TRADITIONAL AND INTEGRATIVE MEDICINE

Trad Integr Med, Volume 6, Issue 1, Winter 2021

Review

On the Therapeutic Applications of Music in Persian Medicine

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Received: 15 Nov 2020 **Revised:** 4 Feb 2021 **Accepted:** 9 Feb 2021

Abstract

Music history is as old as human history and it has been used as a way to reduce human suffering. Persian Medicine (PM) scholars as one of the oldest traditional medicines applied music for health and disease management. This study aims to introduce some of the views and recommendations of PM sages about importance and application of music in disease improvement. Definition and applications of music were collected from main PM medical text books and then databases including Science direct, PubMed, Scopus and Google scholar were searched to evaluation the efficacy of PM recommendations in conventional medicine from 1980-Jan-1 to 2020-Nov-1. PM used music and melody with several instruments to calm and soothe mind and body. Great PM scientists like Rhazes (10th), Farabi (10th) and Qutb o Din (14th), were dominant figures in terms of musical knowledge. They used music for treatment of several conditions including nervous system diseases (headache and epilepsy), sleep disorders, heart weakness and palpitation, digestive system disorders (gastrointestinal ulcer and appetite), sexual dysfunction, and also for pain management. Nowadays, some of their suggested applications are examined in research studies and are used in academic healthcare environments against several diseases. According to PM, to achieve the maximum impact of music effects in mind and body, several points should be considered including coordination of rhythm and melody with physical and mental characteristics and temperaments (Mizaj) of the listener and his/her illness. The duration of listening to the music can also be important. Attention to these points in today's research may lead to interesting results.

Keywords: Music therapy; Persian medicine; Traditional medicine; Avicenna

Introduction

Nowadays music therapy as a complementary therapy has an acceptable situation and in last decades many studies have been done about efficacy of music in disease improvement [1-4]. But attention to music in health and disease improvement is not related only to current century.

History of music indeed is as old as human history and the nature seems to be the first music teacher of the humankind [5]. The first systematic music instrument dates back to 45,000 years ago. It is

Citation: Gorji N, Moeini R, Mozaffarpur SA. **On the Therapeutic Applications of Music in Persian Medicine.** Trad Integr Med 2021; 6(1): 41-54.

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not easy to judge how and when humans started using music as a therapy, but it seems that even in the far past, when treatment was associated with mysterious concepts, the use of music was flourishing with the same purpose i.e. facilitating medical treatment [5,6]. Based on Egyptian papyrus records, music-healers who were both priests and therapists used music to impress the soul according to their religious beliefs about illness [6].

Moreover, one of the most influential medical schools and a source of knowledge to modern medicine is Persian medicine (PM), which grew in the Iranian plateau (600 A.D.) [7]. Nonetheless, many of PM books and references concerning music and its effects on diseases, particularly mental disorders, were not translated into Latin from Arabic, the scientific language of that time in Islamic countries. There are reasons for that a major one of which is the complexity of main concepts used in the expression of melodies and rhythms (*magham*) in this kind of music [8].

While the literatures on the history of music effects on diseases are not scant, based on our best knowledge, no complete study has published attempting to focus specifically on opinions of Persian scholars about this topic. Therefore, this study aims to introduce the history of music in PM, famous scholars and their viewpoints and recommendations about application of music in management of diseases.

Methods

Our study has three main phases. Firstly, short review about history of music therapy in Persian medicine was presented. In second phase the applications of music therapy from main PM books was extracted and finally in the third phase searching on new data was performed to find new evidences for those applications.

Applications and specific considerations of music were collected by searching specific key words including "music (*Musiqi*)" and sound or voice (*lahn*) in eight main medical text books of PM (Hedayat Almoteallemin Fi Teb by Al-Akhvini Al-Bokhari (8th century AD) [9], Masaleh al- abdan wa al- anfos by Balkhi (9th century AD) [10], Al-Havi by Rhazes (10th century AD) [11], Al-Qanun Fi Al-Tib by Avicenna (11th century AD) [12], Zakhireh Kharazmshahi by Jorjani (12th century AD) [13], Kholasat Al-tajarob by Razes (16th century AD) [14], Kholasat Al-hekma by Khorasani (18-19th century AD) [15] and Exir-e-Azam by Azam Khan (19th century AD) [16]) and key sentences and concepts were defined and coded. Moreover, using Noor software, these words were searched in other references as well. Then by constant comparison of data and codes, significant phrases about application of music in health maintenance and treatment were identified and registered thoroughly.

