

The Study of Different Types of Tremor and Epilepsy in Avicenna's Viewpoint and Modern Neurology

Abstract

Tremor as an important sign in modern clinical neurology is related to several disorders of the nervous systems. In this study, it has been tried to compare Avicenna's viewpoints with modern medicine. Epilepsy as a type of tremor has been also considered to be studied. The research methodology is descriptive, so the related literature on the study of Avicenna's viewpoints and modern medicine has been reviewed. Therefore, different types of tremors mentioned in the Canon of Medicine have been reviewed. Next, the causes of epilepsy have been compared with modern medicine. Then, the relevance of Avicenna's views on different tremor types with modern neurology has been mentioned. Finally, it has been found that Avicenna's viewpoints overlap with modern medicine in types of tremors and the causes of epilepsy. In addition, Avicenna's viewpoint regarding the control of epilepsy has been also added that it is recommended to be studied in further research.

Keywords: *Avicenna, Epilepsy, modern medicine, tremor*

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Introduction

Tremor is an important sign in modern clinical neurology and is related to several disorders of the nervous system. Ibn Sina, who is known as Avicenna in the west, was a famous Iranian physician. He was born in a village located in the northeast of ancient Iran called Afsheneh in 980 CE. He began to learn medicine at the age of 10 and became one of the most famous physicians of his time at the age of 18. His famous work on medicine is the "Canon of Medicine" and consists of five books (Zargaran et al., 2012). The third volume is about neuroscience and discussed TBI and its therapeutic approaches. He described TBI under the title of "saghteheh & zarbeh" (Avicenna, 2005). Recent investigations showed that Avicenna is a pioneer in neurological sciences including neuroanatomy (Mazengenya & Bhika, 2017), vasovagal syncope (Shoja et al., 2009), facial palsy (Resende & Weber, 2008), spinal cord injury (Ghaffari et al., 2015), tremor (Zargaran et al., 2013a) headache (Zargaran et al., 2016), and neurosurgery (Ahmed & Zargaran, 2020).

Avicenna provides a detailed description of different types of tremors. The physical characteristics and diagnosis and other relevant factors are causes are also mentioned. Many of these types of tremors have relevance to the ones described in modern clinical neurology. For example, involuntary tremor or rashes as mentioned by Avicenna relates to what is known today as Parkinson's disease. Avicenna also describes Non-

neurologic causes of tremors. In this study, we analyzed different types of tremors from the Canon of Medicine and provide their relevance to modern neurology. Epilepsy as a type of tremor disorder was emphasized to be compared in Avicenna's viewpoints and modern medicine.

Review of Literature

There are many studies regarding the approaches taken by Avicenna in the treatment of neurological disorders; in this section, we review some of them to understand the importance of the subject. Zargaran and colleagues (2013) in their study reviewed the management of stroke as described by Avicenna in the Canon of Medicine. This review examines the definition and etiology, clinical manifestations, prognosis, differential diagnosis, and interventions for stroke based on Ibn Sina's epic work, Canon of Medicine. The pharmacological effects of medicinal herbs suggested by Ibn Sina for stroke are examined in light of current knowledge.

Mesraoua and colleagues (2021) conducted research to review Complementary and Alternative Medicine (CAM) treatment in epilepsy in the Middle East and North Africa (MENA) region, to describe the extent and factors associated with its use among patients with epilepsy (PWE), and to recommend how this alarming use can be effectively reduced. They concluded that the use of CAM and consultation of traditional healers for the treatment of epilepsy has so far been a widespread practice for centuries in the MENA region. Lack of health professionals

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and non-adherence to conventional epilepsy treatment is strongly associated with the use of CAM. Improvement in the level of knowledge of epilepsy among PWE, healthcare professionals, including traditional healers, will educate PWE and their caregivers on potentially unsafe practices and promote adherence to anti-seizure drugs. Additionally, randomized controlled trials are needed to study the role and value of various CAM treatment options in PWEs.

