Review Article

The value of Avicenna’s heritage in development of modern integrative medicine in Uzbekistan

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ABSTRACT

The heritage of Abu Ali al-Husayn ibn Abd Allah ibn Sina (known in Europe as Avicenna, hereinafter referred to as Avicenna; around 980-1037 ce) has been used in the practice of doctors of various specialties in the treatment of various diseases for many centuries. Extensive clinical experience accumulated over a long time is actively used in modern medicine. Avicenna has had an invaluable contribution to world medicine. He is the largest representative of advanced sociohumanitarian ideas among the peoples of Central Asia. He was a philosopher and physician, scientist and mathematician, poet, and specialist in literature. The rich heritage of the scientist takes a worthy place in the history of medicine in particular, and world civilization in general. Avicenna introduced the main contribution to the treasury of the universal culture by his work in medicine. Avicenna brought together the achievements of Hippocrates (c. 460-370 BCE), Galen (c. 130-200 CE), and healers of Egypt, Persia, and India, and he supplemented them with own research results, brilliant discoveries, and hypotheses. Avicenna left many works, among them the especially popular Canon of Medicine. He paid great attention to the prevention of diseases rather than their treatment, which is important today. In his works he gives advice on the use of herbal medicines and biologically active points for various diseases. This article highlights some topical issues of multifaceted heritage of Avicenna for modern medicine and identified promising areas for the development of integrative medicine in Uzbekistan.

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1. Introduction

At the present stage of the medical development, the treatment of disease can be achieved with a combination of modern classical methods of treatment with the most effective methods of Oriental medicine. Integrative medicine—combining traditional and folk direction—is a medicine of the future. An ideal image of the integrative physician has long existed in the history of mankind. Hippocrates, Paracelsus, Avicenna, and others are its real incarnation. Progressive representatives of the Uzbek medicine obtained from folk medicine experience all the best, rational especially relating to medicinal plants, and prepared pills from them and introduced them into the practice of scientific medicine.

Avicenna was a physician of the Middle Ages and numerous books that discuss his achievements have been published.1–7 In his functional encyclopedia Canon of Medicine, he...
summarized many centuries’ experience of Greek, Indian, and Central Asian medicine and medicine of other peoples of the Middle Ages, as well as pharmacology, pharmacy, and pharmacotherapy.\textsuperscript{8–11} Many medicinal plants described by Avicenna are firmly established in the practice of traditional medicine in many countries, and—some of them—even in scientific medicine.\textsuperscript{15}

Western medicine considers external factors as the cause of the disease, such as viruses and bacteria\textsuperscript{16,17}, whereas oriental medicine considers the nature of diseases through internal factors such as the weakening of the protective function of the body. Therefore, the main method of treatment is destruction, prevention of external factors in Western medicine, and the strengthening of internal defense response in oriental medicine.

In Uzbekistan since 1996 the departments of the folk medicine have been organized in all medical schools where senior students receive primary knowledge on treatment methods of traditional medicine. Currently, the total load on traditional medicine for students is 76 hours, including 6 hours of lectures, 54 hours of practical exercises (9 day cycle), and 16 hours of individual work. Particular attention is paid by students to acquiring practical skills in the application of oriental medicine in emergency cases.

The Department of Traditional Medicine of the Tashkent Medical Academy (TMA) annually holds a faculty in training professors, associate professors, and assistants of other medical schools of the country. In 1997, at the First Tashkent State Medical Institute (now TMA) the center of the Oriental Medicine of the Republic of Korea was opened according to the international program of KOICA, which is the base of traditional medicine of the TMA.

2. Scientific heritage of Avicenna

Avicenna was a great scholar of Central Asia, the founder of the world of medicine. In various foreign and domestic literature and other sources, there is a large amount of information about the life and creative heritage of Avicenna.\textsuperscript{18–25} He was born in the village Afshona near to Bukhara (in Bukhara region, current Uzbekistan) According to ancient sources, he was credited with ~470 works ranging in size from a single sheet to 20 volumes in 29 fields of study, 23 in Persian, others in Farsi and Arabic—the language of science and literature of the time. Many of them are lost forever, and only 274 survive and have been preserved.\textsuperscript{21,26,27,28–31} In the judgment of Professor U.I. Karimov, the fullest and sufficient bibliographic source is the work of Iranian scientist Jahji Mahdavi (1954) Catalogue of manuscripts of products of Avicenna, which includes 242 works of Avicenna divided into two groups: the first group includes works that were undoubtedly written by Avicenna; the second group embraces works attributed to Avicenna or representing parts of separate compositions of the scientist.\textsuperscript{32}

