Review Article

The contribution of scholars to the anatomy of the eye and adnexa in islamic geography

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Abstract:

From the early period of Islam, Muslim scholars have translated the ancient Greek medical works, and they reached a much more advanced level. Blindness was a major cause of disability in all Islamic geography, so physicians from Islamic territory, particularly Yuhanna ibn Masawayh, Hunain Ibn Ishaq, Rhazes, Ali bin Isa, Ibn-i Sina, and Ibn Al-Haitam, were particularly focused on the anatomy of the eye and diagnosis and treatment of eye diseases. In this study, we aimed to report the contributions of the Muslim scholar on the anatomy of the eye and adnexa for the first time in the literature.

Keywords:

Eye anatomy, eye diseases, Islamic territory

Introduction

The science of anatomy has attracted the attention of people throughout history, occupied an important place in medical education throughout the history of medicine. It passed through different stages and has reached the present level. The first written records on anatomy are the studies of Alcmaeon of Croton in 500 BC which report the information obtained by dissection in animals.[1] Hippocrates also had speculative claims based on empirical observations on the human body. Aristoteles and Galenos made inferences about human anatomy in the light of their dissection studies on animals.[1] Erosistratos and Herophilus are known to make dissections on humans.[1] Muslim scholars benefited from all these studies and made important contributions to the science of anatomy by making human dissection, although it was probably forbidden.

Medieval Islamic medicine had a special interest in the eye. Blindness was a major cause of disability throughout the Islamic geography, so Islamic physicians were particularly focused on the diagnosis and treatment of eye diseases.[2] Another reason why Muslim philosophers emphasized the eye is that the eye has a separate importance in Sufism. In Sufi thought, the eye is the mirror of the soul. Early Muslim scholars fell under the influence of Greek medicine, especially Galenos, and made significant contributions.[3] Nestorian Christian Arabs like Yuhanna ibn Masawayh and Hunain Ibn Ishaq were influential in the transition between these two cultures.[4] Yuhanna ibn Masawayh, Hunain Ibn Ishaq, Rhazes, Ali bin Isa, Ibn-i Sina, and Ibn Al-Haitam were the main researchers who worked on eye diseases in the early Islamic geography. Yuhanna ibn Masawayh's Daghal al-ain is considered the first book of ophthalmology in Islamic geography.

The most famous work of Hunain Ibn Ishaq (809–873), a student of Yuhanna ibn Masawayh, known as Johannitus in the western world, is the "Ten treaties on the eye" which covers a variety of ophthalmology topics, including the structure and physiology of the eye, etiology, diagnosis, and surgical and nonsurgical treatments of the eye diseases.[5] The earliest known drawings of the eye and ocular surface [Figure 1] are included in this book by Hunayn.[2,4] In this drawing, the frontal image of the ocular surface and the lateral representation of the sagittal image of the eyeball

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Figure 1: The earliest known drawings of the eye and ocular surface

are given together. Although Hunayn was influenced by the Galenic concept, he presented some differences. Galenos and Rufos placed the lens anteriorly, but Hunayn incorrectly placed it in the central position.[4,6] The conjunctiva, cornea, pupil, sclera, choroid, retina, aqueous humor, lens, and optic nerve are included in this drawing. He illustrated the cornea as more convex than sclera as in the Galenic representation. Like Galenos, Huneyn also believed that sclera and cornea were the continuations of meninges. According to Huneyn, the retina was only responsible for delivering visual spirit and nutrients to the lens. Again according to Huneyn, the uvea (choroid) starts from the corneal-scleral junction, forms the iris and ciliary body, and continues to the optic nerve.[4]

Rhazes is another Islamic scientist who made important contributions to the ophthalmology and anatomy. Rhazes (865–925), one of the greatest clinicians of the Islamic world and the Middle Ages, is considered the ancestor of iatrochemists for his application of chemistry to medicine.[7] Rhazes defined the small muscles in the iris and their response to the intensity of the light, thus identifying the pupillary reaction for the first time.[8] Rhazes is also the first physician to recommend extraction for cataract operation.[8]

