

Qualitative Research Article



Tinnitus in Traditional Persian Medicine: A Historical Perspective

Maryam Arabi¹, Tahereh Amirian², Assie Jokar^{2,3*}, Mojtaba Heydari⁴

¹ Student Research Committee, Mazandaran University of Medical Sciences, Sari, Iran

² Traditional and Complementary Medicine Research Center, Addiction Institute, Mazandaran University of Medical Sciences, Sari, Iran

³ Department of Persian Medicine, Faculty of Medicine, Mazandaran University of Medical Sciences, Sari, Iran

⁴ Research Center for Traditional Medicine and History of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran



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Highlights

- TPM physicians suggested many complementary treatments for tinnitus
- GI disorders, especially bloating and constipation, should be treated first
- Potential remedies in TPM resources, may be useful to treat tinnitus

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ABSTRACT

Background and Aim: Tinnitus is a common disorder of the auditory system with a rich history dating back to ancient times. This review aims to provide a historical perspective on tinnitus in Traditional Persian Medicine (TPM) by summarizing the views of TPM scholars on its etiology and treatment.

Methods: A qualitative research (summative content analysis) was conducted, utilizing TPM texts to identify the historical perspectives of TPM scholars on tinnitus. The analysis focused on their understanding of tinnitus, its causes, and recommended treatments.

Results: In TPM, tinnitus was referred to as *Tanin* and *Davi*. The accumulation of phlegm and internal gases in the head or ears was considered as the main cause of tinnitus, with sudden movement or ripple of these vapors leading to auditory nerve stimulation and resulting in tinnitus. TPM scholars recommended addressing the sources of these vapors, such as gastrointestinal issues, and promoting humeral balance through temperament modification and the use of medicinal herbs for treatment.

Conclusion: The TPM view on tinnitus was similar to the Greco-Roman understanding of the disease, with Persian scholars expanding on its details. TPM scholars believed in addressing the underlying causes of tinnitus and promoting humeral balance to alleviate symptoms. These historical perspectives provide insight into traditional medical systems and their approaches to the management of health conditions.

Keywords: Tinnitus; traditional Persian medicine; Tanin; Davi; history of medicine

* Corresponding Author:

Traditional and Complementary
Medicine Research Center, Addiction
Institute, Mazandaran University of
Medical Sciences, Sari, Iran.
a.jokar@mazums.ac.ir



Introduction

Traditional Persian Medicine (TPM) is one of the famous traditional medical systems practiced for centuries in ancient and medieval Persia [1]. TPM has gone through three main periods; Achaemenid era, Sasanian era, and Islamic era [2]. The Achaemenid era dates back to 2,500 years ago and is one of the oldest known periods of TPM [3]. In the Avesta, religious books of Zoroastrian from Achaemenid era, health issues are widely discussed. In the Avesta doctors are divided into physicians, surgeons, veterinarians, and herbalists [4]. In the Sassanid era, since Persia was one of the neighbors of the Eastern Roman countries, famous scientists and physicians migrated from the neighbor regions to Persia [4]. They engaged in the teaching of medical knowledge, and in this way, Jundishapur Hospital and School was established [5]. During Anoushirvan's time, a great revolution took place in the medical science of Persia, which included the establishment of a medical congress for doctors to discuss philosophy and medicine [5]. The beginning of TPM in the Islamic period was when all the heritage of the Sasanians, in addition to the great heritage of the Greeks, was handed over to the Muslims, after the Arab conquest of Iran and the extinction of the Sasanian dynasty and the spread of the Arabic language [6, 7]. During the Abbasid period, "Jandishapur" was transferred to Baghdad, thus Baghdad gradually became the center of medicine and science, and Jundayshapur fell from prosperity [6, 8]. Also, with the blessing of Islamic teachings, Muslims were able to provide great services in the field of medicine, translating and authoring medical texts [6]. In the Islamic era, especially in the field of translation, a new field was opened for translators as a result of the encouragement of the caliph, and many scientific works were translated to Arabic [9]. A group of translators have also been engaged in this service in the west of Muslim countries, such as Morocco, Algeria, Spain, Tunisia, etc. [10]. However, the greatest contribution to Islamic medicine belongs to Iranians such as Rhazes (865–925 AD), Haly Abbas (949–982 AD), and Avicenna (980–1037 AD), and Jorjani (1042–1137 AD) [11–13]. A wide variety of medical topics were discussed and explained in their books, including tinnitus.

