

Original Investigation

History of Neurosurgery

# Dāwūd al-Anṭākī's Account on Macrocephaly and Microcephaly in *al-Nuzhat al-Mubhija*

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## ABSTRACT

**AIM:** To present information regarding macrocephaly and microcephaly provided in Dāwūd al-Anṭākī's Arabic book, *al-Nuzhat al-Mubhija*, which was translated into English and discussed in the context of the period's literature.

**MATERIAL and METHODS:** The copy of *al-Nuzhat al-Mubhija*, which was published in Egypt in 1324 AH/[1906/7 AD] (2<sup>nd</sup> edition) and another copy published in Beirut, Lebanon, in 1420 AH/1999 AD, were analyzed. The section on "the change in the shape of the head" from the copy printed in Egypt was used as the reference and the copy printed in Lebanon was compared to it.

**RESULTS:** Al-Anṭākī presents that the change in head shape can be categorized into macrocephaly and microcephaly. Al-Anṭākī states that the head enlarges due to the separation of the cranial sutures, which occurs because of penetration of a humor between the sutures, accumulation of thick wind under the sutures, or trapping of fluids between the membranes. Al-Anṭākī recommends the use of solvents for the wind and fluids collected in the head, and surgical treatment (incision and evacuation) for cases in which fluids cannot be dissolved. However, he does not provide a detailed explanation about the surgical intervention. In this chapter, al-Anṭākī endeavors to provide an explanation of why microcephaly occurs, and organizes the treatment recommendations according to its proposed etiology.

**CONCLUSION:** Al-Anṭākī briefly provides information regarding the etiology of macrocephaly and microcephaly and offers treatment suggestions for them. His treatment suggestions are in the context of and in line with the principles of humoral theory, which was the medical paradigm of the period. However, a recommendation for surgical intervention may be worth considering even in the absence of detailed information.

**KEYWORDS:** Hydrocephaly, Macrocephaly, Microcephaly, Dāwūd al-Anṭākī, History of medicine

## INTRODUCTION

In the classical period (1450–1730), the theoretical knowledge and practical applications of Ottoman medicine were in accordance with the principles of the medical paradigm, that is, the humoral pathology theory, which was accepted in the Islamic world in the Middle Ages (23,57). During this period, beginning from the Principalities period in Anatolia, medical books were written in Turkish and Arabic, and Persian medical books were translated into Turkish (23,54,56). Conversely, physicians from countries surrounding the Ottoman Empire wrote medical books in Arabic or Persian and dedicated them to rulers or prominent statesmen of the period

(42,50). Abū Bakr Muḥammad b. Zakariyyā al-Rāzī (Rhazes)'s (865–925) *Kitāb al-Hāwī fī al-Ṭibb (Liber Continens)*, Alī b. al-ʿAbbās (Haly Abbas)'s (930?–996) *Kitāb al-Malikī (Liber Regius)*, Abū al-Qāsim Khalaf b. ʿAbbās al-Zahrāwī (Albucasis)'s (936–1013) *al-Taṣrīf li man ʿajaza ʿan al-taʿlīf*, Ibn Sīnā (Avicenna)'s (980–1037) *al-Qānūn fī al-Ṭibb (The Canon of Medicine)* in Arabic (12,61), and Ismaʿīl Jurjānī's (1042–1137) *Dhakhīra Khwārazmshāhī (The Treasure of Khwārazmshāh)* in Persian are the classical medical sources of that period (21,23,60). Although the 30<sup>th</sup> article of Albucasis's work in surgery was translated into Turkish by Sharaf al-dīn Sābūnjoghī (1386–after 1468) in the 15<sup>th</sup> century (55,59), Jurjānī's *The Treasure of Khwārazmshāh* was translated into Turkish only in the 16<sup>th</sup> cen-



tury (5,42). Furthermore, Avicenna's *The Canon of Medicine* was translated into Turkish only in the 18<sup>th</sup> century (58). In our analysis of the Turkish medical manuscripts written in the classical period, information regarding macrocephaly, hydrocephaly, and microcephaly appears to be lacking. In 841/1437-8, by Mü'min b. Muqbil of Sinop wrote *Dhakhira Murādiyye (The Treasure of Murād)* and dedicated it to the Ottoman Sultan Murad II (r. 1421–1444 and 1446–1451) (11). In the book's 14<sup>th</sup> chapter of the first article on brain diseases, hydrocephalus is mentioned (6). However, it should not be noted that *The Treasure of Murād* is actually a Turkish translation of the chapters on diseases from the head to the stomach in the 6<sup>th</sup> volume of Jurjānī's *The Treasure of the Khwārazmshāh* (7).

