

Music: The Magic Medicine

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ABSTRACT

Music is an invisible vibration or wave of multiple frequencies which can be felt by the living world and are capable enough to bring about certain changes in the human cognition and behaviour. It can create such an impact in the mind, which chemical drugs alone cannot. According to the string theorist, each and every particle of our whole Universe is in constant motion and vibration of specific frequencies (Cosmic Microwave Background radiation) and so do our Mother Earth (the Schumann resonance, 7.83 Hz) along with its living organisms. According to Sir Nikola Tesla, “if you want to find secrets in the Universe, think in terms of energy, frequency and vibration.” The waves either may be constructive or destructive ones along with its frequencies. With this concept various music and sound were used as constructive waves or healing frequencies to heal various ailments. Evidences of these type of healing were specially mentioned in our ancient scriptures like Sama Veda and Gandharva Veda. At that time, even cure for Mana Vikara were mentioned using music therapy by Acharya Charaka and Acharya Sushruta. Now a days, music therapy is being under research in the area of neurodegenerative disorder, psychological dysfunction, better cognition and memory, etc. According to World Health Organization recent report, approximately one billion of the population suffer from various neurodegenerative disorders, out of which 50 million suffer from epilepsy and 24 million from Alzheimers and others from dementia. Again, in other reports of WHO show that one in every eight people or 970 million people of the whole world is suffering from various mental illness caused by anxiety, trauma, fear, crisis and critical conditions. Scientists, researches and doctors are carrying out thorough research to cure these patients by the application of non-invasive music therapy. Although, in recent decades, various researches eagerly worked upon deciphering the mystery of music to cure certain ailments. Even the bio-chemical mechanism of the signalling pathway causing synaptic neuroplasticity is still under research.

Keywords: Human Cognition, Mental Health, Music Therapy, Neurodegenerative Disorders, Neuroplasticity, Raga Chikitsa

Music is an aesthetic beauty where a single note within combined multiple notes is capable enough to affect the human emotion and psychological changes. The interest for music therapy is shifting from socio-cultural to human neurology and cognition. Music basically defies a combinatorial composition of vocal and /instrumental producing harmonious impact in mind and emotion as elaborated by Sumathy (2007). The mysterious power of changing human emotions very deeply depends on the tone, note and

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frequency of music. Infact, the full form of **MUSIC** is **Mind Uninterrupted Soulful Intriguing Caravan** which highlights its incredible contribution to consciousness and cognition. In other words, music (a particular group of multimodal sounds) is efficient enough to effect thought processing of mind which is controlled by the signalling of multiple neural networks in the human brain. Nowadays, various types of research is ongoing on music therapy and sound therapy along with its connection to human psychology, behavioural pattern cognition, etc. Malik and Mishra in 2019 reported music as a remedy for various psychological disorders. Research has been also ongoing on music affecting neuroplasticity (i.e., formation of new neuronal connections) within the human brain. Again, many researchers like Goldstein in (1980) and other doctors are recently using music therapy along with medicine to cure many human ailments viz., Alzheimer's, cancer, etc. It has been already reported that music has a strong contribution in memory, speech, language function, logical thinking, cognitive skills, bimanual coordination. In other way, it can influence brain neuroplasticity, i.e., reorganization or rewiring of neuron according to the extrinsic and intrinsic factors. Thus, forming new neuron to neuron connection called neurogenesis via sending signals and bringing about a morphological and biochemical change ultimately leading to psychological transformation, the evidence of which has been reported by Angelucci and others in 2007. Human brain is a very complex network of signal processing circuit consisting of billions of neuronal and non-neuronal cells. Out of various parts of the human brain, the amygdala, a part of the temporal lobe plays the pivotal role expressing various emotions with respect to various external stimuli. It is also responsible for memories, social behaviour and cognition. The brain auditory cortex is another most vital portion which helps to receive and process sound waves of various frequencies and transduce the signal to amygdala for expression. So, the human brain is a mystical natural processes or converting the vibrations into electric impulses which is being transmitted from neurons to neurons resulting in secretion of various hormones and cognition accordingly. For example, various fMRI reports have been found showing release of dopamine from brain in response to listening to music of their personal choices (also reported by Salimpoor and others in 2011). Even, increase of proper blood circulation was also observed within the brain in some of the cases. Although, harmonious music were found to be more effective and desirable than the non-harmonious ones.