Zali and colleagues (2020) reviewed the book Al-Qanun fi al-Tibb and some of the traditional Persian medicine sources, including Kāmil al-Sināa al Tibbiya and Makhzan-O-L Advieh, on uterine epilepsy, its etiology, clinical manifestations, and treatments. Finally, they found that Avicenna considered stomach, spleen, uterus, or other body organs as the factors that influence the brain and can cause epilepsy. In uterine epilepsy, the primary pathology lies with the uterus and can affect the brain. This condition occurs due to the retention of the menses or semen.

Table 1. Different types of tremors are mentioned in the Canon of Medicine

1	اختلاج	Movement of the muscles and the covering skin
2	الخر	The sensation of vibration is lost in severe injuries, but partial impairment in the vibration sensation converts this sensation into trembling.
3	رعشه	Debilitation of motor signals to the muscles or their transmission. Volitional and involuntary movements happen together and in a resting position. source of injury could be in the brain itself, in the spinal cord, in one segment of the spinal cord or peripheral nerve
4	Classification based on the site of trembling	Sometimes the trembling exists only in the head. In other cases, trembling is seen on the face. Which is a warning sign of facial paralysis. Because of stronger innervation of the lower extremities, some insults can damage hands nerves leaving legs nerves spared, causing trembling in the legs but not the hands. It also represents the location of the lesion which might not be in the spinal cord, but in the peripheral nerves reaching the hands. Trembling in the coastal areas is a sign of edema in the diaphragm and trembling in the outer peritoneum layer is a warning sign of melancholy and epilepsy. Etiologies of tremors are those that cause damage to the spinal cord or neural networks. Examples are: too much eating, drinking, and coitus, drinking alcohol or too much cold water, Gluttony (dyspepsia), quitting sports (sedentary lifestyle), Decrease in body strength, Pneumonia, pleurisy, anesthesia, abscess or edema in the nerve, Snakebite, too hot bath, severe fever, medicines, scorpion bite, touching eagle rays, consuming Laudanum
5	Whole body trembling	It can be a warning sign of tetanus or stroke.
6	Tremor of the elderly	This type of tremor is not curable.
7	Physiologic trembling	The tremor happens in response to extreme fear, sorrow, joy, and rage. Like meeting a horrible person or walking on a wall. The northern wing causes tremors.

He also mentioned the causes of epilepsy that which is the condition in the brain to drive something annoying, this annoying to the brain is due to malignant moisture or phlegm

In this study, different types of tremors mentioned in the Canon of Medicine have been reviewed. Next, the causes of epilepsy have been compared with modern medicine. Then, the relevance of Avicenna's views on different tremor types with modern neurology has been mentioned. Avicenna's viewpoint regarding the control of epilepsy has been also added that it is recommended to be studied in further research.

Method

A detailed study of the original Arabic version of the Canon of Medicine and its Persian translation was undertaken with the search word tremor in Arabic () and Persian (). The data was then analyzed based on its type, frequency, etiology, diagnosis, accompanying clinical and non-clinical characteristics, and the treatment mentioned by Avicenna. Finally, relevance was made between different types of tremors described by Avicenna and modern clinical neurology as it is mentioned in Table 1.

heat and it caused the aforementioned blockages (Patel & Moshé, 2020).

Today, we know that hydrocephalus (probably the same case that Avicenna mentioned as brain blockages) is one of the causes of epilepsy. Hydro may which is caused by the increase of cerebrospinal fluid (CSF) inside the ventricles or outside the cerebral cortex, is another cause of epilepsy which is in harmony with Avicenna's description of "moisture". The surge mentioned by Avicenna can be seen in the

Table 2. Relevance of Avicenna's views on different tremor types with modern neurology