Tinnitus is one of the most common symptoms of ear disorders, defined as the perception of sound in the absence of the vibration of an external elastic substance. Qualitative descriptions include humming, ringing, whistling, hissing, roaring, and a cricket-like sound [14]. Population studies estimated the prevalence of tinnitus between 10% and 25% among individuals over 18 years from different nationalities. The prevalence of tinnitus increases with age; nonetheless, it has recently risen dramatically among young people [15]. Due to its heterogeneity, the classification of tinnitus has been a daunting challenge in modern medical literature. Despite a bulk of research conducted in this regard, the exact pathophysiology of tinnitus remains unclear. Tinnitus can be classified by a variety of criteria, including causes, comorbidities, signs, and psychological load [16]. Although some currently available interventions are effective in improving the quality of life, most have demonstrated little effect on tinnitus severity [17].

The historical perspective of tinnitus in different ancient civilizations can provide a valuable insight into the evolution of medical knowledge throughout human history. Tinnitus has been recognized as a medical condition for centuries, and each civilization had its unique understanding of its etiology and treatment. In this article, we focus on tinnitus in TPM and explore its pathophysiology, etiology, and treatment approach as a historical perspective.

Methods

This article is a qualitative research (summative content analysis) that processed in seven classic steps [18–20]:

The research questions to be answered: "What is tinnitus in the TPM texts?" We tried to collect all data about tinnitus in the context of up to date modern texts; this information includes etiology, symptoms, signs, risk factors and treatment of tinnitus. And then we tried to find one disease have more overlap with tinnitus. As a result, tinnitus in TPM texts is known as *Tanin* or *Davi*.

Selecting the sample to be analyzed: In this study, all available medical texts of the TPM texts in this field were selected. These texts included *Al-Hawi fi'l-tibb* by Rhazes [21] (8th–9th century), *Canon of Medicine*

by Avicenna [22] (11th century), Sharh-al-Asbabe-val-Alamate by Nafis bin Awad Kermani [23] (12th century), Zakhireye Kharasmshahi by Jorjani [24] (12th century), Tohfat ol Moemenin by Mohammad Tonkaboni [25] (17th century), Makhzan ol Advieh and Qarabadin-e-Kabir by Aghili Shirazi [26] (18th century), Tebbe-Akbari by Shah Arzani [27] (18th century) and Eksire-Aazam by Nazem Jahan [28] (19th century). In the second step, the databases were searched by using key words of “tinnitus etiology, prevention and treatment” in PubMed, Science Direct, Google Scholar and Scopus.

To identify exact terms: word repetition counts for each identified term computed with source, to contextualize the codes. Modern equivalent terms were identified.

Coding process include three titles (definition, etiology and treatment). According to the TPM texts, we coded and categorized all data under these titles. We tried to translate these findings from Arabic and Ancient Persian to modern medicine language.

Definition of categories include all data were classified into three categories (definition, etiology and treatment) [7].

Reliability include integrity and dependability that given the description of different stage of methods such as key words, coding process, and etc. someone who has the ability to read and understand Arabic and Ancient Persian language and texts, can obtain similar results.

Analysis of the result: according to the qualitative content analysis, we attempted to gather all data about the prevention and treatment of tinnitus [29, 30].

Results

The history of tinnitus in ancient civilizations

Tinnitus, the perception of ringing or buzzing sounds in the ears, has been a subject of medical interest since ancient times. In addition to traditional Persian medicine, tinnitus has been documented in several other ancient civilizations, including China, India, Egypt, and Greece [31]. In ancient China, tinnitus was described in the Huangdi Neijing, one of

the earliest medical texts in Chinese history. The text refers to tinnitus as “the sound of wind or thunder” and suggests that it can be caused by imbalances in the body’s energy channels or by exposure to excessive noise [32]. Similarly, in ancient India, tinnitus was recognized as a medical condition and described in the Ayurvedic texts, which date back to the 2nd millennium BCE. Ayurvedic physicians believed that tinnitus could be caused by a variety of factors, including imbalances in bodily humors, poor diet, and exposure to loud noises [33].

