Review Article

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MUSIC AND ITS THERAPEUTIC EFFECTS ON THE HEALTH OF THE HEART

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ABSTRACT

Music has been a therapeutic tool for many centuries. Still, it was only with the development of modern scientific medicine in the late 19th and early 20th centuries that its use in therapy began to be based on more solid scientific evidence. Today, we know that music can have a powerful effect on the heart, and research has shown that certain types of music can help improve heart function. This review explores the latest scientific findings on how music affects the heart and the different music types that may benefit heart health.

KEYWORDS: Music, Heart, Heart failure.

INTRODUCTION

In 2012, the Centers for Disease Control and Prevention (CDC) collected data showing that nearly 33% of adults in America had used alternative therapies during the preceding year (1), and other studies show that 12% - 64% of people fail to tell their doctor about this use (2). The American Academy of Family Physicians advocates for evidence-based evaluations of integrative medicine to support patient education, treatment, and counseling, given its increasing popularity (3).

For thousands of years, people have documented the impact of music on the body and mind. The use of music as therapy is based on the belief that it has a healing power that can benefit the body and psyche. In studying the therapeutic effects of music, researchers have often focused on cultural and social factors that may explain how music can be used for education, emotional and spiritual healing, and religious purposes (4).

According to music anthropological research and ancient theories about the origins of illness, music may have been employed in preliterate civilizations as a particular type of communication to ask spirits to use their "magic" healing abilities (4). Music has been used therapeutically since the Palaeolithic eras due to the idea that it has beneficial benefits on several body systems, including the cardiovascular system (5).

The ancient Greek philosopher Pythagoras believed music was a mathematical concept based on harmony and proportions. He used music to treat both physical and mental illnesses. He believed that by understanding and recreating the harmony of the universe through music, people could achieve inner peace and balance and even cure mental illnesses. It is important to note that the scientific foundations of psychology and medicine were not established until the late 19th and early 20th centuries, allowing the field of music therapy to progress from lacking scientific foundation to being rooted in more substantial scientific evidence (4).

Dr. Kane's 1914 letter to the American Medical Association documented the successful use of phonographs in operating rooms to soothe patients before administering general or local anesthesia, thereby recognizing the potential advantages of music in hospital treatments (6). Following that, the first musicotherapy course started in 1918 at Columbia University (7). Due to its accessibility, accessibility, simplicity, and reduced risk, music therapy holds promise as a comprehensive form of treatment (8). This review article will review the evidence of music's beneficial effects on heart health.

Music and the Brain

Studies on musical comprehension in people with brain injuries and brain scans of listeners show that music perception involves activity in both brain hemispheres. Some brain circuits have a specific response to music, but these same circuits also process other sounds. For example, the brain region that governs perfect pitch also plays a part in voice sense, and the auditory cortex, located above the ears, receives sounds, including music. Pitch perception, as well as various elements of melody and rhythm, are primarily processed by the right hemisphere. The left hemisphere excels at processing abrupt shifts in frequency and intensity in music and language in most people. To fully comprehend rhythm, both

hemispheres of the brain must be activated. Additionally, the frontal cortex of the brain contributes to the perception of rhythm and melody and is involved in working memory (9).

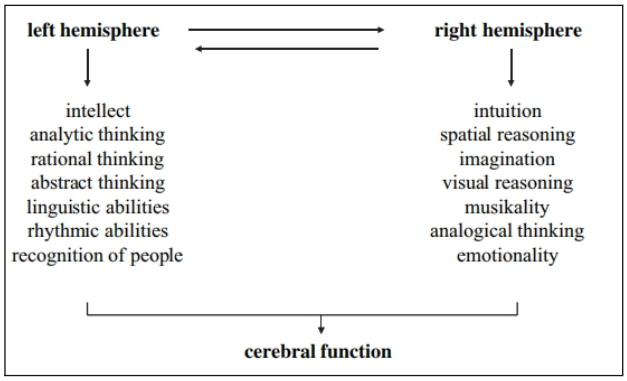

Fig. 1: Brain Association Areas

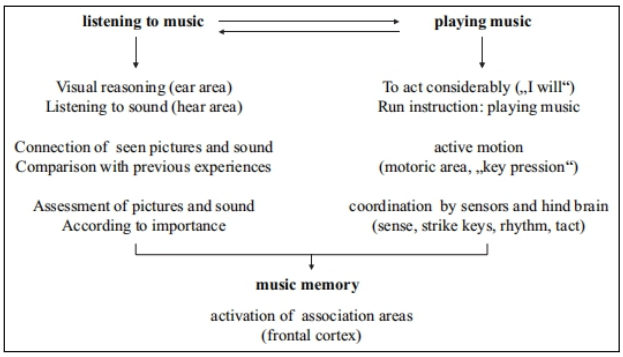

Fig. 2: Music and the Brain

Music and its Cardiovascular Effects

Heart failure (HF) patients commonly exhibit higher heart rates, decreased ventricular electrical stability, and heightened susceptibility to arrhythmias (10,11). Therefore, treatments that elevate the vagal activity of the heart have the potential to mitigate the incidence of arrhythmias and cardiac-related death. Studies show that a reduced QT interval has also been found to have protective effects on the heart by lowering the likelihood of arrhythmias and cardiac-related death (12).