Avicenna summarized the scientific achievements of his time and developed them further in encyclopedic works on philosophy, logic, mathematics, astronomy, physics, mineralogy, jurisprudence, linguistics, and musicology.\textsuperscript{18,20} However, Avicenna acquired most fame as a physician, pharmacist, and scientist.\textsuperscript{31} The Avicenna era—the era of the Samanid dynasty, the heyday of science, culture, and Bukhara, according to many historians—“became a place of greatness, the sanctuary of the kingdom, the dawning-place of stars in the center of literature and scientists of the time.”\textsuperscript{33} From a very young age Avicenna showed his exceptional intellectual abilities, studying medicine and philosophy, and had an interest in the works of Aristotle. It is noteworthy that at the age of 16 years he became a famous court physician who healed the Emir of Khorasan.\textsuperscript{34}

Avicenna grew up in Bukhara, the capital of the Samanid dynasty, whose rule extended to the territory of Maverannakhr and Khurasan in 892-999 CE, and Maverannakh is the territory of modern Uzbekistan.\textsuperscript{36} Desire “to untangle the knot of death”—to unravel the secrets to defeat the ailments do everything possible to make life easier for people—moved Avicenna when he created his major work on medicine: Al-kanun-fi-t-tibb (Canon of Medicine, 5,9,18-20,25,31,32,35,36) This work, written in 1013-1021, brought him fame for centuries and is considered the foundation of medicine, not only in the Islamic world, but also in Europe.\textsuperscript{37,38,39,40} This is truly a medical encyclopedia, in which a logical harmony outlines everything that relates to the prevention and treatment of disease. It is the most important work in his era and incredibly raised a high level of medical science, and 100 years after the death of Avicenna was widely recognized in Western Europe. Thus, until the 18th century the central universities in France, Spain, Italy, England and Germany, had studied the Canon of Medicine. The first translation from Arabic into Latin was made by Gerard from Cremona (1114–1187) in the 12th century (by order of Frederick Barbarossa). The first printed edition of the Canon was published in 1473. In 1476–1479 the Canon was published at Padua, and in 1482–1500 at Venice. In 1543 at Rome, it was published in Arabic, and in 1593 in French. About 40 completed editions had been made by the 17th century. In XIX–XX centuries it has been translated and published in Russian and Uzbek language.\textsuperscript{27,28,41,42} Within 650 years this book had become a handbook for doctors and was equal to half of the curriculum of medical schools in the world.

Canon of the Medicine consists of five books\textsuperscript{19}.

The first book is devoted to medicine theory, disease prevention, and treatment.

The second book is devoted the doctrine about simple medicines and ways of their action.

Separate illnesses and their treatment are described in the third book.

The fourth book is devoted to surgery, doctrine about fevers, etc.

Complex medicines and poisons are described in the fifth book.

Drugs (Al-Adviyat al kalbaya) was written during the first visit to Khamadan. The work enriched the role of the heart in the emergence and manifestation of air, especially the diagnosis and treatment of heart disease. Removing harm from manipulation by various fixes, errors, and warnings (Daf al kuliya an al-abdon al insoniya bi-tadarik an khoato an-tadbir), Poem on the medicine (Urduzhuafit-tib). Urduzhuza (Al urduzhuafit-t-tib) - this work is in second place after the Canon of Medicine in content and coverage of the material. The doctrine about Misadgi is the base of Avicenna’s concepts about health and illnesses, and on all systems of its medical sights. The term
Misadgi (Arab) means proportional mixture. Its equivalent in Russian is nature. In ancient time and the Middle Ages medical views on fever, coldness, dryness, humidity are based on the doctrine of Misadgi concepts. Echoes of this doctrine remain in traditional (Eastern) medicine in Central Asia.32

In Treatise on the Pulse (Risolai nabziya), Avicenna developed the whole doctrine of pulse diagnosis: “Pulse may be wavy and spindle-shaped, two-shock, long, trembling, short, small, slow, ant, soft, intense nervous, low, ramp, full, empty.”34 In addition to the above described characteristics of pulse and 10 more of its varieties, Avicenna also described in detail the 15 different natures of pain, 20 species of urine, differentiated three types of jaundice, and in practice used in various types of operations;34 such medical manipulations used by Avicenna have not lost their value even today.

2.1. Avicenna and modernity

In the third book of Canon of Medicine, Avicenna describes the diseases of internal organs, in particular a detailed description of symptoms of gastritis and gastric ulcer, close to the modern description, i.e., vomiting, pain, heartburn, and, in some cases, bleeding. To determine the place of ulceration, Avicenna localized the pain and time of their arrival, as he said the pain occurs when the food reaches the ulcer. Also, he used oral health as an indicator of disease of the gastrointestinal tract.43,44

In modern medicine, diagnosis of chronic gastritis and gastroduodenal ulcers, is realizing not only with symptom complexes of diseases described by Avicenna, but with modern methods causative disease pathogenesis.