Fasciculation	This type of abnormal movement in muscle fibers is outlined in the neurology chapter and described as the movement of muscles and the covering skin (اختلاج).
Facial nerve paralysis	Isolated Trembling of the face has been brought up as a warning sign of crooked or asymmetric mouth disease (لقوه) which today is known as VII cranial nerve paralysis.
Parkinson's disease	The tremor in the elderly is mentioned in the book as a disease of Parkinson's disease which couldn't be treated at the time.
Tremor	The specific type of tremor is described as a mixture of volitional and voluntary movements while doing an action and in a resting position. The cause is an injury to motor signals. (رعشه)
Titubation	A specific type of trembling that solely involves the head is pointed out in the neurology chapter of the Canon of Medicine which today has its scientific entity.
Paresthesia	A condition is described by Avicenna as incomplete damage of vibration sensory system in which this sensation is not lost, but is perceived as trembling (خدر).
Grand mal seizure	Avicenna mentions a type of trembling involving the whole body. The equivalent in modern neurology is a tonic-clonic seizure.
Localization of lesion	An important step that is done today, has been brought in Canon of Medicine on plenty of occasions. For instance, the trembling that involves only the hands represents the site of the injury to be in peripheral nerves, not in the spinal cord itself.

Avicenna has many recommendations and suggestions for the treatment of patients with epilepsy in his book, The Canon of Medicine, one of which is Rue (Ruta or Fijen). Avicenna recommended using Rue for the treatment of epilepsy at least 5 times in his book; he said that patients should smell it; once he said Rue may be added to the food; and once he said to use it as an ointment. He did not specify which part of the plant (Avicenna, 1991). Rue is a genus of strongly scented evergreen shrubs, in the family Rutaceae, native to the Mediterranean region and southwest Asia (<https://en.wikipedia.org/wiki/Ruta/>, 2020 accessed on 11/11/2018). In one animal study, the effects of an ethanol extract of the aerial parts of *Ruta chalepensis* on the central nervous system (CNS) were studied in mice (Gonzalez-Trujano et al., 2006). A crude extract was given systemically and its effects were tested on PTZ-induced seizures. The results showed a delay in the onset of seizures and a dose-dependent suppression in the tonic phase of the seizure induced by PTZ (Gonzalez-Trujano et al., 2006). It is justifiable to

electroencephalogram during the occurrence of epilepsy. In addition, fever can cause epileptic attacks related to fever, which is similar to high heat. Avicenna pointed out that it often happens that epilepsy appears without feeling a seizure, in this way, he has mentioned for the first time the forms of epilepsy without seizures (Zali et al., 2020). Table 2 shows the relevance of Avicenna's views on different tremor types with modern neurology.

consider this Avicenna's recommended therapy for epilepsy and also other similar recommendations in ancient civilizations and to design future scientific studies on the potential antiepileptic effects of various therapies (e.g., Danshen from Chinese medicine and Rue from Iranian medicine), which had been used to treat epilepsy before.

Conclusion

In this study, it is found that there are some important implications regarding Avicenna's viewpoint on tremors, especially epilepsy, that overlap with modern medicine. It is summarized in the following:

1. Avicenna considers tremor as a sign of the diagnosis and predicts its prognosis. Tremor is related to different types of neurological and non-neurological diseases and different organ systems.
2. Avicenna strongly insists on the correction of lifestyle, habits, diet, individual tempers, and the environment of living as a means for preventing or curing diseases related to tremors, especially epilepsy.

3. Our study describes the important contributions of Avicenna (980-1037 AD) on the etiology and the development of the diagnosis of different types of tremor as understood in that era.
4. Avicenna has many recommendations and suggestions for the treatment of patients with epilepsy in his book that are recommended for further studies.

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Conflict of interest

None.

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Ethics statement

None.