MUSIC THERAPY IN ANCIENT SCRIPTURES

Music has been used as a tangible therapeutic alternative from the ancient Vedic period whose mention has been made in *Atharva Veda* (translated by Whitney in 1971). The mention *Raga chikitsa* could be found in the *Sama Veda* too. The practice of chanting rhythmic *slokas* by the ancient sages for various reasons were mentioned in ancient Hindu texts (*Bhagavad Gita* Chapter 13, Verse 5). In another ancient scripture, *Yajnavalkasmrti* (Yj_3.115 and Yj_3.116), the essence of music has been described as an eternal bliss and a pathway towards liberation (*Moksha*) to the aspirants if practiced diligently. The practice of music has been described as an auspicious blessing of the Gods by Abhinavagupta in his book *Natyashastra* (Chapter 36 verses 26,27 and 28). *Nada Yoga* and *Mantra chikitsa* has been also highlighted in the ancient Hindu scriptures revealing the combination of sound vibrations in balancing the energy system of the body (also mentioned by Sairam in 2006). Even mention of music therapy were found in *Charaka Samhita* and *Susruta Samhita*, the two famous Ayurvedic books (edited and translated by Pandit Rajeshwar Dutta Shastri in 2011 and Yadavji Trikamji Acharya in 2002 respectively). Acharya Susruta, the father of Indian surgeon, used music therapy to bring patient out of coma and Acharya Charaka used the therapy to clear the patient's diffused mental state. According to ayurvedic concept as mentioned by Acharya Sushruta (edited by Yadavji Trikamji Acharya in 2002), imbalance in

all the three gunas (*satwa*, *rajas* and *tamas*) creates suffering and illness (the doshas of *vata*, *pitta* and *kapha*) both physical and mental. It has been also mentioned by Ramu and Venkataram in 1985 that mental illness is connected to physical suffering and vice versa as our body is connected to our mind. Raga chikitsa of specific *praharas* (time) were shown to bring balance in psychological, emotional and neurological balance thus helping in *Mana Vikara* as reported by Sairam in 2005. Thus, this therapy also helps to enhance our consciousness and also balance the vital energy points called the *Chakras* as mentioned by Sumathy in her work (2004). In very recent study, exposure to music in prenatal human offsprings showed some particular neural representation which lasted for a few months after birth which may clearly depict the concept of education remaining inside the mother's womb. According to *Charaka Samhita*, *Jaatisootriyamshariram*, chapter 8, refers application of music (geet) as a remedy for wellbeing and protection for mother and newborns (edited by Sharma and Bhagwan in 2010). In Acharya Sushruta's *Sharirsthana*, Chapter 10, *Garbhiniyakarana* (edited by Shastri in 2015), he refers the use of *mangalmaya* things in *sootikarana*. Again, in another Ancient scripture, *UttaraSthana*, Chapter 1, *Balopcharniya*, Acharya Vagbata referred the advantage of particular hymn recitation in the inactive newborns' right ear (edited by Murthy in 2012). Moreover, non-melodious *Mantra* (both single or multiple *akshara*) chanting with specific rhythm, tone, overtones and tonic vibration has been said to be very effective and that's why the Vedas, Puranas and Upanishads were scripted so.