In ancient Egypt, tinnitus was also recognized as a medical condition and was documented in the Ebers Papyrus, a medical text dating back to around 1550 BCE [34]. The text describes tinnitus as a ringing or buzzing sound in the ears and suggests that it can be caused by a variety of factors, including head injuries, excessive noise exposure, and certain medications [34]. In ancient Greece, tinnitus was mentioned in the works of Hippocrates, who is often referred to as the father of Western medicine [35]. Hippocrates believed that tinnitus could be caused by earwax buildup or by inflammation of the ear canal [35]. He also suggested that tinnitus could be a symptom of other underlying medical conditions, such as epilepsy. Therefore, tinnitus has been recognized as a medical condition in several ancient civilizations, including China, India, Egypt, and Greece. While the specific causes and treatments of tinnitus varied across these cultures, the recognition of this condition highlights the long history of human concern for auditory health.

Tinnitus in traditional Persian medicine

In TPM, the words *Tanin* and *Davi* refer to a sound heard in the ear or head without any external stimulus and are equivalent to tinnitus. *Davi* is a stronger and softer sound, while *Tanin* is a narrower and thinner sound [27].

Pathophysiology of tinnitus in traditional Persian medicine

In TPM sources, hearing is a wave-like movement of air particles that reaches the ear and is finally sensed by the auditory receptors. When two objects rub against each other, the motion of the resulting compressed air affects the auditory organ, and hearing occurs. In

tinnitus, one perceives sounds that do not exist in their environment; instead, these sounds are generated by the movement of air inside the human body. In other words, from the perspective of TPM, just as the movement of air outside the ear causes hearing, the movement of vapor in the head causes tinnitus [36].

The concept of vapor can also be found in Chinese medicine. In TPM manuals, the vapor is defined as a kind of air naturally present in the human body. When the vapor is in a balanced and natural state, it facilitates such processes as defecation and erection; nonetheless, when it gets out of balance, it may cause more than 90 types of diseases, such as tinnitus, headache, vertigo, epilepsy, and joint pain [37].

Etiology of tinnitus in traditional Persian medicine

According to TPM, the causes of tinnitus are divided into two categories (Table 1). The first category is related to the head and ears. Accumulation of extra substances (phlegm) and the resulting vapors in the head or ears and the sudden movement or ripple of them stimulate the auditory nerves, leading to tinnitus in one of the cause. In this situation, tinnitus is usually constant and associated with a feeling of heaviness in the head and ears. Accumulation of dense winds (*Rih*) in the cerebral vessels due to indigestion, overeating of flatulent foods, and sleep after eating, is the second cause in this category. This type of tinnitus is enhanced

by physical activity and emotional excitement, and the patient feels lightheaded [28]. Hypersensitivity is another type of tinnitus in which the body is healthy, and due to the sharpness of the sense, the person hears the slightest movement in the inner humor and vapor, which is called the intelligence of the senses. This type increases in the state of starvation or hunger, and acuity in other senses is also observed [28]. Other types include tinnitus caused by hearing loss, dystemperament or weakness of brain, ear or head infection, head trauma, and tinnitus caused by severe vomiting [36].

