



Influence of Music on Human Body

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Received Date: June 07, 2021

Published Date: July 07, 2021

Introduction

It is a proven fact that Music has pertinent effect on its listeners. Whether psychological or Physiological, music does wonders with those who acquainted with it. The benefit of learning vocal music and its practice to overcome the breathing and speech disabilities is accepted beyond doubt, but it may be a surprise for anyone that problems of Autism are also manageable as already discussed in several occasions earlier. In a broader perspective, music work like a stimulant to break the dullness, recouping a person to work more vigorously. It is a fact that listening to music is an enjoyable experience for many people and it also helps them in alleviating all their pains and discomforts. This could be possible by stimulating their nostalgic concepts and by bringing positive vibrations in their mind to some extent. But, a significant question arises here that, which type of music and which particular aspect of that music makes it relaxing or revitalizing [1].

Further, to understand the effect of any sound on an individual, firstly it is important to know the path followed by a sound to reach its destination i.e., the brain; starting from where it was emanated till it reaches the various auditory centers in the brain. There are many physical and chemical activities taking place in this whole process. Let us first understand about the brain and the auditory nerves [2].

Chemical Reactions in the Brain

The human brain contains several hundred different types of chemical messengers called the neurotransmitters. These neurotransmitters act as communication agents between different brain cells. They relay signals between nerve cells, called "neurons." These chemical messengers are the molecular substances which affect a person's psychological aspects like mood, anxiety, fear, aggression and also the physiological functions like - sleep, heart

rate, body temperature, weight, appetite etc. They can cause adverse symptoms when they are out of balance. There are two kinds of neurotransmitters - Inhibitory and Excitatory. Excitatory neurotransmitters are the ones which stimulate the brain. Those that calm the brain and help in creating a balance are called inhibitory neurotransmitters. They help in balancing the mood and are easily depleted when the excitatory neurotransmitters are overactive [3].

There may be many reasons for the depletion of the level of neurotransmitter like-stress, poor diet, genetic predisposition, drugs (both prescribed and recreational), alcohol, caffeine usage etc. These elements may cause the levels of neurotransmitters to go out of optimal range. Lower levels of neurotransmitter can cause severe personality and emotional changes in a person. Out of the many neurotransmitters present in the brain, Serotonin and Dopamine are two such neurotransmitters which primarily influence an individual's mood and emotions and are therefore relevant in the present context [4,5].

Serotonin is an inhibitory neurotransmitter, which means that it does not stimulate the brain. Adequate amounts of serotonin are necessary for a stable mood and to balance any excessive excitatory (stimulating) neurotransmitter firing in the brain. Serotonin also regulates many other processes such as carbohydrate cravings, sleep cycle, pain control and appropriate digestion. Low serotonin levels are also associated with decreased immune system function. A lack of serotonin may cause sleeplessness, a general feeling of emotional emptiness and paranoia or fear [6].

Dopamine is a special neurotransmitter because it is considered to be both excitatory and inhibitory. Dopamine is associated with the pleasure centers of the brain. It is responsible for feelings

related to love, joy, pleasure, reward, and motivation. Some of the causes of dopamine depletion are stress, alcohol withdrawal, obesity, poor nutrition, certain food stuffs and drugs. Lack of dopamine in the brain causes feelings of low energy, depression, and lack of motivation.

What are brainwaves?

The root of all our thoughts, emotions and behaviors is the communication between neurons within our brains. Brainwaves are produced by synchronized electrical pulses from masses of neurons, communicating with each other. When slower brainwaves are dominant, one may feel tired, slow, sluggish, or dreamy. The higher frequencies are dominant when one feels, wired or hyper-alert. Brainwaves reflect different aspects when they occur in different locations in the brain. Brainwave speed is measured in Hertz (cycles per second) [7-9].

Delta waves (0.5 to 3 Hz)

Delta brainwaves are the slowest brainwaves. They are generated in deepest meditation and dreamless sleep. Delta waves suspend external awareness and are the source of empathy. Healing and regeneration are stimulated in this state.

Theta waves (3 to 8 Hz)

Theta brainwaves occur most often in sleep but are also dominant during deep meditation. This state is best suited for learning and retention. In theta, the senses are withdrawn from the external world and focused on signals originating from within [10].

Alpha waves (8 to 12 Hz)

Alpha brainwaves are present when thoughts are quietly flowing in the brain. Alpha is the resting state for the brain. Alpha waves aid overall mental coordination, calmness, alertness, mind/body integration and learning.

Beta waves (12 to 38 Hz): Beta brainwaves dominate a person's conscious state, when attention is directed towards cognitive tasks and the outside world. Beta wave signifies a 'fast' activity. This brainwave is present when an individual is alert, attentive, engaged in problem solving, judgment, decision making, and involved in focused mental activity. Beta brainwaves are further divided into three bands: Low Beta (Beta1, 12-15Hz) Beta (i.e. Beta2, 15-22Hz) and High-Beta (Beta3, 22-38Hz). Beta2 is a state of high engagement and the state of beta3 has highly complex thought, integrating new experiences, high anxiety, or excitement. It should be noted that continual high frequency processing is not a very efficient way to run the brain, as it consumes a tremendous amount of energy.

Gamma waves (38 to 42 Hz)

Gamma waves are the fastest of brainwaves and relate to simultaneous processing of information from different brain areas. It passes information very rapidly. Since it is the most subtle of the brainwave frequencies, the mind has to be quiet to access it [11,12].

The brainwave pattern of an individual is very much interrelated to his daily activities and experiences of the world. It changes according to what a person does and feels. When the brainwaves are out of balance, there will be corresponding problems in the emotional or neuro-physical health. The result of various neurological research conducted in this area substantiates and identifies that, specific brainwave patterns are associated with all sorts of emotional and neurological conditions.

From the above paragraphs, it has become clear that a balance in the level of neurotransmitters and having a congenial brainwave state is an indication of a healthy brain and ultimately a healthy body [13].

Binaural Beats and its Effect on Human Brain

In this context, a well-accepted theory about the sound frequencies and the human brain comes into picture. According to this concept, the frequency of any sound coming from an external source when reaches the brain, has the potential to alter the frequency of the brainwave, bringing it at par with that frequency of the external sound. Now, if it is desired to bring down the brainwave state of an individual from beta to alpha or theta level, it may be done by making him listen to a musical piece having a frequency level of alpha or theta waves. Since the frequency of alpha and theta are very low and beyond the listening range of an individual (i.e. 20-20,000 hertz), the concept of binaural beats may be used, wherein the person is made to listen to a piece of music using headphones and it is so adjusted that two different frequencies are given from each ear in such a way that the difference between these two frequencies matches with the frequency level of alpha or theta waves. This frequency will in turn reach the brain and will bring down the existing beta waves to alpha or theta waves. Thus, an individual, who is over excited due to the presence of an increased beta level frequency in his brain, can calm down by listening to the binaural sound. This concept may be used to manage psychological problems like hyperactivity and anxiety, wherein the frequency of the brainwaves is believed to be high (beta waves). The same idea may also be used to manage disorders like depression etc. when the existing frequency of the brainwaves is supposed to be low. This situation may be managed by giving a higher frequency from the external source which will raise the frequency of the brainwave from theta to beta level [14-17].

Acknowledgement

None

Conflict of Interest

No conflict of interest.

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