Reflections on Avicenna’s impact on medicine: his reach beyond the middle east

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ABSTRACT

Avicenna, to the west, and Ibn Sina to the East, is more than a historical figure often overlooked beyond his contributions to the Golden Age of Islam. While a deeper image of this multi-faceted individual can be cultivated by exploring his extensive contributions to the fields of medicine, science, philosophy, and pharmacology, his impact on medicine is often forgotten. However, it is important to shed light on the role of the ‘Prince of Physicians’ in the major advancements achieved in medicine today, especially with regards to the Western hemisphere. This report focuses on Avicenna’s advancements in the medical field, and how there is more to the history of medicine than Hippocrates and the western authorities that dominate our accounts.

1. Avicenna’s biography

‘Medicine is a science by which we learn about the conditions of the human body. Its purpose is to preserve health when well and restore health when ill,’ a famous definition of medicine by the Persian polymath of the eleventh century, Avicenna (see Figure 1) [1,2]. Although he went by many titles, Avicenna’s full name was Abu Ali Al-Hussein Ibn Abdullah Ibn Sina, from which the Arab world derived the nickname, Ibn Sina. [3] A native of present-day Iran, Avicenna was born near the Samani kingdom’s capital, Bukhara, in the year 980 AD [3].

Avicenna’s parents recognized his brilliance from a young age and hired tutors of both Islamic knowledge and the Arabic language; as he grew older, Avicenna began to immerse himself further in classical studies and the sciences [3]. As a prominent eighteen-year-old physician of the Islamic Renaissance period, Avicenna most famously said that medicine, ‘is no hard and thorny science, like mathematics and metaphysics, so I soon made great progress; I became an excellent doctor, and began to treat patients, using approved remedies ....’[4].

Despite Avicenna’s academic prowess, his favor among the sultans of his time fluctuated; there were times where he enjoyed lavish living and reward, and other periods where he was briefly imprisoned for accepting positions of power from opposing sultans [3]. Ever the pragmatic, he used his jail time to author several works, which he pursued with greater fervor after his move to Isfahan [3].

Of the 450 works thought to have been produced by Avicenna throughout his lifetime, 240 are preserved and still accessible today. [3] Most notable is his 14-volume book, al-Qanun fi al-Tibb or The Canon of Medicine, which Sir William Osler referred to as ‘a medical bible for a longer time than any other work’ and continued on to say that it was ‘the most famous medical textbook ever written’ [5]. Since its completion in 1025 AD when Avicenna was only twenty-one years old, Avicenna’s Canon has been regarded as the first pharmacopeia. It was used for almost 700 years following its creation by various medical schools and scientific institutions in both the East and the West. [6] Also, due to his other famous contribution, Kitab Al-Shifa, or, Book of Healing, Avicenna is regarded in some circles as the ‘Father of Modern Medicine’ [6].

2. Teachings from Avicenna’s works

The Canon of Medicine and Book of Healing are both valued for bridging the scientific and philosophical concepts of the Islamic Renaissance and Greco-Roman periods [3]. More specifically, Avicenna’s writings in Canon of Medicine reflect not only his own medical observations and logic, but also echo that of his Western influencers- physicians like Galen and Paul of Aegina [7]. Avicenna wrote the five books of The Canon with the intention of dedicating large portions of text to the different fields related to his medical observations [1].

Avicenna’s work remains popular even today and is the focus of scientific publications ranging from perinatal medicine to cardiology [8,9]. In fact, several chapters of the Canon alone are dedicated to the functional neuroanatomy of the spinal cord- valuable information...
that continues to enlighten neurosurgeons today, especially regarding head trauma and skull fractures [7].

It is interesting that Avicenna dedicates a larger portion of the first book of The Canon to discussing the causes of health and disease and the philosophical context that relates the two topics. In the first book, Avicenna voices his beliefs regarding Hippocrates’s humoral theory; he speaks extensively on the four humors and their relation to the temperaments, anatomy, and physiology of the human body [10]. In The Canon, he provides his own definition of medicine or, Tibb, as being, ‘the science by which we learn the various states of the body; in health, when not in health; the means by which health is likely to be lost; and, when lost, is likely to be restored. In other words, it is the art whereby health is concerned and the art by which it is restored after being lost’ [11].