An Ottoman physician, scholar, and poet, Dāwūd al-Anṭākī, also known as *al-Ḍarīr*, *al-Akmah*, *al-Başīr*, and *U'jūb al-dahr*, contributed to the medical literature during the Ottoman Empire rule by writing books in Arabic (10,28-30). Dāwūd al-Anṭākī was reportedly born in Antioch according to some sources (10,16,18,28,30,46). According to other sources (32,43,62), he was born in the village of Fū'a near Idlib and migrated to Antioch at a young age. His father was the headman of the village of Ḥabīb al-Najjār in Antioch, where he had built a guesthouse (10,30). Al-Anṭākī grew up in this guesthouse and learnt logic and physical sciences. Additionally, al-Anṭākī reportedly learnt Greek from an Iranian medical scholar named Muḥammad Sharīf, who had treated him for his walking disability (16,25,28-30). After Muḥammad Sharīf's departure from Antioch and the death of his father, al-Anṭākī travelled around the Islamic world. He spent some time in Jabal Amil on the Lebanese coast before travelling to Damascus (16). While in Damascus, in 976/1568-9, he began writing his best-known work, *Tadhkira* (30). Subsequently, Dāwūd al-Anṭākī travelled to Egypt, where he taught and practiced medicine at the Zāhiriyya Madrasa in Cairo. In 1008/1599, Dāwūd al-Anṭākī travelled to Mecca at the invitation of Hasan b. Abī Numay, the sharīf of Mecca (10,28,29). Dāwūd al-Anṭākī died there in the same year due to diarrhea, according to some sources, or poisoning, according to other sources (10,30,62).

Dāwūd al-Anṭākī, best known for his works in medicine, also wrote books on theology, logic, philosophy, algebra, and astronomy (10,25,28-30). *Tadhkirat Ūli al-Albāb wa al-Jāmi' li l-'Ajab al-'Ujāb*; *al-Nuzhat al-Mubhija fi Tashhīdh al-Adhhān wa Ta'dīl al-Amzija*; *Nuzhat al-Adhhān fi Islāh al-Abdān*; *Majma' al-Fawa'id (al-Manafi') al-Badaniyya*; *al-Tuḥfat al-Bakriyya fi Aḥkām al-Istihmām al-Kulliyā wa al-Juz'iyya* are some of his medical books (10,28-30,42).

Dāwūd al-Anṭākī wrote *al-Nuzhat al-Mubhija fi Tashhīdh al-Adhhān wa Ta'dīl al-Amzija* (Joyful Excursion on Sharpening Intelligences and Correcting Temperaments) in Arabic in the 16<sup>th</sup> century. Adivar (10) considers *al-Nuzhat al-Mubhija fi Tashhīdh al-Adhhān wa Ta'dīl al-Amzija*, which is also mentioned in Kātip Çelebi's *Kashf al-Zunūn* (26,27), to be al-Anṭākī's second most important work in medicine. According to Adivar (10), the general pathology subjects in *al-Nuzhat al-Mubhija*, which begins with the praise of Dervīsh Çelebi b. Muṣṭafā, the mīr-i liwā (royal standard-bearer) in Egypt, were written with wisdom and philosophy, which had never been

done before. *Al-Nuzhat al-Mubhija fi Tashhīdh al-Adhhān wa Ta'dīl al-Amzija*, which was written with the aim of presenting the sciences required by a physician such as medical knowledge, logic, animal science, human beings and their temperaments, health, anatomy, organs, and disease description, consists of a preface, eight main chapters and a conclusion (46). According to Mevaldi (46), there are 27 copies of the manuscript, 18 of which are in Turkish libraries. In addition to the manuscripts, *al-Nuzhat al-Mubhija fi Tashhīdh al-Adhhān wa Ta'dīl al-Amzija* has been printed in *Tadhkirat Ūli al-Albāb wa al-Jāmi' li l-'Ajab al-'Ujāb*'s margin in Cairo, Egypt (10,30).

