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## Andalusian Physicians and Public Health: A review on their Contributions

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### Abstract

*This review explores the significant contributions of Andalusian physicians to public health practices during the Islamic era in Al-Andalus. By examining historical, medical, and cultural contexts, the study illuminates the pioneering advancements made by physicians such as Ibn Sina, Ibn Zuhri, Ibn Rushd, Ibn al-Jazzar, Al-Razi, Ibn al-Wafid, and Ibn al-Khatib. These physicians emphasized the importance of sanitation, disease prevention, and health promotion, laying the groundwork for modern public health principles and practices. Their advocacy for clean water supply, proper waste disposal, and quarantine measures influenced policies and practices beyond geographical boundaries, shaping public health in regions across Europe, the Middle East, South Asia, and North Africa. Furthermore, their ethical principles guided healthcare professionals in providing compassionate and ethical care to patients. The enduring impact of Andalusian physicians underscores the timeless relevance of their contributions and provides valuable insights for contemporary public health efforts worldwide.*

**Keywords:** *Andalusian physicians, public health, sanitation, disease prevention, health promotion, medical ethics, historical context, Al-Andalus, Islamic era, healthcare contributions.*

### Introduction

Throughout recorded history, civilizations have experienced periods of both prosperity and decline, witnessing fluctuations in power and influence among empires. Noteworthy physicians have left enduring legacies etched into humanity's collective memory. Among these luminaries are the physicians from Andalusia during the Islamic era, whose profound contributions to public health underscore the enduring impact of knowledge and human achievement. Situated in the central region of the Iberian Peninsula, Al-Andalus emerged as a pivotal hub for intellectual, cultural, and scientific exchange, fostering an extraordinary era of enlightenment [1-3].

The study of Andalusian physicians' contributions to public health practices during the Islamic period holds significant historical and contemporary relevance. This examination offers insights into a period marked by forward-thinking intellectuals and innovative strategies in healthcare, urban development, and disease management. By exploring temporal dimensions and interconnecting historical analysis, medical knowledge, and the field of public health, this review aims to elucidate the groundbreaking progress made by Andalusian physicians in epidemiology, sanitation, governance, and herbal medicine. Through an analysis of their

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methods and the cultural backdrop in which they operated, this study seeks to illuminate the diverse strategies employed by these physicians to safeguard the health and welfare of their communities.

The examination of Andalusian physicians' contributions to public health unveils a wealth of historical knowledge often overshadowed by more mainstream narratives. The enduring impact of Al-Andalus, characterized by the dynamic interaction between Islamic, Christian, and Jewish traditions, underscores the significance of cross-cultural enrichment and the capacity for heterogeneous communities to thrive through diversity and knowledge exchange. Furthermore, insights gleaned from Andalusian public health practices hold relevance to contemporary healthcare challenges, offering perspectives for addressing present health emergencies and shaping public health policy. Despite the historical challenges they faced, Andalusian medical practitioners demonstrated unwavering dedication to their communities, serving as an inspiration for modern healthcare practitioners and researchers.

In seeking to understand the diverse realm of Andalusian physicians and their groundbreaking advancements in public health methodologies, this review endeavors to establish a connection between historical and contemporary contexts. By shedding light on this subject, our aim is to contribute to a healthier and more equitable future. In the subsequent sections, this paper will delve deeper into the historical, medical, and cultural intricacies of Andalusian physicians' pursuits, offering a comprehensive exploration of their groundbreaking advancements in public health methodologies.

## **Historical Synopsis of Andalusia in the Islamic Era**

### **Al-Andalus: A Beacon of Cultural and Scientific Exchange**

To comprehend the noteworthy advancements made by physicians from Andalusia in the realm of public health practices during the Islamic era, it is imperative to engage deeply with the rich fabric of Al-Andalus, an area widely celebrated for its cultural, intellectual, and scientific vitality.

### **Early Islamic rule in Al-Andalus**

The region known as Al-Andalus, which comprises a significant chunk of the Iberian Peninsula, was subjected to Islamic governance during the initial decades of the 8<sup>th</sup> century. Rapidly, it underwent a transformation into a thriving hub of human civilization. Cordoba was developed as a prominent center of knowledge, culture, and invention by the Umayyad Caliphs, effectively competing with other renowned towns in the Islamic world such as Baghdad and Damascus [4].