The great ancient Greek philosopher Plato also said, "music and rhythm find their way into the secret places of the soul." He also explained that music is a moral law. It gives soul to the Universe, wings to the mind, flight to the imagination and charm and geity to life and to everything." He also observed that Human behaviour flows from three main sources: desire, emotion and knowledge." Famous philosopher Socrates also believed good harmony and rhythm results to good disposition. Aristotle also believed that music can purify soul. Mention should be made of the famous Greek mathematician Pythagoras, who discovered the mathematical ratios of the sound frequencies of the intervals between two notes in primary harmonic system. In the 20th century, Dr. Joseph Puleo and Dr. Leonard Horowitz discovered the concept of healing frequencies of music known as the Solfeggio frequencies which can calm and heal mind states required for a person's well-being. Mention should be made of the valuable contribution of Sir Ludwig Van Beethoven for his famous discovery of the Beethoven's 5th symphony i.e., C minor in music in the late 18th centuries. The music therapy were carried out in various countries but Sir Thayer Gaston was, a famous psychologist also known as the Father of music therapy carried his research in United States during 1940s. Whereas Dr. T.V. Sairam a former civil servant (IRS) was known as the father of music therapy in India.

THE NAVARASAS AND RAGA CHIKITSA

Music of various combinations of frequencies and tones causes various impact to listener's mind to evoke the Navarasas i.e., *Sringara*, *Karuna*, *Shanta*, *Vira*, *Advhuta*, *Hasya*, *Abhyanka*, *Krodha* and *Vibhatsa* meaning love, sadness, peace, dignified, wonder, laughter, fear, anger and disgust respectively as observed by Sarkar and Biswas in 2015. In Indian Classical system overall 7 swaras with 12 tones octave division are practiced. Again, there are a number of Ragas, each of which is composed with a combination of various tones each having various frequency ratios, depicted in Table 1, as mentioned by Mathur and others in 2015. According to those frequency compositions by our Great ancient composers also mentioned the time span (*praharas*) of its practice for the benefit of the listener or the practitioner. According to the time theory of *ragas*, the experts classified them into *prahares*

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by usage of *shuddha*, *komal* and *teevra swaras*. Table 2 depicts the various ragas along with their *praharas* of practice contributing different benefits (reported by Malik and Mishra in 2019). The concept of time theory of the *ragas* and its possible benefits has been also reported by Arora in 2022 and by Sarkar and Biswas in 2015. Moreover, mention should be made of few many ragas whose essence could be perceived at its highest in particular season or nature's condition. Moreover, it has been experienced by the experts that the *Madhyam* (Ma) *swara* plays a pivotal role in the mood and mind of a listener. Again, it has been also experienced that the ascending *swaras* (*arohan*) were beneficial to start an energetic work while the descending *swaras* (*aborohan*) were frequently used to bring the mind to calmness.

Table No. 1 Music intervals in Hindustani classical music (as mentioned by Mathur and others in 2015)

Interval name (swara)	Abbreviation used	Western scale (Interval name)	Frequency ratio	intonation (Cents)	12-TET (Cents)
<i>Shadja</i>	<i>Sa</i>	Perfect unison	1	0	0
<i>Komal Rhishabha</i>	<i>re</i>	Minor second	16/15	112	100
<i>Shuddha Rhishabha</i>	<i>Re</i>	Major second	10/9	183	200
<i>Komal Gandhara</i>	<i>Ga</i>	Minor third	6/5	316	300
<i>Shuddha Gandhara</i>	<i>Ga</i>	Major third	5/4	386	400
<i>Madhyama</i>	<i>Ma</i>	Perfect fourth	4/3	498	500
<i>Teevra Madhyama</i>	<i>ma</i>	Tritone	45/32	590	600
<i>Panchama</i>	<i>Pa</i>	Perfect fifth	3/2	702	700
<i>Komal Dhaivata</i>	<i>Dha</i>	Minor sixth	8/5	814	800
<i>Shuddha Dhaivata</i>	<i>Dha</i>	Major sixth	5/3	884	900
<i>Komal Nishada</i>	<i>Ni</i>	Minor seventh	9/5	1018	1000
<i>Shuddha Nishada</i>	<i>Ni</i>	Major seventh	15/8	1088	1100
<i>Shadja</i>	<i>Sa'</i>	Perfect octave	2	1200	1200

Table No. 2 List of some Ragas along with their praharas and their possible benefits (and as mentioned by Arora in 2022 and by Sarkar and Biswas in 2015)