In this study, we aimed to translate the chapter on “the change in the shape of the head”, which is included as a subheading in the 7<sup>th</sup> chapter of *al-Nuzhat al-Mubhija fi Tashhīdh al-Adhhān wa Ta'dīl al-Amzija*, entitled “about the visible diseases,” into English and discuss our findings in the context of the literature of that period.

## ■ MATERIAL and METHODS

In this study, two copies of Dāwūd al-Anṭākī's work *al-Nuzhat al-Mubhija fi Tashhīdh al-Adhhān wa Ta'dīl al-Amzija* were analyzed. One copy was printed in the margin of the *Tadhkirat Ūli al-Albāb wa al-Jāmi' li l-'Ajab al-'Ujāb* by the *Azhariyya* printing house in Egypt in 1324 AH/[1906/7 AD] (second edition) (Figure 1) (13), and the other was printed and published by Muassasat al-Balāgh in Beirut, Lebanon, in 1420/1999 (14). The copy printed in Egypt was used as the reference and compared with that printed in Lebanon. The Arabic-to-English translation of the chapter is presented in the Results section, and the results have been discussed in the light of the period's literature.

## ■ RESULTS

### The Change in the Shape of the Head

“The head may become enlarged due to the separation of the sutures, either because of the penetration of a humor into the sutures or the trapping of thick winds under them (the sign of this is pain, and it cannot be recognized by touching it, the mind may be confused by this disease. Sometimes fever and other symptoms may occur without headache, for which there is no treatment) or because of the trapping of moisture between the membranes (which can be felt by pressing on it, and its sign is the opposite of the forementioned).

Treatment: It is usually purged, and subsequently coated with solvents that get rid of the wind, such as cumin, millet, black cumin, naphtha, and chamomile oil. The treatment of what collects between the membranes is anything that collects and dissolves symptomatically, such as gall oak, vinegar, pomegranate peel, and cypress walnut. If it is very difficult, incise and evacuate. The head may also be smaller than its natural shape, either because of obstruction in the nerve, the symptom of which is the health of other organs than itself, or because of few of food or its dryness, the symptom of which is its generality. The treatment is to make him drink all the medicines that open obstructions such as chicory, celery, vinegar with honey, and to soften the hardness in him with oil.