### **The cosmopolitan character of Al-Andalus**

Cosmopolitanism was a prominent characteristic that defined the nature of Al-Andalus. The region functioned as a cultural amalgamation, facilitating the coexistence and interaction of Islamic, Christian, Jewish, and indigenous Iberian societies. The presence of a cultural mosaic in the region contributed to the enhancement of its intellectual landscape, creating a favorable setting for the interchange of ideas, knowledge, and customs [5].

### **Centers of learning and translation**

Al-Andalus was renowned for its multitude of educational institutions, libraries, and establishments dedicated to the translation of knowledge. Academics from several disciplines assembled with the purpose of translating ancient Greek, Roman, Persian, and Indian literary works into the Arabic language. The "Translation School of Toledo" was a significant

translation movement that had a crucial impact on the preservation and dissemination of ancient knowledge. This movement was vital in ensuring the transmission of works by prominent figures such as Hippocrates, Galen, and Aristotle, which afterwards exerted a profound influence on physicians in the region of Andalusia [6].

### **Governance and societal structure**

The government and societal structure of Al-Andalus were distinguished by a distinctive amalgamation of Islamic governance, specifically the Caliphate, alongside the simultaneous coexistence of several religious and ethnic communities [7,8].

### **Islamic governance: the Caliphate of Cordoba**

The establishment of the Caliphate of Cordoba in the 10th century signified a significant era characterized by both political stability and a flourishing of cultural expression. During the period of caliphal governance, Al-Andalus saw an unparalleled era of economic growth, which created a favorable environment for the advancement of intellectual endeavors. The rulers of the Caliphate actively fostered intellectual pursuits by promoting research, thereby encouraging scholars and physicians to engage in a diverse array of subjects, including as medicine and public health [7,8].

### **Coexistence of religions and cultures.**

The Caliphate of Cordoba was characterized by a notable level of religious tolerance, facilitating the coexistence and intellectual and cultural contributions of Christians, Jews, and Muslims within the region of Al-Andalus. The presence of religious concord in this context created a conducive atmosphere for the sharing and dissemination of knowledge and ideas among many cultures [9].

### **The role of Islamic principles in the field of public health.**

The Islamic period in Al-Andalus witnessed the significant influence of Islamic ideals and ethics on the development and implementation of public health initiatives.

### **The Moral Obligation of Promoting Health**

Islamic teachings place a significant emphasis on the ethical need to prioritize and promote health and well-being. The Islamic ethical framework placed significant emphasis on the principles of "hifz al-nafs" (the preservation of life) and "hifz al-sihhah" (the maintenance of health). The aforementioned principles emphasize the ethical responsibility to safeguard and enhance the well-being of both individuals and communities [10].

### **The Islamic Tradition's Understanding of the Concept of "Tibb" (Medicine)**

Within the Islamic tradition, there exists a recognition of the significant role of medicine, referred to as "tibb," in the processes of healing and maintaining overall well-being. The Quran and Hadith, which encompass the teachings and practices of the Prophet Muhammad, incorporate mentions to the utilization of medical herbs and treatments to address diverse ailments. This underscores the incorporation of healthcare within the framework of Islamic culture [11,12].

### **The Significance of Physicians as Healers and Benefactors**

In the Islamic tradition, physicians were regarded as individuals who fulfilled the role of healers and contributors to the welfare of society. They were anticipated to deliver care, mitigate

distress, and advance well-being, all while adhering to ethical principles of compassion and integrity. The practice of medicine and public health in Al-Andalus was significantly shaped by the profound impact of this ethical paradigm [13].

The comprehensive examination of Al-Andalus' historical trajectory throughout the Islamic era furnishes a fundamental comprehension of the cultural, sociological, and ethical milieu within which Andalusian physicians conducted their practices. The intricate interaction between many cultures, the administration of the Caliphate, and the moral tenets of Islam established the foundation for the noteworthy advancements made by Andalusian physicians in the field of public health [13].

### **Pioneering Andalusian Physicians in Public Health**

This section explores the biographical profiles of notable Andalusian physicians and scholars who played pivotal roles in advancing public health practices during the Islamic period in Al-Andalus.