Sl.No.	Ragas	Timmings	Benefits
1,	<i>Asavori</i>	Morning (8am-10am)	Builds confidence
2,	<i>Bageshri</i>	Night (10pm-12pm)	Cures insomnia
3,	<i>BasantBahar</i>	Midnight (12am-3am)	Cures Gall Stones
4,	<i>BhimPalas</i>	Evening (3pm-6pm)	Cures Anxiety
5.	<i>Darbari</i>	Night (9pm-12am)	Sedative
6.	<i>GurjariTodi</i>	Late morning (9am-12noon)	Cures cough
7.	<i>Kedar</i>	Night (8pm-10pm)	Cures Headache, Common Cold, Cough, Asthma
8.	<i>Puriya</i>	Evening (6pm-8pm)	Cures Colitis, Anaemia, Hypertension
9.	<i>Yaman</i>	Evening (6pm-8pm)	Cures Rheumatic Arthritis
10.	<i>Bhairavi</i>	Morning (10am-12noon)	Cures T.B., Cancer, Severe Cold, Phlegm
11.	<i>KharaharaPriya</i>	—	Strengthens mind and relieves tension
12.	<i>HindolamandVasanth</i>	Early morning (3am-6am)	Gives relief from VathaRoga, B.P., Gastritis and purifies Blood
13.	<i>Saranga</i>	Afternoon (12noon-2pm)	Cures PithaRoga

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14.	<i>Kalyani, Sankarabharanam and Charukesi</i>	Evening (3pm-6pm) and late morning (9am-12noon) respectively	Give relief from Heart ailments
15.	<i>Asawari</i>	Between late morning and noon (10am-1pm)	Cures Headache and Psychological disorders
16.	<i>72 Melakarta ragas</i>	In various timings	Stomach operation avoided and ailment cured
17.	<i>Malkauns</i>	Midnight (12am-2am)	Cures Low Blood Pressure
18.	<i>Darbari</i>	Late evening (6pm-9pm)	Cures stress
19.	<i>Shiva Ranjani</i>	Night (9pm-12am)	Helps to achieve Intellectual Excellence
20.	<i>DarbariKanhara, Khamaj and Pooriya</i>	Late evening (6pm-9pm)	Helps difusing tension of mind and Hysteria
21.	<i>AhirbhairavandTodi</i>	Morning (8am-10am)	Cures High Blood Pressure
22.	<i>Punnagavarali and Sahana</i>	Midnight (12am-2am)	Controls anger and inner violence
23.	<i>Deepak</i>	Night (9pm-12am)	Cures Acidity
24.	<i>Gunakali and Jaunpuri</i>	Early morning (6am-9am) and morning (9am-12noon) respectively	Cures constipation
25.	<i>MiankiMalhar and DarbariKanada</i>	Monsoons, night (9pm-12am)	Cures Chronic Asthma
26.	<i>Bhairavi</i>	Early morning (6am-9am)	Cures Sinusitis
27.	<i>Todi and Poorvi</i>	Morning (8am-10am) and Evening (3pm-6pm) respectively	Cures Headache and Anxiety
28.	<i>Kafi and Khamaj</i>	Evening (6pm-9pm)	Cures Sleep disorders
29.	<i>Hindol and Marva</i>	Morning (3am-6am) and evening (3pm-6pm) respectively	Controls High fever like in Malaria
30.	<i>Darbari-Kanhar, Jayjaywanti or Sohan</i>	Midnight (12am-2am) and night (8pm-10pm) respectively	Cures Headache
31.	<i>Bageshri and Darbari</i>	Midnight (12am-3am)	Cures Insomnia

CONTEMPORARY SCENARIO OF MUSIC THERAPY

Not only traditionally, but even today music and sound is being used to alter states of consciousness to reduce perception of pain. Recently, Music therapy is being preferred by the doctors due to its non-invasive and painless nature. It is being used for the treatment of many neurodegenerative diseases like Parkinson's, Alzheimer's, etc. This therapy is also gaining its popularity during the post chemotherapeutic or radio therapeutic treatment of cancer patients. According to various study reports the music is efficient enough not only to activate and secrete hormones like dopamine (as mentioned by Salimpoor and others in 2011), serotonin (as reported by Koch and others in 1998), endorphins, but also to balance stress and anxiety levels by regulating cortisol (as revealed by Halpaap and others in 1987). Burns and others in 2001 reported that music therapy can also enhance the immune system in cancer patients and relief them from post anti-cancer treatment pain. Moreover, Hao in 2020 and Gangrade in 2013 reported and mentioned that music is capable of influencing the