The second category of causes of tinnitus from the perspective of TPM occurs with the participation of other organs or the whole body. The stomach is one of the main organs affecting tinnitus. There is a relationship between the brain and the stomach (intestine-brain axis). The consumption of flatulent foods, such as pepper, onion, garlic, and leeks, mediates vapors toward the head. Apart from the stomach, dysfunction of other organs which may cause tinnitus are the intestine, spleen, liver, uterus, and peritoneum [27]. Excessive body dryness is another casue of tinnitus from the perspective of TPM. This type of tinnitus is intensified in malnutrition and starvation and is reduced during fullness. The static vapor moves in the head and produces the sound. Hot dystemperment at the beginning of febrile illnesses, which casue the vapors move and stimulate the auditory nerve [38] and fullness of the vessels of the head and body in case of intoxication or sleep after eating are another cause of

Table 1. Causes of tinnitus in traditional Persian medicine

	Accumulation of waste materials in the head or ears	Humoral	Phlegm
Related to the head and ears	Dystemperament or weakness of brain	Endogenous gases (vapors)	Endogenous gases separated from the extra material in the head or ears Movement of endogenous gases during emotional excitement or exercise
	Head or ear infection		
	Head trauma		
	Hearing loss		
	Severe vomiting		
	Organic	Gastric: consumption of flatulent medicines and foods Non-gastric dysfunction of: spleen, liver, uterus, and peritoneum	
Participative	Hot dystemperment: febrile diseases Fullness of blood vessels of the head and body Excessive dryness of the body		

tinnitus from the perspective of TPM [39].

These two categories are distinguishable by some symptoms. In the category related to the head and ears, tinnitus is generally permanent, and the sound is louder and resembles the sound of rustling leaves. In the second category, the intensity of sound is not consistent and changes with satiety or hunger, rest or physical activity and warm or cold weather. In these cases, the sound of tinnitus looks like the sound of boiling water in a pot [28, 40-42].

Tinnitus treatment in traditional Persian medicine

The treatment of tinnitus in TPM is based on its etiology and pathophysiology. Since the main pathophysiology of tinnitus is the abnormal vapor movement in the head and ears, the treatment focuses primarily on this. Tinnitus treatments in TPM are divided into three steps: the first step is lifestyle modification, including six essential principles for health maintenance (weather, motion and stillness, sleep and wakefulness,

retention and excretion, eating and drinking, as well as mental state) [43]. Some of these measures include avoiding concentrated, sticky, hardly digestible foods, exposure to hot weather, heavy exercise, loud noises, prolonged starvation and overeating, reducing the use of flatulent vegetables, such as raw garlic and raw onion, limiting daily sleep and the consumption of laxatives, such as carrots and figs, as well as strengthening the brain by inhaling roses, apples, and saffron aromas [22, 28, 41, 44-46].

The second step is medication, which is prescribed by topical and oral route according to the type of tinnitus. Local treatments include dripping medicine into and around the ear and pouring medicine on the head [22, 26]. A list of topical herbs for tinnitus is provided in Table 2. The third step is manual interventions, such as massage of the lower limbs, phlebotomy, and wet cupping of the back area of the ears in some types of tinnitus. These interventions may be used before, during, or even after pharmaceutical therapy.

Table 2. Medicinal plants for the treatment of tinnitus in traditional Persian medicine

No.	Scientific name	Common name	Persian name	Family	Effective organs	Temperament
1	<i>Prunus amygdalus</i> variety amara	Bitter almond	Laos ol mor	Rosaceae	Kernel	Hot and dry
2	<i>Ferula assa-foetida</i>	Asafoetida	Heltit	Apiaceae	Resin	Hot and dry
3	<i>Allium ampeloprasum</i>	Chives	Koras	Amaryllidaceae	Leave	Hot and dry
4	<i>Citrullus colocynthis</i>	Colocynth	Hanzal	Cucurbitaceae	Fruit and root	Hot and dry
5	<i>Ruta graveolens</i>	Rue	Sodab	<u>Rutaceae</u>	The whole plant	Hot and dry
6	<i>Peganum harmala</i>	Peganum	Harmal	Nitrariaceae	Seed	Hot and dry
7	<i>Azadirachta indica</i>	Neem Tree	Azadderakht	Meliaceae	Fruit and leaves	Hot and dry
8	<i>Ecballium elaterium</i>	Ecballium	Ghosa-al hemar	<u>Cucurbitaceae</u>	Fruit	Hot and dry
9	<i>Marrubium vulgare</i>	Horehound	Frafiun	<u>Lamiaceae</u>	Aerial organs	Hot and dry
10	<i>Carum copticum</i>	Ajwain	Zenian	Apiaceae	Seed	Hot and dry
11	<i>Mentha pulegium</i>	Pennyroyal	Fudanaj	Lamiaceae	Leaves	Hot and dry
12	<i>Rosa gallica</i>	Rose	Vard	Rosaceae	Flower	Cold and dry
13	<i>Artemisia absinthium</i>	Common wormwood	Afsantin	<u>Asteraceae</u>	Leaves, flower	Hot and dry
14	<i>Mentha spicata</i>	Spearmint	Naana	<u>Lamiaceae</u>	Leaves	Hot and dry
15	<i>Allium cepa</i>	Onion	Basal	Amaryllidaceous	Bulb	Hot and dry