#### **Ibn Sina (Avicenna)**

Ibn Sina, a Persian polymath, was a major influence on Andalusian medicine and scholarship. His magnum opus, "The Canon of Medicine" (al-Qanun fi al-Tibb), was a comprehensive medical encyclopedia that was widely studied in Al-Andalus. In this work, Ibn Sina emphasized the importance of preventive medicine and public health [14]. He highlighted the role of environmental factors, climate, and diet in maintaining health. His work laid the groundwork for understanding the spread of diseases and the importance of epidemiology in public health. Avicenna's 'The Canon of Medicine' was used as the standard medical textbook in the Islamic world and Europe up to the 18th century [14,15]. The Canon still plays an important role in Unani medicine [16].

#### **Ibn Zuhr (Avenzoar)**

Ibn Zuhr presented a precise delineation of esophageal, stomach, and mediastinal malignancies, along with additional pathological abnormalities. He suggested the administration of enemas as a means of sustaining individuals diagnosed with gastric cancer. Additionally, he was the pioneering physician to provide pathological descriptions of inflammatory conditions such as otitis media and pericarditis [17,18]. Ibn Zuhr is recognized for his contribution to the field of microbiology by presenting one of the earliest documented instances of the Scabies mite. The user did not provide any text to rewrite. In his work titled Kitab al-Taysir [19], the author penned the subsequent statement:

*There are lice under the hand, ankle and foot like worms, and sores affecting the same areas. If the skin is removed, there appears from various parts of it, a very small animal which can hardly be seen.*[20]

#### **Ibn Rushd (Averroes)**

Ibn Rushd, hailed from Cordoba, was a versatile scholar renowned for his multifaceted contributions across diverse disciplines, encompassing the realm of medicine among others. Ibn Rushd's medical writings encompassed a comprehensive exploration of the significance of public health policies and governance. He emphasized the significance of governmental entities in executing strategies aimed at safeguarding public hygiene [21]. His proposals encompassed the implementation of regulations pertaining to the manufacture and distribution of food to mitigate the risk of contamination, as well as the promotion of public health education. The contributions of Ibn Rushd's work in Al-Andalus were significant in advancing a more

methodical and organized approach to the field of public health. Averroes, renowned for his role as the royal physician in the Almohad court, authored several medical treatises. One of the most renowned works authored by Ibn Rushd is *al-Kulliyat fi al-Tibb*, which translates to "The General Principles of Medicine" and was later Latinized as the *Colliget* in Western academia. This significant piece of literature was composed approximately in 1162, prior to his assumption of a position at the palace [21]. Among his other extant works are *On Treacle*, *The Variations in Temperament*, and *Medicinal Herbs* [22]. Additionally, the author produced synopses of the literary contributions of Galen, a Greek physician who passed away around 210 CE, as well as a scholarly analysis of Avicenna's *Urjuzah fi al-Tibb*, commonly referred to as the "Poem on Medicine." Averroes's medical treatise, *Al-Kulliyat fi al-Tibb*, mostly adheres to the medical principles espoused by Galen, a prominent Greek physician and writer of the second century. The author's depiction of stroke as a cerebral event resulting from arterial blockage between the heart and the brain has been documented [23]. The current explanation provided is more aligned with the contemporary comprehension of the condition in contrast to Galen's perspective, which ascribes it to the blockage between the heart and the periphery. He was additionally credited as the initial observer to delineate the clinical manifestations and indications associated with Parkinson's disease inside his *Kulliyat*. However, it is worth noting that he did not assign a specific nomenclature to this ailment [23].