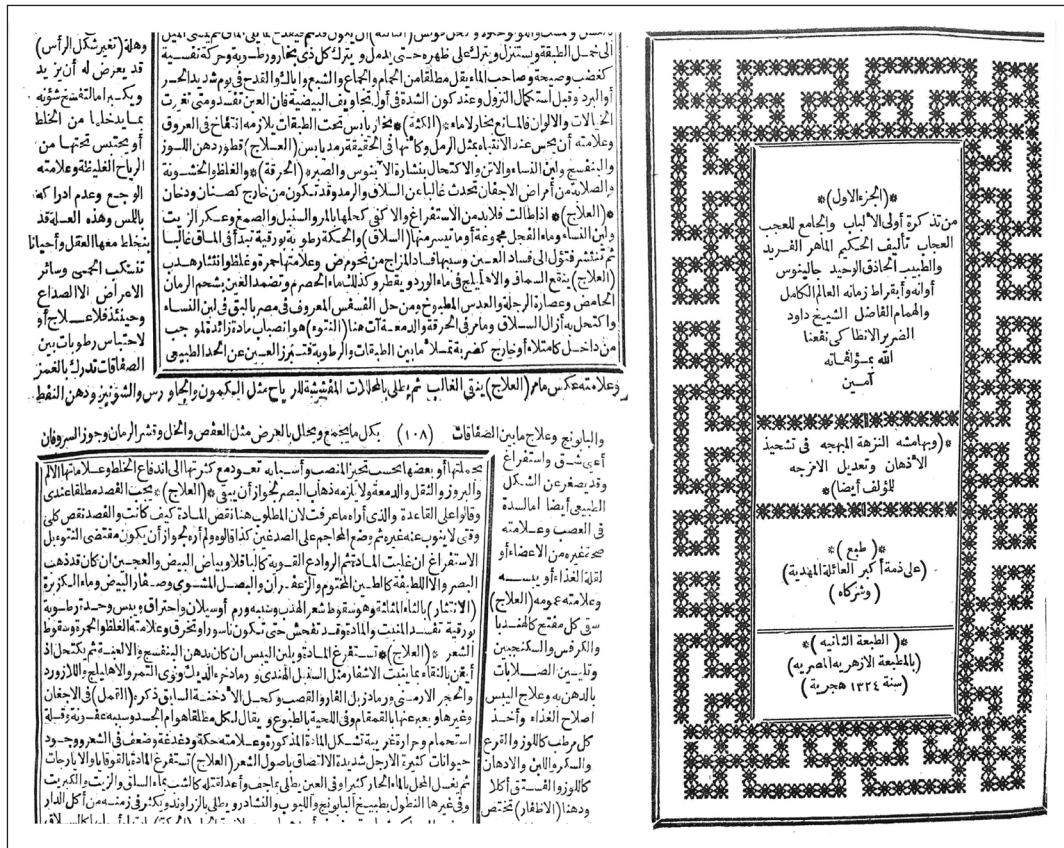


Figure 1: Title page and the pages containing “the change in the shape of the head” of the book in which *al-Nuzhat al-Mubhija fi Tashhīdh al-Adhḥān wa Taḍīl al-Amzija* was printed in the margin of the *Tadhkirat Ūlī al-Albāb wa al-Jāmi' li-l-ʿAjāb al-ʿUjāb* by the Azhariyya printing house in Egypt in 1324 AH (2<sup>nd</sup> edition) (13).

The treatment of dryness is to correct the food and consume all moisturizers such as pumpkin, sugar and milk, and almonds and peanuts as food and oil.” (13, pp.107–108; 14, p.404).

DISCUSSION

In *al-Nuzhat al-Mubhija fi Tashhīdh al-Adhḥān wa Taḍīl al-Amzija*, Dāwūd al-Anṭākī presented that the change in head shape can be categorized as follows: growth of the head (macrocephaly) and a head smaller than its natural size (microcephaly). Dāwūd al-Anṭākī states that macrocephaly occurs because of the separation of the cranial sutures. According to al-Anṭākī, this separation occurs due to penetration of a humor between the sutures, accumulation of thick winds under the sutures, or trapping of fluids between the membranes (*ṣifāqs*). Dāwūd al-Anṭākī recommends the use of solvents for the winds and fluids collected in the head. The statements by Dāwūd al-Anṭākī on the causes of such enlargement of the head and medical treatment in such cases is similar to those by Rhazes (3,22,52,53), Haly Abbas (17) and Albucasis (20). However, in cases of fluid collection between the membranes that cannot be dissolved, Dāwūd al-Anṭākī recommends the “incision and evacuation” process. However, he does not provide a detailed explanation about the surgical intervention or membranes between which the fluid is collected. Dāwūd al-Anṭākī uses the word *ṣifāqāt*, the plural of *ṣifāq*, in reference to the membranes between which fluid collects. According to Lane’s (44) *An Arabic-*

