In medicine, Avicenna wrote many books, the most celebrated of them is 'Al-Qanun fil Tibb', in which he got benefit from his indulgence in philosophy that was shown clearly in the volume... is the method of classifying the contents in an accurate system contrary to the past physicians who were busy in trifle matters away from the right course of medicine, which is diagnosis of the diseases and therapy which is based on experience and actual findings (ancient medicine was under the influence of philosophical ideas based on logic solely).

The book 'Al-Qanun' is considered a very valuable scientific heritage that shows the skill and extensive knowledge of its author, stating all the medical teaching of Hippocrates and Galen, mixed with Aristotles' philosophy in biology.. all put down in a neat classified system, divided into sections. He built his medical basis on the theory of humours and temperaments following Hippocrates. It also reveals his precise and docile description of morbid and clinical symptoms of the

diseases, his precise ways of treatment based on logic without much exaggeration and in an eloquent method.

Avicenna did not submit to the intermixing of medieval medicine with priesthood, magic and spells, nor deny the influence of higher or lower spirits on the living bodies, but stated that the physician has to recognise the disease as being a physical incident only and also as a condition of change of temperaments.

He practised healing the sick with remedies according to his long practice and was considered not just quoting from the Greek medicine but a man of innovation, invention and experimentation. He did not rely on old Greek sciences only but opposed what others agreed upon, thus renovated medicine by putting down new bases. He modified ancient medicine, trimmed it through the use of his vast knowledge and power of observation, then wrote his supreme encyclopaedia which gained fame over all past medical compendiums and remained for many centuries as the only medical text-book in medical schools of east and west, up to the mid 16th century specially in Europe after being translated into Latin by Girard De Cremona in 1170.

Europe considered "Al-Qanun" as a sacred inspiration and admired its logical and undisputed classifica-

tion, and took its prefaces for granted. It was looked upon as the best text book on medicine with all merits of investigations and coordination, contained the heritage of past civilisations on medical sciences, explaining the symptoms of diseases and prescribing the appropriate medication together with a list of drugs and pharmaceuticals, description of surgical operations and their tools, and above all a considerable ability to encyclopaedic arrangement never before demonstrated.

He pointed out clearly his scientific pattern in "Al-Qanun", mentioned to the beginning the general outlines of medicine, both theoretically and experimentally, then moved on to simple drugs and their divisions, then those diseases occurring in each organ of the body, commencing with its anatomy then its functions, followed by the anatomy of the simpler organs and their functions and describing the way to keep it healthy. He then proceeded with absolute evidence of its diseases, etiology and symptoms then their methods of treatment.

He then described minor diseases with their etiology and symptoms together with their governing rules, then the general law of treatment, followed by particular therapy using simple drugs or compound ones, mentioning previous medication by simple then compound drugs. (Thus

his pattern begin with the anatomy of each organ, its function, nature of its diseases, then treatment showing how accurate his system was, which enabled his students to proceed in a true scientific and academic way.

Avicenna was also a clever physician as well as a thoughtful philosopher, with his theory on diseases date back to the Greeks who stated that nature was composed of four elements; fire, water, earth and air...also there are four temperaments; hot dry, cold humid, cold dry and hot humid. The human body also has four humours controlling it; blood, phlegm, black bile and yellow bile (these humours are liquid bodies originated from food). Thus the blood is airy...hot and humid; black bile is earthly...cold and dry; yellow bile is firey...hot and dry; phlegm is watery...cold and humid. The complete balance between these humours gives man good health, while the disturbance in the equilibrium of the percentage of each humour causes ill health and sickness.

He then mentioned the causes of the diseases and their symptoms, showing that diseases are an abnormal phase in the body, arising from abnormal humour function or structure, eventually their symptoms are abnormal, whether direct such as pain in the abdomen or indirect such as redness in the cheeks in case of tuberculosis. As an example; the

cause of putrefaction...the disease is fever, the symptoms are thirst and headache. Another example; the cause is fullness in the vessels connected to the eyes, the disease is obstruction in the interior of the eye-ball, symptoms are loss of sight.