### **Ibn al-Jazzaar (Algizar)**

Ibn al-Jazzaar, a notable physician and scholar hailing from Qayrawan, Tunisia, gained prominence for his contributions to the field of medicine while practicing in Al-Andalus. Ibn al-Jazzaar placed significant emphasis on the significance of personal hygiene, the provision of clean water, and the implementation of sanitation measures as effective means of illness prevention. Additionally, he expounded upon the tenets of quarantine protocols in the context of epidemics, so demonstrating his comprehension of strategies for disease containment. The book titled '*Zad Al Mussafir*' (The Viaticum), authored by Ibn Al Jazzar, serves as a comprehensive medical manual encompassing all aspects of healthcare [24]. It is specifically intended for the purpose of practical instruction. The document includes the identification of the condition, enumeration of the recognized symptoms, provision of the treatment options, and occasionally offers insights into the prognosis. In addition, he possessed a collection of literature pertaining to geriatric medicine and the well-being of the aged, specifically referred to as "*Kitāb Tibb al-Mashāyikh*" [24] or "*Tibb al-Mashāyikh wa-hifẓ shihhātihim*" [4]. In addition, there is a literary work discussing sleep disorders, as well as another publication focusing on forgetting and techniques for enhancing memory, titled "*Kitāb al-Nisyān wa-Ṭuruq Taqwiyat al-Dhākira*" [25,26]. Furthermore, there exists a treatise that delves into the various factors contributing to mortality, known as "*Risāla fi Asbāb al-Wafāh*" [24].

### **Al-Razi (Rhazes)**

Al-Razi, hailing from Ray in Persia (present-day Iran), was a polymath who made significant contributions to diverse disciplines, encompassing medicine and public health. The author's literary contribution, "*Kitab al-Hawi*" (The Comprehensive Book), pertained to matters concerning public health [27]. Al-Razi placed significant emphasis on the significance of sustaining health through cleanliness, access to good drinking water, and appropriate waste disposal. Additionally, he espoused the importance of health education and the implementation of preventive measures such as vaccination and isolation protocols to combat infectious diseases. His endeavors in the field of public health established the fundamental basis upon which subsequent advancements in the realm of illness prevention were built. He is widely

recognized as the progenitor of the field of psychology and psychotherapy [27]. Al-Razi made significant contributions to the early field of pharmacy through his compilation of literature. In these texts, he introduced the utilization of “mercurial ointments” and developed various apparatus such as mortars, flasks, spatulas, and phials. These apparatuses were widely employed in pharmacies until the early twentieth century. Al-Razi made significant contributions to the fields of medicine and psychology by introducing numerous practical and progressive concepts. Practitioners are encouraged to maintain their expertise by engaging in ongoing study of medical literature and actively seeking exposure to emerging material. He established a differentiation between disorders that can be treated and those that cannot be treated. Regarding the latter, he expressed the viewpoint that in instances involving advanced stages of cancer and leprosy, it would be unjust to hold the physician accountable for their inability to effect a cure. The *Diseases of Children*, authored by Al-Razi, holds the distinction of being the inaugural book dedicated to the study of pediatrics as a distinct and autonomous discipline within the realm of medicine [28,29].

### **Ibn al-Wafid (Abenguefit)**

Ibn al-Wafid, who was born in Toledo, was a prominent medical practitioner and pharmacist in the region of Andalusia. He has published several medical texts, encompassing topics such as pharmacology and therapeutics [30]. His expertise in the field of medicinal plants and substances made a valuable contribution to the advancement of herbal medicine, hence playing a substantial role in the implementation of public health strategies. The profound knowledge of Ibn al-Wafid in the field of pharmaceuticals exerted a significant impact on the management of diverse health ailments, encompassing those of utmost relevance to public health matters. The primary contribution of the Ibn al-Wafid is the publication of *Kitāb al-adwiya al-mufrada* [30]. He employed the methodologies and practices inherent to the field of alchemy to derive no fewer than 520 distinct medicinal compounds from a diverse array of botanical sources. The renowned botanical dictionary, *‘Umdat al-Ṭabīb fī Ma‘rifat al-Nabāt li kulli Labīb*, was authored by Ali Ibn al-Lukuh, a notable student [31].