Potential mechanism of suggested medicinal plants in treatment of tinnitus

Studies on the potential mechanisms of suggested medicinal plants in the treatment of tinnitus from the perspective of modern medicine have also suggested that these bioactive compounds possess neuroprotective effects that can prevent or reduce auditory nerve damage [47]. This is particularly relevant in age-related tinnitus, where oxidative stress and inflammation may play a significant role in the deterioration of the auditory system [48, 49]. Additionally, some of the suggested plants possess analgesic effects, which can reduce the perception of tinnitus-related discomfort or pain. The

potential mechanisms of these plants in the treatment of tinnitus are promising and suggest that they may be beneficial for individuals suffering from this condition (Table 3). However, further studies are needed to confirm these potential benefits and determine the optimal doses and treatment durations.

Comparison of tinnitus in modern medicine and traditional Persian medicine

The mechanism of hearing is the physical movement of the air molecules and the vibration of the tympanic membrane (Table 4). This wave motion affects the audi-

Table 3. Studies on the potential mechanism of medicinal plants in treatment of tinnitus

Authors	Year	Plant name	Bioactive compounds	Potential mechanisms of tinnitus treatment
Guici El Kouacheur et al. [58]	2023	Prunus amygdalus variety amara	Flavonoids, terpenoids, phenolic compounds	Antioxidant and anti-inflammatory properties can reduce oxidative stress and inflammation in the auditory system.
Bagheri et al. [59]	2016	Ferula assa-foetida	Sulfur compounds	Antioxidant and anti-inflammatory properties can reduce oxidative stress and inflammation in the auditory system. Neuroprotective effects can prevent or reduce auditory nerve damage.
Jalilian et al. [60]	2020	Allium ampeloprasum	Organosulfur compounds, flavonoids, polyphenols	Antioxidant and anti-inflammatory properties can reduce oxidative stress and inflammation in the auditory system. Anti-platelet and anti-coagulant effects can improve blood flow to the inner ear.
Hussein et al. [61]	2017	Citrullus colocynthis	Flavonoids, alkaloids, terpenoids	Antioxidant and anti-inflammatory properties can reduce oxidative stress and inflammation in the auditory system. Analgesic effects can reduce the perception of tinnitus-related discomfort or pain.
Mokhtar et al. [62]	2022	Ruta graveolens	Alkaloids, flavonoids	Antioxidant and anti-inflammatory properties can reduce oxidative stress and inflammation in the auditory system.
Abbas et al. [63]	2021	Peganum harmala	Harmine, harmaline	The auditory system may experience a reduction in oxidative stress and inflammation through the antioxidant and anti-inflammatory properties of certain compounds.
Kandhare et al. [64]	2017	Azadirachta indica	Flavonoids, terpenoids	Certain compounds may possess antioxidant and anti-inflammatory properties that can contribute to reducing oxidative stress and inflammation in the auditory system.
Bourebaba et al. [65]	2020	Ecballium elaterium	Cucurbitacins	Oxidative stress and inflammation in the auditory system can potentially be reduced through the antioxidant and anti-inflammatory properties of certain compounds.
Kazemi [66]	2014	Carum copticum	Thymol, carvacrol	Certain compounds have been suggested to possess antioxidant and anti-inflammatory properties that can contribute to reducing oxidative stress and inflammation in the auditory system.
Messaoudi et al. [67]	2021	Mentha pulegium	Pulegone	Antioxidant and anti-inflammatory properties can reduce oxidative stress and inflammation in the auditory system.
Lee et al. [68]	2018	Rosa gallica	Flavonoids, phenolic compounds	The auditory system may benefit from the antioxidant and anti-inflammatory properties of certain compounds in reducing oxidative stress and inflammation.
Moacă et al. [69]	2019	Artemisia absinthium	Absinthin	Oxidative stress and inflammation in the auditory system may be addressed through the antioxidant and anti-inflammatory properties of certain compounds.
Hashmi et al. [70]	2022	Mentha spicata	Carvone, limonene	Antioxidant and anti-inflammatory properties can reduce oxidative stress and inflammation in the auditory system.
Marefati et al. [71]	2021	Allium cepa	Flavonoids, sulfur compounds	Certain compounds may possess antioxidant and anti-inflammatory properties that can potentially reduce oxidative stress and inflammation in the auditory system.