PubMed, Science direct, Scopus, Google scholar and Web of science were searched for all applications that were collected from above PM physician's references such as "Music therapy" and related words from 1980-Jan-1 to 2020-Nov-1.

Inclusion criteria were any systematic review and meta-analysis study, clinical or animal evidence of the efficacy of PM recommendations in English.

Findings

Persian medicine (PM)

PM, also known as the Iranian traditional medicine (ITM), is the sum of all the knowledge used in diagnosis, prevention and elimination of diseases in Persia from ancient times to the present which has been shaped on experience and analogy [17]. PM roots back to before 8000 years B.C. and it is a branch of the so-called Greco-Arabic medicine, or maybe the root of that, as quoted by Cyril Elgood [7].

Music therapy in Persia and the pioneers

Persia has been one of the few areas, which has persistently maintained its identity and individuality throughout history, a fact that is reflected in its classical music. Archaeological evidence reveals that musical instruments were used in Persia during the Elamite era around 800 BC [18].

However, little data were found about Persian music in the ancient world, especially concerning the music of the Achaemenid Empire. As it is stated, many important documents of knowledge from the large territory of Persia, including knowledge of medicine and music, may be destroyed in great attacks in different historical periods [18].

Evidence from the post-Islamic period is much higher; from many books that have survived after Islam, we understand Persian physicians used music and melody with several instruments to calm and soothe mind and body besides the different types of treatments such as phytotherapy, aromatherapy (utilization of essential oils from herbs), and touch-massage therapy (Fig1) [13,16,19,20].

Reference to music and its therapeutic effects are available in many medical books and treatises [13,20,21]

Some PM sages believed that the knowledge of the basics of music was a complete necessity for physicians, while others did not agree with this idea maintaining that mere understanding of what is suitable music for every patient sufficient for the therapist [22]. In this line, many of PM physicians were also musician.

PM scholars' attention to music is so substantial that music was not only used in treatment, but also considered essential in maintaining health of physique and soul [10].

"In the tangible pleasures, nothing can enter wisdom to the same extent as music which is the greatest gratification" [10].

In this point of view, each mode or "*Magham*" of music is a concept of melody that determines tonal relations and an overall indication of the melodic patterns [23]. Each *Magham* is associated with a specific part of body, affecting it more than other parts. Some *Maghams* of Persian music include Nava, Isfahan, Oshagh, Hoseini and Zangule [20].

Rhazes (854-925 AD) is one of the greatest scientists in the world who has been working on music effects in disease management. He built one of the biggest hospitals in Baghdad, one section of which was devoted to mental patients. He used music for treatment of his patients. He was oud player and wrote a treatise about music entitled "fil Jomale al-Musiqi" before the age of 30 [24-28].

Abu Nasr al-Farabi (872–950 AD), known as

Alpharabius, is very prominent in the science of music therapy. He explained theories, methods to apply, and purpose of music as well as a variety of rhythms and melodies in his books such as "*Ehsa'al' Ulum*" and "*Musiqi Kabir*" [21,29].

He dealt with music in his treatise "Meanings of the Intellect", in which he described the therapeutic effects of music on the soul: *"Music promotes good mood, moral education, emotional steadiness, and spiritual development. It is useful for physical health. When the soul is not healthy, the body shall also be unwell. Good music, which cures the soul, restores the body to good health"* [30,31].

He was so skillful in playing music and talented on music knowledge and its influences on body and brain such that dancing people would fall sleep within a few minutes of his specific music [32].