### **Ibn al-Khatib**

Ibn al-Khatib, born in Loja, Andalusia, was a physician, historian, and scholar who served as the chief physician to several Andalusian rulers. His works included discussions on public health and the prevention of diseases. Ibn al-Khatib advocated for strict quarantine measures during outbreaks of infectious diseases, such as the Black Death. He also emphasized the importance of personal hygiene, clean living conditions, and public health governance to protect the population from epidemics. In his book titled *"Muqni'at al-Sā'il 'an al-Maraḍ al-Hā'il"*, Ibn al-Khatib delves into the concept of illness transmission through contagion, predating Louis Pasteur's European studies by many centuries. In his scholarly work titled *"On the Plague"*, Ibn al-Khatib presents his insights [32]:

*The existence of contagion is established by experience [and] by trustworthy reports on transmission by garments, vessels, ear-rings; by the spread of it by persons from one house, by infection of a healthy sea-port by an arrival from an infected land [and] by the immunity of isolated individuals.*

### **Implications of Andalusian physicians on advancements in sanitation, disease prevention, and health promotion**

The contributions of Andalusian physicians to sanitation, disease prevention, and health promotion in Al-Andalus were transformative, leaving a lasting impact on public health practices during the Islamic period. Their pioneering work influenced policies and practices



that enhanced the well-being of the population in several key ways:

### **Advancement in sanitation**

Ibn al-Jazzar emphasized the importance of clean and safe drinking water. His advocacy for proper water storage and purification methods, as well as efforts to maintain water sources free from contamination, significantly improved water quality in Al-Andalus [24-26]. Physicians like Ibn al-Khatib recognized the dangers of improper waste disposal. They stressed the need for organized waste management systems to prevent the spread of diseases linked to poor sanitation practices [32]. Understanding of the importance of isolation during epidemics contributed to early quarantine measures in Al-Andalus. Isolating infected individuals helped contain the spread of contagious diseases [26,32].

### **Disease prevention**

Andalusian physicians played a crucial role in disease prevention through various means. Ibn Sina's emphasis on epidemiology and the understanding of disease transmission was foundational in shaping early efforts to control epidemics. His work highlighted the importance of environmental factors, human contact, and contaminated water sources in disease transmission [14-16]. Ibn Rushd's advocacy for regulating food quality and safety contributed to disease prevention. Monitoring food production and distribution helped reduce the risk of foodborne illnesses, which were prevalent in the region. Ibn Rushd's promotion of health education encouraged individuals to make informed decisions about their well-being [21-23]. Education about personal hygiene, nutrition, and disease prevention empowered the population to take an active role in safeguarding their health.

### **Health promotion**

Andalusian physicians went beyond disease prevention by promoting overall health and well-being. Ibn Sina emphasized the importance of a balanced diet and recognized the role of nutrition in maintaining health. His dietary recommendations aimed to promote overall well-being, which contributed to a healthier population. Ibn al-Quff's [33] contributions to medical ethics stressed the importance of ethical conduct among healthcare practitioners. Ethical standards in healthcare promoted trust between physicians and patients, enhancing the quality of care and the well-being of individuals. Ibn Rushd's advocacy for public health policies and governance highlighted the role of authorities in safeguarding the health of the population. His ideas contributed to the development of policies aimed at promoting health and preventing diseases on a societal level [34].

### **Impact on public health policies and practices**

The impact of Andalusian physicians on public health policies and practices extended far beyond the borders of Al-Andalus and influenced not only Europe but also other regions. Their contributions laid the foundation for the development of public health policies and practices that transcended geographical boundaries [35]. The impact can be assessed in the following sections.

Firstly, it enabled the advancement in medical knowledge, enabled integration of medical traditions, and influenced renaissance in Europe. Andalusian physicians, influenced by classical Greek, Roman, Persian, and Indian medical texts, played a pivotal role in preserving and translating this knowledge into Arabic [35]. These translations served as a bridge for the transmission of ancient medical wisdom to the Western world during the Middle Ages. the Andalusian scholars amalgamated various medical traditions, including Greco-Roman, Islamic,

and indigenous Iberian, resulting in a comprehensive body of medical knowledge. This synthesis of diverse influences contributed to the rich tapestry of medical understanding that laid the groundwork for modern medicine in Europe [13]. During the European Renaissance, the works of Andalusian physicians were reintroduced to Europe through Latin translations. This reintroduction sparked a revival of interest in medical scholarship, leading to a surge in scientific and medical inquiry that laid the foundation for the modern medical discipline [36].