The most common chronic diseases of the digestive system are pathology of the stomach and duodenum (gastritis, gastro, and ulcer). As a result of the pathological process local immunity is disturbed, destroying the microecological structure of the stomach and intestines, leading to a vicious circle of inflammation of the mucous membrane of the digestive system.

Scientific novelty of the research is to develop ways of acting to the biologically active points of the human body. Patients with diseases of the gastrointestinal tract were examined. Of these, one group of patients received drug therapy and a second group of patients was treated with acupuncture. Clinical studies have shown that the use of acupuncture in the second group was more effective and pronounced and the treatment was 70% more efficient than in the first group.34

2.2. Diseases of the gastrointestinal tract in the Canon of Medicine and the current state of the issue

In Canon of Medicine, Avicenna provides data on diseases of the stomach and intestines as a reaction of the organism to changing environmental conditions and violation of specific forms of adaptability of the organism.30,45. The interaction of the organism with the environment, heredity, and changing its reactivity should be considered in judgment about the cause and the origin of diseases of the digestive system. To maintain this harmony, Avicenna recommended foods for certain persons who had close relatives who suffered in the past from disorders of the stomach and intestines to avoid disturbing the relationship between nutritional factors, the intestinal flora, and intestinal motility.34 To maintain this harmony Avicenna recommended that those patients should mixed foods—animal and plant. He also attached great importance to the rhythm of the food: “It is better to feed little by little, rather than once and too much”.

The problem of the gastrointestinal tract is one of the complex problems of the modern medicine. Relevance of the research is one of the most important problems of modern gastroenterology. Gastrointestinal disease is a multifactorial chronic relapsing disease with different course and dynamics.

2.3. Avicenna about certain issues of drug therapy

In the Canon of Medicine, the second and fifth volumes are devoted to issues of drug therapy.46–50 In the second book (Simple Medicines), 811 means of vegetative, animal, and mineral origin with instructions of their action, ways of application, gathering, and storage rules are described. The fifth book is the Pharmacopoeia, which outlines the methods of manufacturing and application of medicines of difficult structure (powders, broths, juice, infusions, ointment, syrups, jams, oil, etc.).

The second book of Canon consists of 811 articles, 520 of them devoted to herbs, 31 to the products received from them, and 215 to animal and mineral origin products and the medical products received from them. Approximately 40% of the herbs described in Canon can be found in tropics and are not grown in Uzbekistan.

According to the Uzbek researcher, Professor H.M. Komilov, of 520 plants described in Canon as medicinal, 178 can be found in Uzbekistan, including 100 in the wild and 68 cultivated for various purposes.35 Among 52 plants listed in Table 1, 25 (48%)

| Table 1 – List of herbs from the heritage of Avicenna used by scientific medicine at present |
| --- |
| 1. Acorus calamus L. | 27. Hyoscyamus niger L. |
| 2. Allium cera L. | 28. Hypericum perforatum L. |
| 3. Allium sativum L. | 29. Inula helemint L. |
| 4. Althaea officinalis L. | 30. Linum usitatissimum L. |
| 5. Amygdalus communis L. | 31. Mentha piperita L. |
| 6. Anethum graveolens L. | 32. Oryza sativa L. |
| 7. Armeniaca vulgaris Lam. | 33. Pastinaca sativa L. |
| 8. Artemisia absinthium L. | 34. Peganum harmala L. |
| 9. Artemisia vulgaris L. | 35. Persica vulgaris Mill. |
| 10. Berberis vulgaris L. | 36. Pimpinella anisum L. |
| 11. Brassica juncea L. | 37. Plantago major L. |
| 12. Brassica oleracea L. | 38. Poligonum aviculare L. |
| 13. Calendula officinalis L. | 39. Poligonum hydropiper L. |
| 14. Carum carvi L. | 40. Populus nigra L. |
| 15. Chamomilla recutita L. | 41. Prunus domestica L. |
| 16. Corechures officinalis L. | 42. Rhiza coriaria L. |
| 17. Coriandrum sativum L. | 43. Ricinus communis L. |
| 18. Cucurbita maxima Duch. | 44. Rosa canina L. |
| 19. Datura stramonium L. | 45. Rubia tincorum L. |
| 20. Daucus carota L. | 46. Silybum marianum Gaertn. |
| 21. Driopteris filix mas L. | 47. Taraxacum officinale Web. |
| 22. Equisetum arvense L. | 48. Tribulus terrestris L. |
| 23. Ficus carica L. | 49. Trigonella foenum graecum L. |
| 24. Foeniculum vulgare Mill. | 50. Triticum vulgare Vill. |
| 25. Glycyrrhiza glabra L. | 51. Urtica dioica L. |
| 26. Gossypium herbaceum L. | 52. Urtica dioica L. |
Table 2 – Medical herbs described by Avicenna and used in modern medical products