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cytokines and also the amino acid neurotransmitters like, dopamine, serotonin, glycine, GABA, glutamine, etc. Contribution of music therapy also includes improved heart beat, anxiety reduction and relaxation, brain stimulation in learners, autism ailment, cure for stress, anxiety, bipolar disorder, congenital heart disease, stroke, dementia, aphasia, grief and bereavements as reported by Khalifa and others in 2003). Very recently, reports by Lordier in 2019 and Haslbeck in 2012 mentions and describes regarding the promising results of application of music therapy in Neonatal Intensive Care Unit for the advancement of favourable development in a premature newborn. Interestingly, Dey and others in 2012 revealed the contribution of Rabindra Sangeet (specially the songs of love) worked as medicine for stress reduction and mental relaxation. Music can do miracles in various patients although the total bio-chemical mechanism or the pathway is still under intensive research.

MUSIC THERAPY AND NEUROPLASTICITY

Interestingly, many scientists have discovered the occurrence of synaptic plasticity of the neurons when subjected to various high frequency stimulation. The Famous Canadian psychologist and the Father of neuropsychology, Sir Donald O Hebbin 1949 gave his famous Hebbian rule where he says that “neurons that fire together, wire together”. It means, “any two cells or system of cells that are repeatedly active at the same time will tend to become associated, so that activity in one facilitates activity in the other.” Although, the principle of neuroplasticity has been established long ago but its relation to music remains under modern scientific research. Again, although, medical intervention says that neuroplasticity occurs within a specific time period of lifespan called the critical period, many reports have been showing the cure of various ailments via music therapy even at their adolescence. Clinically, now a days, music therapy is being used for brain cortical remapping which aids to learn and apt new behaviours. Moreover, many clinical researches on LTP and LTD focuses on, the hippocampus and cerebellum area of the brain which serves for memory and learning. Long term potentiation (LTP) requires very brief and high rate of stimulation which capable of large amount of calcium (Ca^{++}) release which in turn triggers a series of mechanism possibly leading to increased synaptic activity, as evaluated by Lynch in 2004. On the other hand Long term Depression (LTD) requires long low rate stimulation resulting in less Ca^{++} release and decreased synaptic activity. But, interestingly both the processes are responsible for the activation of N-methyl-D-aspartate (NMDA) receptors. Gurden and others in 2000 showed that NMDA receptors plays a vital role in neuronal signalling regulating synaptic transmissions and synaptic plasticity. Thus, these processes and regulators along with the external stimuli can successfully bring about physiological changes leading to increase the strength of multiple synapses in a neuronal network contributing to neuro- plasticity (as reported by Kroutin 2004 and by Stegemöller in 2014).

CONCLUSION AND FUTURE PROSPECTS

Music therapy is blooming into a new research pathway in the area of cognitive science, neuroscience and neuropathology, human psychology and behaviour. Specially, after the COVID-19 situation practice of Ayurveda along with sound and music therapy were of much interest in many parts of the countries worldwide. As this type of therapies are non-invasive and painless, it may find its importance in near future curing patients of various other neurodegenerative diseases. This invisible magic medicine will also be preferred to cure mental certain extent of mental health avoiding the drugs causing side effects. May be the property of relieving pain in various cases will be used to treat patients. Although the practice of sound and music therapy is very common in the path of spiritualism, among the

saints, sages and monks, it is still in its nascent stage in the field of science and medicine. If the concept of music therapy could have been scientifically proven by numerical data, then it could be inferred that there is also science in spirituality. Lastly, it can be concluded that one who is capable of understanding the philosophical essence of music and its vibrations can make their life harmonious

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Conflict of Interest

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