Secondly, it promoted the good public health practices by emphasizing on sanitation, hygiene, and clean water supply, which later influenced European public health practices. The recognition of the link between unsanitary conditions and disease transmission was a significant step in improving public health. The concept of quarantine during epidemics, championed by some Andalusian physicians like Ibn al-Jazzar, became an essential public health measure in Europe during outbreaks of diseases such as the Black Death [37]. This practice helped mitigate the spread of contagious diseases. Ibn Rushd's advocacy for regulating food quality and safety influenced European efforts to ensure the safety of food products. This concern for food safety contributed to the development of modern food regulation and safety standards.

The impact of Andalusian physicians on modern public health practices is profound, as their contributions laid the groundwork for many of the principles and strategies that continue to guide public health efforts today [38-40]. Values are integrated into the public health policies. For instance, the following policy statement of a hospital (bimaristan) during 12<sup>th</sup> century reflects modern policy objectives like equal access to healthcare, lack of discrimination, service-orientation, and sustainability.

*"The hospital shall keep all patients, men, and women, until they are completely recovered. All costs are to be borne by the hospital whether the people come from afar or near, whether they are residents or foreigners, strong or weak, low, or high, rich, or poor, employed, or unemployed, blind, or signed, physically or mentally ill, learned or illiterate. There are no conditions of consideration and payment; none is objected to or even indirectly hinted at for non-payment. The entire service is through the magnificence of God, the generous one."*[40].

Furthermore, emphasis on sanitation, hygiene, and disease prevention was instrumental in shaping modern public health policies and practices. Concepts such as clean water supply, waste management, and quarantine measures, advocated by Andalusian physicians, are foundational components of contemporary public health systems worldwide. These principles are especially relevant in the prevention and control of infectious diseases, ensuring safe food and water supplies, and maintaining clean living environments.

Moreover, the Andalusian physicians' commitment to ethical medical practice and the patient-physician relationship has enduring significance in modern public health. Ethical standards in healthcare, emphasizing patient autonomy, informed consent, and compassionate care, remain at the core of contemporary medical ethics. The ethical principles promoted by Andalusian scholars continue to guide healthcare professionals in their interactions with patients and communities, emphasizing the importance of trust and transparency in public health endeavors. In essence, the contributions of Andalusian physicians continue to resonate in the design and implementation of public health policies and practices that prioritize the well-being of individuals and communities in the modern era.

## Conclusion

The impact of Andalusian physicians on public health is remarkable, extending across several regions and enduring for extensive periods of time. The enduring impact of their work, which



originated in the rich cultural milieu of Al-Andalus during the Islamic era, may be observed in the widespread adoption of contemporary public health practices and policies across the globe. The contributions of Ibn Sina in the field of epidemiology and Ibn Zuhr's advocacy for sanitation and cleanliness have had a lasting impact on the development of public health. These influential figures have paved the way for advancements in this field that are still relevant and influential today. The principles pertaining to the provision of clean water, effective waste management, and the implementation of quarantine procedures have emerged as fundamental pillars in contemporary endeavors aimed at preventing and controlling diseases. Scholars such as Ibn Rushd and Ibn al-Quff have played a significant role in promoting the importance of food safety and ethical medical practice. Their contributions continue to serve as a guiding light for healthcare workers as they confront intricate ethical challenges within contemporary healthcare environments.

Furthermore, the influence of physicians from Andalusia extends beyond geographical limits. The writings and ideas of these physicians permeated various regions including Europe, the Middle East, South Asia, and North Africa, exerting a significant influence on public health practices and medical ethics within diverse cultural settings. In contemporary public health policy, the enduring impact of their contributions is evident, as there is a deliberate focus on promoting the welfare of both individuals and communities. This is achieved via the prioritization of key elements such as sanitation, cleanliness, ethical principles, and a patient-centric approach to healthcare delivery.