| No. | Herb Name                  |
|-----|----------------------------|
| 1.  | Apium graveolens L.        |
| 2.  | Asparagus officinalis L.    |
| 3.  | Cannabis sativa L.          |
| 4.  | Citriulus colocynthis L.    |
| 5.  | Cydronia oblonga Mill.      |
| 6.  | Ferula asafoetida L.        |
| 7.  | Juglans regia L.            |
| 8.  | Pyrus malus L.              |
| 9.  | Malva silvestris L.         |
| 10. | Mellotus officinalis L.     |
| 11. | Melissa officinalis L.      |
| 12. | Pappaver somniferum L.      |
| 13. | Petroselinum crispum (Mill).|
| 14. | Pistacia vera L.            |
| 15. | Punica granatum L.          |
| 16. | Rosa damascena Mill.        |
| 17. | Sesamum indicum L.          |
| 18. | Trachyspermum ammi L.       |

The herbs in Table 2 were described by Avicenna and used earlier in scientific medicine, but for various reasons were excluded from pharmacopoeias and registers; nowadays, thanks to the creation of medical products with new properties on them, they have again come back to medical practice.51

To satisfy the demand on medicinal herbs in Uzbekistan, purposeful research is being conducted in the following directions: research and studying of new medicinal herbs to replenish and update the catalogue of medical products by more effective and safe domestic preparations; protection and rational usage of medicinal herbs resources; and including in the culture of valuable herbs to provide needs of pharmaceutical industry.

There are some scientific centers of Uzbekistan engaged in research on studying and introduction herbs used by Avicenna in medical practice, namely: Institute of Chemistry of Vegetative Substances; Institute of Bioorganic Chemistry of Uzbekistan Academy of Sciences; National University of Uzbekistan named after Mirzo-Ulugbek; Uzbek Research Chemical-Pharmaceutical Institute; Tashkent State Pharmaceutical Institute.

Avicenna divided all medicines into two groups, ethers and complex. In the second volume of Canon, he described > 800 simple drugs of herb, mineral, and animal origin; in the fifth volume he provides information about the complex forms of drugs (powders, teas, juices, infusions, ointments, syrups, jams, oils, etc.) and their application for various diseases.

Of great significance is Avicenna’s thought of having a purely individual approach in the purpose and use of drugs in a particular case. Avicenna’s idea, innovative for the level of development of medical science of that period, retains its value today.32

Avicenna highlighted three basic principles of treatment with medication.34 The first principle (qualitative) involves selecting drugs whose properties are opposite to those of the disease, which stems from the ancient therapeutic principle that treatment received treats the opposite ailment. The second principle (quantitative) provides quantification of the degree of heat, cold, humidity, and dryness of the medication which is used according to the disease. The third is establishment of the dose of medication and climate.

Avicenna state that special attention should be given to determining the dose (third principle); the physician must use their own experience, tailored to the affected organ, the individual characteristics of the patient (age, sex, profession), and various external factors (season, climate, country, etc.). He wrote: “Quantitative measurement [medicine] in two ways [i.e. the choice of medication appropriate degree of quality and proper dose] taken as a whole, made by conjecture using the Healing Art, [based] on the natural body, the extent of disease and such moments that require compliance for yourself and congruity; [these moments] are: sex, age, habit, season, country, occupation, strength, and appearance.”34 This principle is particularly progressive, considering Avicenna during and after the assignment of the case on the basis of astrological forecast—searching the symptoms by astrological forecast (according to last era of medicine treatment 9–10 c.m.e.).

Medicines, trapped in the body, according to Avicenna held various transformations, and influenced each other. It is a value the way of drug administration and dosage form into which it is introduced into the body. Here, in fact, Avicenna introduces issues of pharmacokinetics.

Thus, 1000 years ago Avicenna put forward progressive thinking genius doctor principles that has not lost its relevance and needs to be studied.

3. Conclusion

Some observation stated in Canon and nowadays forgotten, can become an impulse for new openings in the field of diagnostics and therapy. Research into medical herbs recommended in Canon will allow enlargement of the arsenal of modern therapeutic means. Current studies indicate the relevance and necessity of deep analysis and study of the multifaceted heritage of Avicenna, which has not lost its value for medical theory and practice, and from the perspective of integrative medicine.

Taking into consideration the existing potential in Uzbek organizations engaging in folk medicine, there is a need to consolidate them to develop a common strategy and development of the Uzbek integrative medicine. International cooperation in this area, including with the Korean Institute of Oriental Medicine will help to create a science-based Uzbek integrative medicine and the general promotion of the study of the great scientist Avicenna’s heritage.52

Conflicts of interest

The author has no conflicts of interest.

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