Avicenna (980-1037AD), was also a dominant figure in terms of musical knowledge. He described his opinions about music in "Ketab al-Shifa", "*Ketab' al-Najat*" and "*al-Madkhal ela Sanaate al Musiqi*". He also demonstrated pulse based on musical patterns [21].

The other scientist who used music for treatment was Qhutb al-Din Mahmud al-Shirazi (1236-1311 AD). He was no more than 14 years old when he was appointed as the head of *Mozaffariyeh* hospital in Shiraz. He was considered as an elite of his time in the fields of music and physics as well [33,34]. Qhutb al-Din, who was a skillful *rubab* player, had achieved a profound insight into music composition and thus prevented from the destruction of melodies; his descriptions on music are available in "*Dorat o Taj*" [34,35].

Indication of music therapy in PM

Pediatric advice

Persian scholars explained interesting points to be followed by parents during first days and months of child's birth. They emphasized listening to music, especially at low volume, during feeding. They proposed that such music can improve the infant's digestive system. Lullaby, which is defined as a quiet or soothing song that makes a child sleep, was also recommended.

"*Mother's milk is for growth of the baby's body and the music is for growth of the mind*" [36].

In this situation, light music and song were considered useful for improving the infant's intelligence and his/her strength of intensity and threshold of auditory system [9,14].

"Children enjoy hearing songs and melodies greatly, especially accompanied by gentle massage whereby they feel highly relaxed" [15].

Nervous system

Memory function

There is a kind of dementia in PM medical texts with similar signs and symptoms of Alzheimer disease and one of the therapeutic strategies to decrease the dementia symptoms is listening to appropriate music [16,37].

Headache

Sex-induced headache is one of the more than twenty types of headaches in PM that has different etiologies and treatments. Listening to appropriate music is considered helpful as a complementary therapy [16]. Music is also recommended to improve epilepsy and

dementia [22].

Auditory disease

Avicenna mentioned sports as the major principle for good health and elaborated on appropriate sport practices for different people and body organs. He recommended listening to music as a special sport and training for the auditory system. For this purpose, he advised listening to subtle tones more often but also sometimes loud sounds [12].

Sleep disorder

According to PM, listening to music has a hypnotic and modifying effect on sleep quality, particularly when it is played with natural voice and in special *Maghams*.

"*Among things that can induce sleep is listening to beautiful sounds in slow rhythm like Nahavand magham, sound of flowing water, and sound of wind blowing through trees*" [13]

"*And in treating insomnia especially resulted from sorrow and anxiety, nothing is better than beautiful music in slow rhythm*" [38]

Pain

Music was used for treatment of pain, especially joint pain, accompanied with oral medications, salves and ointments. To relieve the pain in different parts of body, different modes were recommended such as Nava (one of main modes of Persian music), which was used for sciatalgia [20].

Mental disorder

PM references of the medieval age encouraged the treatment of psychological disorders not only by tackling the circumstances that underlay or contribute to the disorder but also by applying phlebotomy, psychotherapy, music and color therapy, as well as other types of medicaments [39]. Evidence indicates that a certain place was available in hospitals to play and listen to music for patients with psychiatric disorders [40].

They frequently noted use of music therapy for treatment of melancholy and depression. However, as for sickness of love, the situation varied from patient to patient [12]

"*Treatment of fear and grief lies in hearing loud and rapturous singing*". In this situation, the *Hoseini magham* was recommended [13]. To treat vigorous anger, hearing light music and songs was suggested.

Cardiovascular disorder

The heart is of a special importance in PM and Persian physicians advised several recommendations for cardiovascular improvement like special diet, herbal medicine, exercise and psychiatric rehabilitation with aroma and music [12,41].

"*Among things that have a profound impact on heart strength and ignition of instinctive heat are joy, happiness, and ... and exhilarating music*" [38].

The *Zangule magham* was used to improve palpitation and reduce seething of blood in the vessels [20].