In case there are resemblance in the symptoms, he gave accurate differentiation between them, depending on comparative diagnosis between the different diseases, e.g. concerning the difference between epilepsy and vertigo; he stated that vertigo may last for sometime while epilepsy occurs suddenly, the patient collapses, falls at once then regains consciousness after a certain period. Meantime, dizziness is a condition through which the patient becomes drowsy if stands up after long sitting, have blackness in vision and about to fall down. It might look like epilepsy if it is severe but with no convulsions.

He was also capable of diagnosing the illness from the examination of the urine, faeces and pulse of the patient, he stated... the urine is collected first thing in the morning, without drinking water or eating food or having coloured food or drinks with saffron, pomegranate or Indian laburnum which colours the urine. Concerning the faeces examination, Avicenna mentioned in chapter 13, second volume of the Qanun its characteristics such as colour, form

etc., while pulse was examined to diagnose illness as mentioned in chapter 19, first volume of the Qanun wether even, different or normal pulse with its variations, and that female pulse is different from males. Other types of pulse were teeth, humours, seasons, places, bodies, pulse related to consumption of certain materials or stimulants or sedatives. Also pulse of awakesness, sports, bathers, pregnancy, pain and spasms, tumours or psychiatric affections.

So from those three guides... urine, faeces and pulse the physician could identify and diagnose the illness, depending on his experience, skill and medical knowledge both clinically and experimentally.

One of Avicenna's major medical results and achievements that attracted universal attention was Ankylostoma parasite present in the human body and mentioned in a special chapter of the Qanun on intestinal worms which he called Round Worms. He mentioned tuberculosis, stated that diseases are transmitted by water and dust; was also the first to describe Filaria parasite causing elephantiasis and showed its distribution in the human body.

He was the first to describe malignant Anthrax (which he called Persian Fire) and the fever it produces

(Persian Fever). He could describe accurately through his clinical observations the supuration of the pleura, and differentiated between bronchitis and acute meningitis. He could also differentiate between intestinal and renal colics, between facial paralysis caused by central affection of the brain and that from local affection to the nerve supplying the facial muscles, which is the major cause.

Avicenna described brain arrest arising from excessive blood supply (haemorrhage), and differentiated between pain in the body sides and that pain in the nerves in between the ribs. He also identified different types of insect larvae and gave reasons for that; was also the first to treat tear duct occlusion through the insertion of a sterilized probe. Also advised the use of coated pills so as to cover their bitter taste; revealed in a very accurate way the symptoms of having stones in the bladder, and their difference from kidney stones.

He was the first to diagnose accurately inflammation of the ribs, lung infection and also liver abscess, he described well skin and venereal diseases and nervous disorders. He described in a precise way urinary fistulae, post partum fever, sterility and sex differentiation of the foetus and male responsibility in it (and not the female). He described some gynaecological diseases scientifically

such as vaginal obstruction, lymphatic tumours etc. He skillfully pointed out that external senses such as sight, hearing or taste are governed by a special centre in the brain.

Concerning psychology, Avicenna stated that psychological influences affect the body organs and their functions greatly, and proved that it is a natural science away from illusions and superstitions. He used his keen vision and vast intelligence during its therapy so as to identify the symptoms of organic diseases, and did not forget to emphasize on the use of psychological entrance as a cure to human bodies.

Avicenna's writings on medicine are clear and simplified for students and professionals to understand easily (contrary to Galen whose works are vague, obscure and lack organisation and order). The book 'Al-Qanun' by Avicenna is considered the biggest medical encyclopaedia of his time, where he mentioned the bases of medicine such as the temperaments, humours, different body organs and their functions; different diseases and their etiology, materia medica, simple drugs and the effect of each on the body systems. He also mentioned compound drugs, effect of each on the diseases with tracing its fate in the body and put down his remarks... thus his remedies and opinions resulted from his experience.

Al-Qanun contains one million words, divided into five big books, each in turn is divided into several sections and each section is composed of several treatises and each is divided into chapters (all divisions are logically related to each other). Thus the five books are;

Book I : comprise several sections;

Section 1 : deals with major faculties of medicine such as definitions, purposes, the four elements, the temperaments, anatomy, researches in physiology and psychology.

Section 2 : deals with diseases... definitions, etiology, varieties: pulse urine and faeces examinations.