The processing of the musical signal by the CNS involves the limbic system, diencephalon, and brainstem (13). Studies show that relaxing and pleasant music attenuates the sympathetic pathway and activates the autonomic parasympathetic pathway (14-15). Decreased sympathetic activity has been shown to have several physiological effects, including reduced heart rate, a lighter cardiac strain, and more stable ventricles (15). These effects may help reduce the risk of arrhythmias and sudden cardiac death in people with HF (12).

β-adrenergic receptor antagonists are commonly used to treat HF, but listening to music may provide additional benefits by amplifying the effects of these medications. It is possible that listening to music after a heart attack may prevent the sustained elevation of sympathetic tone that can lead to HF. Additionally, listening to calming music lowers blood levels of stress chemicals such as adrenaline and norepinephrine (16).

A randomized controlled study was conducted on 159 HF patients over a six month period. The study found that patients in the experimental group, who listened to music for a minimum of 30 minutes daily from a pre-selected playlist for three months, exhibited marked improvements in heart failure-specific quality of life, general quality of life, sleep quality, anxiety and depression levels, and cognitive abilities, compared to the control group, which received regular treatment (17).

Research comparing the effects of nature sounds and Benson Muscle sounds on fatigue in patients with HF suggests that nature sounds could be a viable alternative in this population (18).

Music and its Endocrine and Neurochemical Effects on the Heart

HF patients have been found to have higher levels of circulating catecholamines. Vasopressin and endothelin can be released when the renin-angiotensin-aldosterone axis is activated by increased adrenergic receptors in the circulation. In patients with HF, this may result in decreased compliance and increased blood volume (19,20). Calming music may help reduce the negative effects of tachycardia and anxiety by lowering plasma levels of catecholamines (21).

Relaxing music has positive effects on vascular features, including increased release of nitric oxide due to activation of β-endorphins and impact on hormonal status. Studies show that self-selected happy music can enhance arterial function by increasing flow-mediated dilatation and reducing arterial stiffness. These positive effects are primarily due to the dilation of small- and medium-sized peripheral arteries and arterioles (22-25).

Music and its Immunological effects on the Heart

In HF patients, proinflammatory cytokines like interleukin-6 and TNF are often found in higher concentrations in the blood (26, 27). These cytokines have been shown to alter the biology of heart muscle cells and the composition of the cardiac extracellular matrix in HF patients. Additionally, increased levels of angiotensin II, noradrenaline, and adrenaline can harm the peripheral vasculature, the structure and function of the left ventricle, and the conditions that affect cardiac loading. These factors can specifically stimulate the release of neurohormones, cause tissue breakdown, lead to salt and water retention, and impair ventricular function (12, 28).

The immune system is modulated by listening to soothing music, which lowers proinflammatory signals and raises IgA levels (28). Research has indicated that music therapy reduces histamine, plasma levels of interleukin-4, 6, 10 and TNF, as well as increase the number of CD8+ T-cells and natural killer cells (29, 30). Since the neuroimmune reflex interacts with the humoral immune system and directly impacts immunomodulation, people with HF may benefit from the cardiovascular advantages of relaxing music more than others. (31-32).

Music Selection

Classical music (Bach, Mozart), a key component of music therapy, is most beneficial to a patient's health. Classical music would be most advantageous for patients suffering from anxiety, mental illnesses, cardiovascular problems, pain, stress, or sleep disturbances because the sounds are sluggish and the beats are few, meditation music has a relaxing effect (9).

Rap and hip-hop are less often successful because of the sounds, yet they frequently have an effect brought about by their words, of which the crucial component is the rhyming pattern. There needs to be more research on jazz's impact on health. The samba, tango, cha-cha-cha, and rumba are examples of Latin American music. Mambo and reggae both have strong rhythms. They promote good feelings, a movement-inspiring disposition, and upbeat energy. It enhances motivation and incites activity (9).

Compared to music therapy, listening to music is a more direct intervention. Music therapy is a methodical procedure that draws on various sophisticated conceptual frameworks based on controlled, in-depth musical experiences. The effectiveness of music therapy depends on the therapist and patient developing a deep bond and using music to ignite transformative energies. In contrast, listening to music involves playing pre-recorded music (usually through a smartphone) that may be based on evidence or selected by the patient or healthcare provider. This lacks the complexity and interpersonal connection of music therapy. With a committed music therapist, results are probably most positive and quick. Despite being more thorough and effective than music listening, music therapy needs more specialized resources and financial support (12).

The full potential of music as a healthcare tool remains unexplored, making it uncertain whether patients will benefit more from one approach than another. Given that heart failure is a chronic condition, the cost of having a professional music therapist may be high. Conversely, listening to music is a cost-effective self-care option that can be seamlessly integrated into the regular care routine of heart failure patients, benefiting both the individual and the healthcare facility (12).

For patients with HF, using recorded music playlists appropriately crafted to suit their musical and aesthetic tastes is an appropriate adjuvant therapy method.

CONCLUSION

There are many different physiological, psychological, and emotional changes that occur while you listen to music. This review has emphasized the data supporting the notion that music inhibits pro-inflammatory signals, improves humoral and cellular responses, promotes brachial flow-mediated dilatation, and elevates cardiac vagal activity. Music, thus, plays a significant influence in people's lives and, consequently, in medicine. Listening to music as an adjuvant therapy could enhance the benefits of beta-blockers and other care plans, leading to positive psychological and physiological effects on the heart. This cost-effective approach could be beneficial for patients.

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