Of Avicenna’s other books in the Canon, book two or The Materia Medica, part five under ‘Drug Formulas,’ he lists 800 mineral, herbal, and animal substances used as medical treatments [12]. This pharmacopeia was heavily influenced by prior works of Dioscorides and Rhazes [13]. Avicenna’s tribute to Galen’s work is more overt in the chapter where he outlines seven rules of new drug experimentation and clinical trials [14]. To provide context, it was widely believed that the foundations of modern clinical drug trial and experimentation were set by eighteenth-century, Scottish physician, James Lind, and his experiments with scurvy and lime juice [1]. However, as historians continue to translate and uncover the forgotten texts of ancient civilizations, they found earlier records of such trials dating back to the early tenth century with Rhazes and his introduction of experimental control groups. Avicenna followed Rhazes’ work with his own preposition of seven conditions for ‘the recognition of the strengths of the characteristics of medicines through experimentation;’ his approach built on the logic of Greek science while emphasizing the importance of empirical evidence and experimental reproducibility [1]. Not only did Avicenna help influence the shift towards human-centric experimentation, but Avicenna’s work influenced later scientists like Claude Bernard who attempted to study drug efficacy on human subjects based off experiments on animals [15]. These statutes were instrumental in indicating Avicenna’s inclination towards what is now known as holistic medicine, as he emphasizes the importance of considering both physical and psychological factors when devising medical treatment plans for patients [15]. A similar sentiment of preventative care through balancing the six essential lifestyle factors (including diet, nutrition, and exercise), is emphasized in Avicenna’s teachings [15]. The timing of The Canon of Medicine’s release was influential at a time when the first Arab pharmacies and apothecaries were being established—well before these entities became popularized in the West [16].

Despite Avicenna’s advancements in the field, he is still less known for his work in cardiology, where he was responsible for many of the field’s firsts. As a learned ‘pioneer of pulsology,’ Avicenna correctly clarified Galen and Chinese physicians’ beliefs regarding pulse generation; Avicenna was also the first to accurately describe a symptom of vasovagal syncope known as carotid sinus hypersensitivity in his third book of The Canon [10]. Most notably, Avicenna was the first to associate a person’s pulse rate with his inner feelings; he describes the lovesickness phenomenon in one of his books, as the diagnosis of a young prince that yearned for a girl living in another town [10]. He famously described it as an obsessive disorder that shared many symptoms with depression and was characterized by imagination and all-consuming thoughts; it can most closely be related to Broken-heart syndrome [3]. In his book, Kitab al-Adviyt-al-Qalbiye or The Book on Drugs for Cardiac Diseases, Avicenna goes into detailed explanations about the uses and benefits of cardiac drugs such as stimulants, diuretics, calcium channel blocker-like agents, and many more [10].

![Figure 1. Avicenna's portrait on a Persian postage stamp. Reprinted by permission from [Springer Nature]: [Springer Nature] INFECTIOUS DISEASES OF POVERTY] (Rabies in medieval Persian literature – the Canon of Avicenna (980–1037 AD), Behnam Dalfardi et al, (2014).](image-url)
the fact that his concepts were erroneously based on the Galenic anatomy of the heart, Avicenna’s insights into these various drug classes can help broaden the list of therapeutic agents being studied today. For instance, scientists recently set to explore Avicenna’s notes in this book on using zarnab or Taxus baccata L. as a cardiac remedy [17]. They were surprised to discover this plant’s ability to block calcium channel activity, thereby ‘setting the heart at ease,’ per Avicenna’s observations [17].

Avicenna is also credited with some of the early stirrings of important public health and safety measures still in practice today, such as quarantine. In his observations throughout The Canon, he identifies Tuberculosis as a contagious disease whose victims should be subject to quarantine, or isolation, so as to avoid further spread of the illness [3]. He also highlights water and soil as possible agents of disease and emphasizes that they should be targeted and remedied in tandem [11].

3. Final remarks

Although Avicenna died at age 57 in 1037 C.E., his legacy lived on for hundreds of years through his books and acolytes. And while western physicians tend to regard the Greco-Romans as the ‘fathers’ of modern medicine, many important contributions to the profession came from eastern luminaries such as Avicenna. This is evident in how Avicenna’s teachings reached beyond the East and well into the West. Avicenna’s work was repeatedly adopted by physicians of later generations and adapted as knowledge of previously unclear concepts were elucidated. Al-Juzcani summarized it best when he said that, ‘medicine did not exist until Hippocrates invented it. When he died, Galen revived it. It was blind; Huneyin bin Ishak gave it eyes. Rhazes bestowed on it coherence. And Ibn Sina made it a whole and hale’ [7].

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