*English Lexicon*, “*ṣifāq*” is defined as “the inferior [or inner] skin, that is beneath the skin upon which is the hair: (S,O,K:) a thin skin beneath the upper skin and above the flesh: (Iath, TA).” However, in *Elias’ Modern Dictionary Arabic-English* (31) it is defined as “inner skin; true skin; dermis” or “fascia”. In Fonahn’s *Arabic and Latin Anatomical Terminology Chiefly from the Middle Ages* (33), “Siphac/Siphach” is defined as “1. peritoneum; 2. dura mater; 3. ependyma (of the cerebral ventricles); 4. vesica urinaria; the (urinary) bladder; 5. “siphac commune membranarum nomen est” (Spigelius: De hum. corp. fabric, page 214).” Furthermore, “Siphacium” is defined as “dura mater + pia mater” (33). Thus, for Dāwūd al-Anṭākī’s reports of fluid collection outside the skull, *ṣifāqs* may refer to the galea aponeurotica and pericranium. Thus, for a subgaleal fluid collection, the proposed “incision and evacuation” process may be paralleled to a recommendation of surgical treatment of his predecessors such as Haly Abbas (3,17), Albucasis (2,15,19), Avicenna (4,41), Ibn Hubal (1122–1213) (9,39,40), and Ibn al-Quff (1233–1286) (9,37,38), and Roman-Byzantine authors such as Galen (129–200) (36,47), Oribasius (325–403) (36,45,49), Aetius (502–575) (24,36,45), and Paul of Aegina (625–690) (45,48,51). It is unlikely to expect suture separation for a fluid collection outside the skull.

If it is to be understood from Dāwūd al-Anṭākī’s account that these membranes are located under the sutures, then the anatomical information provided by Dāwūd al-Anṭākī is crucial. Dāwūd al-Anṭākī in his chapter on the anatomy of the



brain, explains that the brain is reinforced/protected by two membranes. The first is a hard membrane (dura mater) which remain in contact with the head and skull due to its interference with the sutures, and the side under the cover of the eye is called *simhāq* (pericranium). The second membrane lies below the first membrane and is known as *umm al-dimāgh* (pia mater) (6,14,15). Based on this, we can assume that the fluid collection between the membranes indicates fluid collection between the dura mater and pia mater, i.e., the subdural space. Thus, Dāwūd al-Anṭāqī's statements contradict those of his predecessors such as Haly Abbas (3,17), Albucasis (2,15,19), Avicenna (4,41), Ibn Hubal (9,39,40), and Ibn al-Quff (9,37,38), who stated that fluid accumulates between the bone and dura mater in the cranium; this is also similar to what was stated by Roman-Byzantine writers such as Oribasius (36,45,49), Aetius (24,36,45) and Paul of Aegina (45,48,51). However, Dāwūd al-Anṭāqī's statements are similar to those of Galen (34,35,47), who suggests that fluid accumulates within the cranium not only between the bone and meninges but also between the brain and meninges. Furthermore, Dāwūd al-Anṭāqī may have represented a more bold and advanced stance than Galen, who argued that fluid accumulation between the meninges and brain was incurable (47).

Another thing that distinguishes Dāwūd al-Anṭāqī from the others is his attempt to provide an explanation for why microcephaly occurs. Dāwūd al-Anṭāqī also organized his recommendations for treating microcephaly according to the causes he proposed, whereas Rhazes (22,52), and Albucasis (20), made no recommendations in this regard.

## CONCLUSION

Dāwūd al-Anṭāqī dealt with macrocephaly and microcephaly under the heading of "visible diseases," provided information regarding their etiology and offered treatment suggestions. His treatment suggestions were in the context of the principles of humoral theory, which was the medical paradigm of the period, and were compatible with it. However, he states the need for surgical treatment for subdural fluid accumulation/hydrocephalus and provides a treatment option for microcephaly, unlike other important physicians.

## ACKNOWLEDGEMENTS

We would like to thank Dr. Yaser Zakkour for his review of our Arabic to English translation.

Preparation for publication of this article is partly supported by Turkish Neurosurgical Society.

### Declarations

**Funding:** No financial support was received for this research.

**Availability of data and materials:** The datasets generated and/or analyzed during the current study are available from the corresponding author by reasonable request.

**Disclosure:** The authors declare no competing interests.

## AUTHORSHIP CONTRIBUTION

Study conception and design: AA, AY

Data collection: AA, AY

Analysis and interpretation of results: AA, AY

Draft manuscript preparation: AA, AY

Critical revision of the article: AA, AY

Other (study supervision, fundings, materials, etc...): AA, AY

All authors (AA, AY) reviewed the results and approved the final version of the manuscript.

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