## References

- Renima, A., Tiliouine, H., Estes, R.J. (2016). The Islamic Golden Age: A Story of the Triumph of the Islamic Civilization. In: Tiliouine, H., Estes, R. (eds) *The State of Social Progress of Islamic Societies. International Handbooks of Quality-of-Life*. Springer, Cham. [https://doi.org/10.1007/978-3-319-24774-8\\_2](https://doi.org/10.1007/978-3-319-24774-8_2)
- Zaldi, Z., Irham, M.I. and Wanto, S. (2023) 'Intellectual triumph in the Islamic Scientific Exploration of Andalusia', *Jurnal Ilmu Sosial dan Ilmu Politik Malikussaleh (JSPM)*, 4(2), p. 345. doi:10.29103/jspm.v4i2.10132.
- Chavoushi, S.H. et al. (2012) 'Surgery for gynecomastia in the Islamic Golden Age: al-tasrif of Al-Zahrawi (936–1013 AD)', *ISRN Surgery*, 2012, pp. 1–5. doi:10.5402/2012/934965.
- Dodds, J. D. (1992). *Al-Andalus: The art of islamic Spain ; in conjunction with the exhibition Al-Andalus: The art of islamic Spain, held at the Alhambra, Granada (March 18 - June 7, 1992), and the Metropolitan Museum of Art, N. New York, NY: Abrams.*
- Safran, J. M. (2015). *Defining Boundaries in Al-Andalus*. Cornell University Press. doi:10.7591/9780801468018
- Hernando, I. G., & Uscatescu, A. (2018). *En busca del saber: Arte y ciencia en el mediterráneo medieval*. Madrid: Ediciones Complutense.
- Fuess, A. & Hartung, J.P. (2014). *Court Cultures in the Muslim World: Seventh to Nineteenth Centuries*. Routledge.
- David StephThe Governance of Gwynedd. (Studies in Welsh History, number 5.) *The American Historical Review*, 91(4):902-903. doi:10.1086/ahr/91.4.902-a
- Marín, M. (1992). *Muslim religious practices in Al-Andalus (2nd/8th-4th/10th centuries)*. The

- Wan Halim, W. M., & Desa, R. (2022). Analysis of hifz al-nafs' (protection of life) achievements on the Shariah criminal offenses enactment in Malaysia based on the fuzzy delphi method. *International Journal of Academic Research in Business and Social Sciences*, 12(5). doi:10.6007/ijarbss/v12-i5/13239
- Rashid, B. & John, G. (2017). The Role of Tibb in Integrative Medicine for Diseases of Lifestyle. *Bangladesh Journal of Medical Science*, 16(1):13-20.
- Deuraseh, N. (2006). Health And Medicine In The Islamic Tradition Based On The Book Of Medicine (Kitab Al-Tibb) Of Sahih Al-Bukhari. *JOURNAL OF THE INTERNATIONAL SOCIETY FOR THE HISTORY OF ISLAMIC MEDICINE*, 5:5-18.
- Al-Majali, S.A.M. (2017). Arab Muslims' Medicine and Pharmacy in Andalusia: 138-172 A.H./ 755-788 A.D. *Research on Humanities and Social Sciences*, 7(20):21-29.
- McGinnis, J. (2010). *Avicenna*. Oxford: Oxford University Press. p. 227. ISBN 978-0-19-533147-9.
- Jonathan, A.C.B. (2014). *Misquoting Muhammad: The Challenge and Choices of Interpreting the Prophet's Legacy*. Oneworld Publications. p. 12. ISBN 978-1-78074-420-9.
- Rahman, H.S.Z. (2003). *Avicenna*. Scientific and Practical International Journal of Ibn Sino International Foundation, Tashkent/Uzbekistan. 1(2):40-42.
- van den Tweel, J. G., & Taylor, C. R. (2010). A brief history of pathology. *Virchows Archiv*, 457(1), 3–10. doi:10.1007/s00428-010-0934-4
- Weiss, L. (2000). Cancer and Metastasis Reviews, 19(3/4), 205–217. doi:10.1023/a:1010698321682
- Harbi, K. Foundations of modern microbiology. [online] Available at: <https://www.diwanalarab.com/%D9%81%D9%89-%D8%A7%D9%84%D8%AD%D8%B6%D8%A7%D8%B1%D8%A9> [Accessed: 02 Sep 2023]
- Grove, D. (2014). *Tapeworms, Lice, and Prions: A Compendium of Unpleasant Infections*. OUP Oxford. p. 72.
- Fakhry, M. (2001), *Averroes (Ibn Rushd) His Life, Works and Influence*, Oneworld Publications, ISBN 978-1851682690
- Arnaldez, R. (2000). *Averroes: A Rationalist in Islam*. Translated by David Streight. University of Notre Dame Press. ISBN 0268020086.
- Belen, D. & Bolay, H. (2009). "Averroës in The school of Athens: a Renaissance man and his contribution to Western thought and neuroscience". *Neurosurgery*. Oxford University Press. 64 (2): 374–381. doi:10.1227/01.NEU.0000338262.42326.A1
- Islam.org. Ahmad Ibn Ibrahim Al Jazzar: a emnent doctor. [online] Available at: [http://www.islam.org.br/al\\_jazzar.htm](http://www.islam.org.br/al_jazzar.htm) [Accessed: 01 Sep 2023]
- Medarus. ALGIZAR (Abu Jaafar Ahmed ibn Ibrahim Ibn Abi Khalid al-Jazzar al-Kairaouani) [online] Available at:

[https://www.medarus.org/Medecins/MedecinsTextes/al\\_jazzar.htm](https://www.medarus.org/Medecins/MedecinsTextes/al_jazzar.htm) [Accessed: 03 Sep 2023]

- Gerrit, B. (1995). *Ibn al-Jazzar, Risala fi l-isyan* (Treatise on forgetfulness), London.
- Phipps, C. (2015). *No Wonder You Wonder!: Great Inventions and Scientific Mysteries*. Springer. p. 111. ISBN 9783319216805.
- Tschanz David W., PhD (2003). "Arab(?) Roots of European Medicine". *Heart Views*. 4 (2).
- Elgood, C. (2010). *A Medical History of Persia and The Eastern Caliphate* (1st ed.). London: Cambridge. pp. 202–203. ISBN 978-1-108-01588-2.
- Emilia C. (1997). "Ibn Wafid", in: *The Encyclopaedia of the History of Science, Technology, and Medicine in Non Western Cultures*, ed. Kluwer Academic Publishers, Dordrecht, 1997, p. 438
- Kaya, M. (1999). İBN VÂFİD - An article published in *Turkish Encyclopedia of Islam* (in Turkish). Vol. 20 (Ibn Haldun - Ibnu'l Cezeri). TDV *Encyclopedia of Islam*. p. 436. ISBN 9789753894470.
- Byrne, J.P. (2012). *Encyclopedia of the Black Death*. ABC-CLIO. p. 182. ISBN 978-1598842531.
- Awad, A. T. (1975). Ibn al-Quff [Review of *The Physician, Therapist and Surgeon, Ibn al-Quff. An Introductory Survey of his Time, Life and Works*, by S. K. Hamarneh]. *Pharmacy in History*, 17(2), 77–78. <http://www.jstor.org/stable/41108909>
- Pormann, Peter E. (2007). *Medieval Islamic medicine*. Savage-Smith, Emilie. Washington, D.C.: Georgetown University Press. pp. 82, 119. ISBN 978-1-58901-160-1. OCLC 71581787
- Shahidipak, M. (2022). *Mediterranean Period of Islamic Medicine in Medieval*. *Journal of Biomedical Research & Environmental Sciences*, ; 3(3): 307-310. doi: 10.37871/jbres1438
- Al-Hassan, A.Y. (2006). *Transfer of Islamic Science to the West*. FSTC Limited, UK, p2-30.
- Glatter, K. A., & Finkelman, P. (2021). *History of the Plague: An Ancient Pandemic for the Age of COVID-19*. *The American journal of medicine*, 134(2), 176–181. <https://doi.org/10.1016/j.amjmed.2020.08.019>
- Mitha K. (2020). *Conceptualising and addressing mental disorders amongst Muslim communities: Approaches from the Islamic Golden Age*. *Transcultural psychiatry*, 57(6), 763–774. <https://doi.org/10.1177/1363461520962603>
- HAMARNEH, S. (1962). *Development of Hospitals in Islam*. *Journal of the History of Medicine and Allied Sciences*, 17(3), 366–384. <http://www.jstor.org/stable/24620114>
- Tschanz, D. (2017). *The Islamic Roots of the Modern Hospital* [online] Available at: <https://www.aramcoworld.com/Articles/March-2017/The-Islamic-Roots-of-the-Modern-Hospital> [Accessed: 05 Sep 2023]