tory cochlea through the bones of the middle ear and is converted to an electrical message, stimulating the auditory nerve. The physiology of hearing in both medicines begins with the movement of air particles, and hearing occurs after the conversion of mechanical motion to the auditory message [50]. The pathophysiology of tinnitus in TPM and that of the hearing mechanism are similar in that as the movement of air outside the ear and stimulation of the hearing receptor causes hearing, the movement of vapor inside the human body and stimulation of the hearing receptor causes tinnitus. The endogenous gases or vapors, such as hydrogen sulfide (H₂S), nitric oxide (NO), and carbon monoxide (CO) which are known in modern medicine, have been mentioned in traditional Persian and

Chinese medicine as pathogenic agents [37].

Tinnitus is generally categorized into two types: subjective and objective. Objective tinnitus is a sound with a real source produced by blood flow, muscle contractions, or spontaneous emissions of the cochlea. This type of tinnitus which can be detected and measured by an external observer is uncommon. Subjective tinnitus is a common type of tinnitus in which only the patient hears the sound, while the sound has no outer source [14]. The physiopathology of subjective tinnitus is unknown, and certain theories, such as dysfunction of the cochlea, auditory cortex, dorsal cochlear nucleus, and somatosensory system, have been proposed for it [16, 51].

Table 4. Comparison of the hearing physiology and the tinnitus pathophysiology in conventional medicine and traditional Persian medicine

	Conventional medicine	TPM
Physiology of sound perception	Physical movement of air molecules outside the ear (sound source) → middle ear bones → wave movement in hair cells of the cochlea → electrical message → sound perception	Rubbing of two objects against each other outside the ear (source of sound) → wave-like movement in air particles → ear space → stimulation of auditory receptor → perception of sound
Pathophysiology of tinnitus	Cochlear, auditory cortex, dorsal cochlear nucleus, and somatosensory dysfunction → changing the gas transmitter (NO) level	Abnormal vapor (<i>Rih</i>) and its movement in the head or ear (source of sound) → stimulation of the hearing receptor → tinnitus

TPM; traditional Persian medicine, NO; nitric oxide

Table 5. Causes of tinnitus in conventional medicine and traditional Persian medicine

Tinnitus type	Characteristic	Classic medicine	TPM	
Objective tinnitus	The presence of a real source of sound that can be heard by others, except for the patient	Vascular	Fullness of the veins of the head and body	
		Muscular	Contraction of the ear and chewing muscles	
Subjective tinnitus	Absence of a real source of the sound (only the patient hears the sound)	Otolologic	Noise-induced hearing loss, age-related hearing loss, sudden sensorineural hearing loss	
			Cerumen impaction	Hearing loss related to weakness, Hearing loss due to dystemperament
			Meniere's disease	Hearing loss due to wet distemperament
			Otosclerosis	-
			Otitis	Hearing loss due to dry dystemperament
		Non-otologic	Head injury	Ear infection
			Multiple sclerosis	Head trauma
			Vestibular schwannoma and other tumors	Hearing loss due to brain dystemperament
			Infectious	Cancers
			Psychological Status	Head infections, febrile illness
Related to medicine and food	Depression and anxiety			
		Consumption of certain foods and herbal medicines		

TPM; traditional Persian medicine

NO is an important intercellular messenger in the regulation of nervous system function. Animal studies indicated that changes in the level of NO and its producing enzyme (nitric oxide synthase) might cause tinnitus. Nitric oxide has a significant effect on auditory neurons and signaling [52]. The Ventral Cochlear Nucleus (VCN) is one of the first nuclei in the auditory pathway that receives most of its input from the auditory nerve and is thought to be involved in the development of tinnitus and contains high levels of neuronal nitric oxide synthase [53].