Digestive system

Persian physicians believed that music could increase appetite. Thus, thin persons were encouraged to listen to music to modify weight. Entertainment with music, if especially

accompanied by suitable diet, is one of the adjunct methods for increasing weight in PM [12]
PM sages proposed different etiologies and theories to manage the inflammatory bowel disease and intestinal ulcer (*sahj*) [42]. One of the most interesting recommendations was music therapy. After describing a medicinal treatment for this disease in his main book *Zakhire Kharazmshahi*, Jorjani wrote "*It must be known that hearing good songs and melodies ... has a great effect on the strength and merriment of the patient in the course of this disorder and helps him, furthermore, to forget the disease. This should not be overlooked* " [13].

Ascites

There are special advices and protocols for the treatment of Ascites in PM. In addition to medications and dietary modifications, listening to exhilarating music was recommended [16].

Sexual dysfunction

PM sages believed that sexual problems may have physical or psychological etiologies. So, to increase libido, they proposed listening to exhilarating music, in addition to eating suitable foods and smelling appropriate perfumes [43].

Skin care

According to PM, relaxing music besides proper physical exercise and nutrition can increase skin clearance, decrease skin ageing, and improve skin healing [43].

Fever

Fever is of a wide variety of types and etiologies and has a broad sense in PM. One type of fever is "*Day fever*", which is defined as having a temperature above the normal range due to physical or mental severe pressure. It can usually be resolved quickly unless physicians and relatives do not pay enough attention to the patient's condition. For treatment of this kind of fever, especially if it is caused by anger, it is recommended to listen to music on several occasions [12].

Dys-temperament treatment

An important characteristic of PM lies with its consideration of individualistic differences in both physical and psychological characteristics known as *Mizaj* or temperament, which leads to specified treatment for each individual. Some kinds of music used for dys-temperament modification of warm/dry and some others were beneficial for cold/moist. People with warm/dry temperament, are thin, irritable, have warm and dry skin and doing things fast; while people with cold/wet have opposite characteristics [44].
Given to appropriate music according to the temperament is important to the extent that *Onsor Al –Ma'āli said*:
"*In every community you go, look at audience and if he is red and demos, play exciting music mostly; if he is yellow and has bilious (choleric) temperament play treble, if he is lean and swarthy play sitar and if he is obese and white play also exciting music*" [45]
It also has been said "Listening to light music and songs is the most appropriate thing for people with warm and dry temperament" [45].
On the other hand, Music in the Aragh magham

is considered helpful for patients with cold temperament [20].

Consideration of the temperament is also important for music selection for other diseases [46].

Other diseases

Some references point out to the impact of music in managing other diseases such as paralysis, colitis, dysuria as well as abortion prevention [20].

New research about indications of music therapy in PM

New studies about effects of music in improvement of diseases mentioned in PM books were listed in table 1. In some indications which have much evidence only some of them were presented.

Due to the direct and clearer effects of music on the nervous system, more studies have conducted in this field. Positive results from music therapy have been reported in a wide range of mental illnesses from depression to complications of diseases such as Alzheimer's, multiple sclerosis, epilepsy and stroke [47-57]. Many studies have also shown the effect of music on sleep improvement [61-63]. One systematic review and metanalysis study by reviewing 20 studies emphasized on advantages of using music for primary insomnia as well [88]. Improvement of hearing in hearing impaired patients and decrease of tinnitus have been reported with training or listening to music [58-60]. Decrease in stress, anxiety and acute or chronic pain is also among the proven effects of music therapy [64-69].

In the field of obstetrics and pediatric medicine, large number of studies were conducted during last decades. One systematic review and metanalysis study by reviewing 14 appropriate reports from1803 relevant records, involving 964 infant participants and 266 parent participants concluded that there is sufficient evidence to confirm a large, favorable effect of music therapy on infant respiratory rate and maternal anxiety (91). Moreover, according to some studies live sound and parent-preferred lullabies can influence cardiac and respiratory function and may improve feeding behaviors and sucking patterns [92]. In addition, creative music therapy improved functional brain networks and integration, thalamocortical processing and prefrontal, supplementary motor and temporal brain regions in very preterm infants [93].