References

- Ahmed, S., A. Zargar, A. (2020). Contributions of Avicenna to surgery and anesthesiology. *Acta Chirurgica Belgica*, 120(3): 204–211.
- Avicenna, (1991). The Cannon of Medicine [translated from Arabic to Persian by Abdulrahman Sharaf-kandi], 4th ed. Tehran: IRIB Publications.
- Avicenna, (2005). Qanun fi al-Tib Canon of Medicine, Ehyaal Toras al-Arabi Press, 2005.
- Eva González-Trujano, M., Tapia, E., López-Meraz, L., Navarrete, A., Reyes-Ramírez, A., & Martínez, A. (2006). Anticonvulsant Effect of Annona diversifolia Saff. and Palmitone on Penicillin-induced Convulsive Activity. A Behavioral and EEG Study in Rats. *Epilepsia*, 47(11), 1810-1817.
- Ghaffari, F., Naseri, M., Movahhed, M., & Zargar, A. (2015). Spinal Traumas and their Treatments According to Avicenna's Canon of Medicine. *World Neurosurgery*, 84(1): 173-7.
- Gonzalez-Trujano, M. E., Martínez, A. L., Reyes-Ramírez, A., Reyes-Trejo, B., & Navarrete, A. (2006). Palmitone isolated from Annona diversifolia induces an anxiolytic-like effect in mice. *Planta medica*, 72(08), 703-707.
- Ibn Sina (2004) Qanoon fi al-Tib (The canon of medicine), Arabic manuscript, dated 1270 AH (1853–54 AD), downloaded from world digital library, <<https://www.wdl.org/en/item/16766/>>, last accessed: 7/10/2021.
- Ibn Sina. (1978) Qanoon fi al-Tib (The Canon of Medicine), Bulaq edition, Sharafkandi, A. (trans.). University of Tehran Press edn: Tehran
- Mazengenya, P., & Bhika, R. (2017). The structure and function of the central nervous system and sense organs in the canon of medicine by Avicenna. *Archives Iran Medicine*, 20(1): 67-70.
- Mesraoua, B., Kissani, N., Deleu, D., Elsheikh, L., Ali M., Melikyan, G., Hail, H. A., Wiebe, S., Asadi-Pooya, A. A. (2021). Complementary and alternative medicine (CAM) for epilepsy treatment in the Middle East and North Africa (MENA) region. *Epilepsy Research*, 170: 106538. doi: 10.1016/j.eplepsyres.2020.106538.
- Patel P., & Moshé S. L. (2020). The evolution of the concepts of seizures and epilepsy: What's in a name? *Epilepsia Open*, 5(1): 22-35.
- Resende, L. A., & Weber, S. (2008). Peripheral facial palsy in the past: contributions from Avicenna, Nicolaus Friedreich and Charles Bell. *Arquivos de Neuro-Psiquiatria*, 66(3B): 765-9.
- Shoja, M., Tubbs, R. S., Loukas, M., Khalili, M., Alakbarli, F., & Cohen-Gadol, A.A. (2009). Vasovagal syncope in the Canon of Avicenna: The first mention of carotid artery hypersensitivity. *International Journal of Cardiology*, 134(3): 297-301.

Zali, F., Bahrami, M., & Akhtari E. (2020). Uterine epilepsy: a historical report from Avicenna's point of view. *Neurological Sciences*, 41(1): 229-232.

Zargar, A., Mehdizadeh, A., Zarshenas, M.M., Mohagheghzadeh, A. (2012). Avicenna (980–1037 AD). *Journal of Neurology*, 259(2): 389–390.

Zargar, A., Zarshenas, M.M., Mehdizadeh, A., Mohagheghzadeh, A. (2013). Management of tremor in medieval Persia. *Journal of the History of the Neurosciences*, 22(1): 53-61.

Zargar, A., Zarshenas, M.; Karimi, A., Yarmohammadi, H., & Borhani-Haghighi, A. (2013). Management of stroke as described by Ibn Sina (Avicenna) in the Canon of Medicine. *International Journal of Cardiology*, 169(4): 233–237.

Zargar, A., Borhani-Haghighi, A., Faridi, P., Daneshamouz, S., Mohagheghzadeh, A. (2016). A review on the management of migraine in Avicenna's Canon of Medicine. *Neurological Sciences*, 37(3): 471–478.