The etiology of subjective tinnitus includes otologic and non-otologic causes. Otologic causes encompass noise-induced hearing loss, age-related hearing loss, otosclerosis, otitis, cerumen impact, meniere's disease, and sudden sensorineural hearing loss. Non-otologic causes of tinnitus include infectious (Lyme disease, meningitis, syphilis), psychological state, neurological diseases (head trauma, multiple sclerosis, vestibular schwannoma), drugs, and diet. The most common medications involved in tinnitus include salicylate, non-steroidal anti-inflammatory drugs, aminoglycoside antibiotics, loop diuretics, and chemotherapy agents [16, 51, 54, 55]. Despite differences in conventional medicine and TPM in the literature, some similar causes of tinnitus have been reported, such as hearing loss, infectious diseases, head trauma, psychological and vascular diseases, as well as food and medicine-related causes (Table 5).

Discussion

The history of tinnitus in ancient civilizations reveals that tinnitus has been a known condition for centuries, with different cultures having their own understanding of its causes and treatments [56]. The history of tinnitus in TPM dates back to centuries ago [57]. In TPM, tinnitus is considered as a manifestation of an underlying disease, with the etiology of tinnitus being attributed to a variety of factors such as coldness, dryness, and heat [44]. The treatment of tinnitus in TPM is based on a holistic approach that focuses on restoring the balance between the four humors of the body, which are blood, phlegm, yellow bile, and black bile [36].

TPM view on tinnitus was compatible with the idea of Greco-Roman medicine on this disease, which was

expanded by Persian scholars with more details [57]. The basis of the treatment of tinnitus in TPM was to pay attention to the treatment of other related diseases such as *gastrointestinal* disorders, especially bloating and constipation, the modification of temperament, returning the humeral balance of the body and use of medicinal herbs. The common treatment of tinnitus in TPM included lifestyle modification to balance the six essential principles in the patient's lifestyle, manual methods, and pharmacotherapy with herbal medicines [36].

TPM utilizes various medicinal plants for the treatment of tinnitus, many of which contain bioactive compounds that possess antioxidant and anti-inflammatory properties [58]. These properties may contribute to reducing oxidative stress and inflammation in the auditory system, potentially leading to a reduction in tinnitus symptoms. The potential mechanisms of these plants in the treatment of tinnitus are promising, as they may help prevent or reduce auditory nerve damage, as well as reduce the perception of tinnitus-related discomfort or pain [58].

In comparison to modern medicine, TPM provides a holistic approach to the treatment of tinnitus that takes into account the overall health and balance of the body. While modern medicine has made significant advancements in the understanding and treatment of tinnitus, TPM's holistic approach may provide additional benefits, particularly in addressing the underlying causes of tinnitus and promoting overall health [36].

Conclusion

In conclusion, tinnitus has been a known condition for centuries, with different cultures having their own understanding of its causes and treatments. Further research is needed to explore the potential mechanisms of these plants in the treatment of tinnitus and to determine their optimal doses and treatment durations.

Ethical Considerations

Compliance with ethical guidelines

The study was approved by the Ethical Committee of Mazandaran University of Medical Sciences, Sari, Iran. Code No. IR.MAZUMS.REC.1399.749.

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Authors' contributions

MA: Study design, acquisition of data, and drafting the manuscript; TA: Study design and supervision, interpretation of the results, and critical revision of the manuscript; AJ: Interpretation of the results and critical revision and submission of the manuscript; MH: Study design, acquisition of data, and drafting the manuscript.

Conflict of interest

The authors declare that they are no conflicts of interest.

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