Other important fields are cardiovascular and respiratory systems. One systematic review and metanalysis showed that MT can significantly decrease systolic hypertension and insignificantly reduce diastolic hypertension. Decrease in frequency of congestive heart failure events, increase in parasympathetic activities, changes in cytokines and improvement of fatigue and quality of life in patients with heart failure were reported. Improvement of dyspnea severity and some spirometry parameters in patients with asthma are results of using music therapy in respiratory system diseases [75].

In gastrointestinal disorders, fewer studies have been conducted about music therapy and most of them were performed as an evaluation of gastrointestinal symptoms along with other symptoms in cancer patients.

Table 1: Evidence in new researches for indication of music therapy according to PM

Indication in PM		New evidence
Nervous system	**Nervous system and Mental disorders**	Enhance conventional cognitive rehabilitation in patients affected by multiple sclerosis [47]
		↓Stress, depression and anxiety in Alzheimer's Patients [48]
		20.5% reduction in average seizure frequency compared to the baseline in institutionalized subjects with severe/profound intellectual disability and drug-resistant epilepsy [49]
		Improving verbal fluency and alleviating the psychiatric symptoms and caregiver distress in Alzheimer's Patients [50]
		↓Agitation after traumatic brain injury [51,52]
		In combination with rehabilitation care lead to progressive development in listening abilities, creativity and improvement in rhythmic and melodic skills in patients with stroke [53]
		Useful in treatment of stroke-induced motor dysfunction [54]
		↓ Interictal epileptiform discharges [55]
		↑Secretion of 17β-estradiol, testosterone in Alzheimer’s disease [56]
		Improving motor function, emotion and social communication and enhancing quality of life in chronic stroke [57]
	Auditory system	Long-term normalized listening to tailor-made notched music, can significantly reduce the perceived tinnitus loudness in varying degrees [58]
		Music listening and training improved rehabilitation process of cochlear implant users [59]
		↓Subjective tinnitus over 12 months of individual, spectrally altered music-based sound therapy [60]
	Sleep disorder	Improved subjectively assessed short-term sleep quality [61]
		Improvement of insomnia and sleep quality after 6 weeks of listening to Persian traditional music [62]
		Improved sleep quality in traumatized refugees [63]
	Pain and Anxiety	↓Pain score and increase satisfaction with pain control during trans-vaginal ultrasound-guided oocyte retrieval procedure [64]
		↓ Chronic pain and improve midterm quality of life after mechanical valve replacement [65]
		↓ Pain level, and the anxiety level during labor [66]

		↓Anxiety and pain levels, ↑patient's well-being and improving the quality of care [67]
		↓ Stress-responsive anxiety and pain in the breast cancer patients [68]
		↓Dental anxiety due to listening to music especially Turkish music and classical music [69]
		↓ Pain and anxiety and ↑comfort during colonoscopy [70]
Obstetrics and Pediatric		Significant changes were observed in the number of uterine contractions, accelerations, episodes of higher variability, and fetal movements [71]
		↓Stress responses in autonomic, motor and state systems and thus affect vital signs of preterm infants during hospitalization [72,73]
		↑Mother's milk with higher fat content [74]
Cardiovascular		↓Systolic blood pressure and palpitation and ↓ heart rate [75,76]
		↓Frequent congestive heart failure events, parasympathetic activities, interleukin-6 (IL-6) Plasma, adrenaline and noradrenaline levels [77]
		↑Total exercise duration, Higher values of Maximal heart rate during exercise with music than without music [78]
		↓Fatigue in hospitalized patients with heart failure by listening to natural sound [80]
		↓Fatigue in hospitalized patients with heart failure by listening to natural sound [80]
Respiratory System		↓ Severity of dyspnea in patients with dyspnea [82]
		Improvement of FEV1/FVC and FEF25-75 and ↓ hospitalizations in asthmatic pediatrics [83]
		↓Inspiratory occlusion pressure for the first 0.1 s of inspiration (P0.1), ↑ maximum P0.1 in hospitalized patients with asthma exacerbation [84]
Digestive system		↑Amplitude of gastric myoelectrical activity in healthy humans. Improve gastric motility and may be used to stimulate gastric emptying [85]
		↓Production of acid in the stomach [86]
		↓Chemotherapy-related nausea/vomiting in patients with early stage colorectal cancer [87]
		A single, in-person, tailored music therapy intervention improved nausea and appetite in inpatient individuals with cancer [88]
Sexual dysfunction		Affects the testosterone level in both sexes [89]
Skin care		↓ Skin wheal responses induced by latex [90]
Fever		↓ Plasma interleukin-6 (IL-6) [77]