Ibn-Sina (980–1037), known as Avicenna in the western world, has included the anatomy and diseases of the eyes and adnexa in his famous book "The Canon of Medicine," which was read as a reference book in the Islamic world and in Europe until the end of the 17th century, Ibn-Sina (980–1037), known as Avicenna in the western World.[9] Ibn-Sina described six eye muscles with their functions in this book.[3] He stated the relation of the tendons of muscles that are involved in elevation, depression, adduction, and abduction of the globe with the optic nerve.[10] Ibn Sina described that the lacrimal canal is connected with the nasal and oral cavity.[10] In the light of this knowledge, he applied a probing procedure to the lacrimal system in related eye diseases.[11] Ibn-Sina objected to the claim of Galenos which stated that the optic chiasm is a total crossover and corrected it as a partial crossover.[10]

Ibn Rushd (1126–1198), an Andalusian Arab known as Averroes in the western world, made a revolutionary contribution to the anatomy of the eye by claiming for the first time that photoreceptors were in the retina, not in the lens.[12]

Muslim scholars made corrections and additions to anatomy knowledge based on the work of former Greece scholars such as Galenos, Aristotle, and Hippocrates. Hence, they brought the science of anatomy to a much higher level. Of course, studies on the eye did not only focus on anatomy but also on the physics of optics and vision, for example, Ibn Al-Haitham, who produced particularly important works on these subjects, is known as the father of optics, and he also has studies on the diagnosis and treatment of eye diseases. In the following centuries, the flow of information to Western Europe did not come directly from these ancient Greek sources but rather from the translations of Arabic sources. Thus, Islamic medicine has influenced European medicine for centuries, and the works of Muslim scholars, especially Rhazes called Arab Galen and Ibn-i Sina, were taught in European schools until the end of the 17th century.[2] This effect is also seen in anatomical terms. For example, the term "cornea" originates from Arabic World "qarniyah."[2] Another example is from the 12th century. Gerard of Cremona, an Italian Scholar working at the count of Toledo in Spain, introduced the word "retina" literally "small net" to render in Latin the Arabian term "rescheth (net-like) 'used by İbni Sina to denote the tissue which, inside the eye, invests the vitreous body just "as a net invest the catch."[13]

Conclusion

To the best of our knowledge, this is the first study that compiles the studies and contributions of Muslim scholars on the anatomy of the eyes and adnexes.

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Conflicts of interest

There are no conflicts of interest.

References

1. Malomo AO, Idowu OE, Osuagwu FC. Lessons from history: Human anatomy, from the origin to the renaissance. Int J Morphol 2006:24;99-104.
2. Lin D. A foundation of western ophthalmology in medieval Islamic medicine. UWOMJ 2008;78:41-5.
3. Keskinbora HK, Keskinbora K. A systematic review of Ibn Sina's (Avicenna) studies: Reflections on anatomy. Eur J Anat 2016;20:99-105.
4. Murube J. Hunain's eye: The oldest preserved scientific image of the ocular surface. Ocul Surf 2007;5:207-12.
5. Dalfardi B, Daneshfard B, Nezhad GSM. Johannitius (809–873 AD), a medieval physician, translator and author. J Med Biogr 2016;24:328-30.
6. Leffler CT, Hadi TM, Udupa A, Schwart S, Schwartz D. A medieval fallacy: The crystalline lens in the center of the eye. Clin Ophthalmol 2016:10;649-62.
7. Sarton G. Introduction to History of Science. Vol. 1. Baltimore: The Williams and Wilkins Company; 1927. p. 609-10.
8. Ligon L. Rhazes: His career and his writings. Semin Pediatr Infect Dis 2001;12:266-72.

9. Mazengenya P, Bhikha R. A critique on Avicenna's (980-1037) studies on anatomy of the upper respiratory system and some otohinolaryngologic concepts. Bangladesh J Med Sci 2017;16:188-93.
10. Mazengenya P, Bhikha R. Anatomical concept of the musculoskeletal and peripheral nervous system as viewed by Avicenna in the Canon of Medicine. Acta Med Hist Adriat 2018;16;267-82.
11. Beg H. Surgical principles of Ibn-Sina (Avicenna). Bangladesh J Med Sci 2015;14:217-20.
12. Tbakhi A, Amr SS. Ibn Rushd (Averroës): Prince of science. Ann Saudi Med 2008;28:145-7.
13. Cloe TF. Biophysics of Photoreception: Molecular and Phototransductive Events.Napoli, Italy: World Scientific; 1998. p. 382.