Section 3 : deals with newly born infants, breast feeding, children diseases and their treatment, sports, baths, food management, geriatric diseases, temperaments and their correction, travel and their care.

Section 4 : deals with treatment, purgatives etc.

Book II : on simple drugs, and deals with pharmaceutical art and contain many drugs that were unknown to the Greeks. It comprise several sections such as;

- 1- discusses the nature of the drugs, their characters, action of each drug on the body organs.
- 2- discusses simple drugs in alphabetical order.

Book III : discusses diseases in the human body organs from head to foot, both externally and internally with mention of their pathology, symptoms of each disease, and with fully accurate description, etiology and treatment, with mention of the past written items on this subject and anatomy of the diseased organ.

Book IV : Sections 1 to 4; deal with those diseases that affect more than one organ such as the different types of fevers and their treatment. Also with description of infective diseases such as small-pox, measles and others such as tumours, pimples, leprosy, fractures, bone-setting and cosmetics.

Section 5 : deals with surgery, dislocations and fractures.

Section 6 : deals with poisons.

Section 7 : deals with drugs used in cosmetics.

Book V : deals with preparations of compound drugs (Aqrabazin), different methods used in the art of preparing drugs and about materia medica.

Avicenna was also skillful in surgery, evident in Book III of his "Al-Qanun", where he mentioned the treatment of nerves, methods of stopping haemorrhage by using tourniquet or insertion of wicks or cauterization or application of caustic materials or pressing the flesh around the vein tightly.

He also mentioned anal infections, treatment of haemorrhoids (either by cutting them off or by drying or cauterization). Also described anal fistula and showed that there is a relation between the fistula and the sphincter muscle through the insertion of a probe inside the fistula and pushing one finger inside the anus, then pressing on the muscle after the patient had constricted it, thus could identify its position from the probe, then the muscle is cut off partially or completely. (This procedure is still applied up till now in treating anal fistula).

Avicenna also mentioned kidney stones and warned of their extraction through an incision in the back, same warning with bladder stones lest complications may arise endangering the life of the patient (such as shock, haemorrhage and urine incontinence). He also mentioned the use of catheters and bowls if drugs were useless, and warned of their use in case of bladder tumour thence the pain will aggravate.

He described in Book IV of Al-Qanun surgical shock and warned of serious complications arising from shock or falling such as rupture to a part of the heart muscle or even to the stomach which is fatal. Also urine or faecal retention may occur or drain involuntarily. Blood vomiting or extreme haemorrhage may occur due to cut in the veins of the cranium, spleen or liver, together with abdomen flatulence, difficult respiration, inability to speak or talk.

Avicenna described also joint dislocation as an unusual depression in the joint in comparison to the healthy one, and if the joint does not move then the dislocation is complete. He favoured the use of Hippocratic method for setting the joint back to normal with care in fixing the shoulder tightly till the tissues heal.

He mentioned that vertebral dislocation causes paralysis, gave an account on the symptoms of bone fractures and their complications, emphasized on the importance of fixing the fracture with splints and even surgical interference to cure mal healing of the bones. He was the first to discover and describe the internal ocular muscles, the first to differentiate between the types of jaundice, the first to recognise some diseases that are transmitted by drinking water and attributed them to the presence of minute animals

unseen by the naked eye and swallowed unnoticed.

Avicenna approved upon the anatomical theories attributed to Aristotle and Galen, and mentioned them in his medical books, but was the first to oppose them and even corrected them specially in Optics where he showed that the centre of vision is not the lens but in the optic nerve. He also described the liver and mentioned that by pressing over it, one can feel if it is hard, enlarged or having a tumour thus diagnosing its illness.

Avicenna's compilations exceeded one hundred in all aspects and sciences known in his time such as philosophy, wisdom, religion, mathematics, sophism, literature, poetry and medicine (68 in religion and metaphysics; 11 on astronomy and physical philosophy; 16 on medicine; 4 on poetry etc.). Of his medical volumes, 8 were written in the form of poems and in different subjects such as "Symptoms and Signs of Death Approach", "Hygienic Commandments", "Experimental Therapy", "Notes on Anatomy" etc., and above all "Poetical Metre on Medicine" on all arts of medicine, composed of 1000 lines.