QOL: Quality of life, HF: Heart failure, FEV1/FVC: Forced Expiratory Volume and Forced Vital Capacity

Figure 1: Persian classic music

Discussion and conclusion

Result of this study showed, at least in some parts of the long PM history, knowledge of principles of music, and its benefits and use in health care were necessary for physicians [22]. It was so essential that knowing the principles of music was among the eight basic required sciences for medical education. Also, PM scholars recommended several musical instruments, tones and lyrics for different situations [20]. They believed each kind of music have different effects on function and metabolism [10]. This issue was investigated on patients' preoperative anxiety in one clinical trial and results showed different types of music) natural sounds, Classical Turkish or Western Music) had various effects on blood pressure and heart rate [94].

The historical evidence suggests that the use of music in the treatment of patients in ancient era was so widespread that in various hospitals like *seyedi Faraj* hospital in Marakesh, imitating Jundishapur hospital (3rd century AD), one ward was devoted to music therapy [95].

Iranian physicians had understood the profound impact of music on the mind and body and as in other therapies, individual differences were considered as important factors, so in use of music therapy, they also considered this issue, so that *Onsoro al maali* introduced ability to play commensurate with listener status as the most important ability and art of musician [96]. Since personalized medicine is recently taken into consideration in the different fields of medicine as precision medicine or individualized medicine, it seems attention to this area is also necessary in music therap. because according to PM, differences in temperament can also contribute in biochemical processes and cell structure which is also approved by some recent evidences [97,98].

Nowadays, some of PM's suggested music therapies are examined in researches and are

used in academic healthcare systems. One of these fields is psychiatric and mental diseases like depression, anxiety, Alzheimer's disease and dementia, and also psychosomatic disorder like some types of diabetes [99-101]. On the other hand, our search results showed no relevant studies about some other indications like fever, ascites and inflammatory bowel diseases. Studies about sexual disorder, cardiovascular disease and other digestive system dysfunction were also limited; so these aereas may be suitable topics for future studies.

Additionally, this study shows the history of using music in the treatment of certain diseases can be much longer than the comments in some articles as Huan Liao et al. which attributed the history of using music therapy in epilepsy to 1970 [102].

Moreover, despite large number of studies on music therapy, there is little new information about the effect of classical Persian music on diseases. Meanwhile, one case report showed the positive effects of passive listening to Persian music with the Iranian *daf* instrument on the hand dexterity and depression in a patient with chronic stroke [103].

Another study showed music therapy with *santur* (a Persian string instrument) as an adjunct to standard care, showed acceptable effectiveness in reducing obsessions and co-morbid anxiety and depressive symptoms in patients with obsessive compulsive disorder (OCD) [104].

One clinical trial was designed to examine the effect of selective soothing music on fistula puncture-related pain in hemodialysis patients. A few pieces of familiar Persian folklore/traditional/soothing music were initially selected by the experimenter on the basis of patients' social and cultural background. According to the results, authors suggested that music can be effective for pain related to needle insertion into a fistula in hemodialysis patients [105].

Controversially, the results of some clinical trials showed no significant effects from music therapy [106,107].

In all, to achieve the maximum impact of music therapy according to PM, several points should be taken into account including coordination of rhythm and melody with physical and mental characteristics of the listener and his/her illness. Time of listening to the music can also be important. Therefore, further comparative and interdisciplinary studies are recommended be conducted in this regard.

Conflict of Interests

None.

Acknowledgments

None.

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