Apart from his very famous book "Al-Qanun", Avicenna wrote another important book "Treatise on Cardiac Drugs" and a third one "Notes on

Body Constitution". Also wrote a book on "Reasons of Occurrence of Geometrical Letters" which dealt with sound (from the perspective view of the Arabic and Persian languages), composed of six chapters...

chapter I : on the reasons of sound occurrence (he mentioned that it occurs due to strong and swift wave movements in the air, and that waving arise from; 1) knocking, which is the approach of a body to something resisting it, followed by violent reaction to the velocity of approach movement and its strength..., 2) displacement, which is the migration of one body away from another., coherent to it and superimposed on each other, to a distance with a vast speed.

chapter II : on the reasons of letters occurrence; a letter is an organised voice, related to it and characteristic, so differentiates from another voice which is similar in pitch and tone.

chapter III : on the anatomy of the Larynx (showed that it is composed of three cartilages.

chapter IV : on some reasons to one letter of the Arabic alphabets.

chapter V : on letters resembling those letters which are absent in the Arabic language such as the Persian "J".

chapter VI: on how to hear the letters from non-vocal movements.

Avicenna wrote also a book on "Signals" (Al Isharaat) in which he expressed his philosophy which was very close to mysticism. He also wrote a book called "The Recovery" ('Al Shifa',) which contained various subjects such as logic, physics, mathematics and theology (he wrote later on an abridged form of this book which he called "The Salvation"). The book "Al Shifa" consists of three sections; the first deals with logic... the second and third deal with physics and metaphysics. This book is a huge scientific encyclopaedia in which Avicenna mentioned accurately informations on physics, plants, animals and minerals.

Concerning the part of this book on physics, Avicenna wrote about the mountains, earthquakes, velocity of sound and light, clouds, shadow, ice, cold weather, fog, rainbow, sun, meteors, winds, lightning and thunder. He also mentioned extensively his opinions and theories on plants, their multiplication, male and female flowers, that the plant shares the animal in action and emotions towards food. Also mentioned plant fruits, thorns and plants that grow on the coasts, sand, rivers and mountains, also grafting, evergreen and deciduous plants.

In the section on animals in this book, Avicenna described studies, remarks and different observations about the animal species, birds; also described aquatic animals such as clams, fish, frogs and sponges. He then moved on to land animals and mentioned their different organs, muscles, tendons, ligaments, arteries, veins, membranes, nerve fibres, lungs, heart, voluntary and involuntary movements. He then discussed minerals and how to transfer low minerals to precious ones (Alchemy), classified minerals to stones, soluble rocks, sulphurated rocks, salts, and showed how mistaken these lie alchemists were in pretention of transferring elements to each other, since their constitution remain intact and unchanged, and that other similar elements might arise which cause that confusion.

To conclude, Avicenna became very famous throughout the Islamic world as a wiseman and philosopher besides being an efficient physician. His book "Al-Qanun" surpassed other similar books on medicine which written by Rhazes or Al-Magusi and even replaced them. Those orientalists who believe in Greek medicine consider this book as the only text book on the art of curing and recovery.

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सारांश

चिकित्सा विज्ञान की उन्नति एवं प्रगति में अविसेन्ना का योगदान

—समीर याह्या अल गम्माल

अविसेन्ना का जन्म ईरान में बुखारा के समीप बल्ख नामक एक गांव में हुआ था। वह एक सुप्रसिद्ध दार्शनिक, मेधावी तथा प्रभावशाली चिकित्सक था। तत्कालीन अनेक वैज्ञानिक विषयों पर उसने लगभग एक सौ से अधिक ग्रंथ लिखा। चिकित्सा विज्ञान पर उसका अत्यंत महत्वपूर्ण ग्रंथ “अल खानून फिल तिब्ब” है जो कि उस काल में तत्सम्बन्धित सभी ग्रंथों में सर्वोपरि माना जाता था। यूनानी चिकित्सक इस ग्रंथ को चिकित्सा शास्त्र के विषय में लिखित अद्वितीय ग्रंथ मानते हैं।