Bulletin of the *Transilvania* University of Braşov
Series VIII: Performing Arts • Vol. 14(63) No. 1 – 2021
https://doi.org/10.31926/but.pa.2021.14.63.1.6

Therapeutic use of Indian ragas on various diseases

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Abstract: *With the rapid and fast-paced life, balancing work pressure is not easy. Many people are affected by mental stress, anxiety, depression and hypertension diseases causing harmful effects in physical and mental disorders. The medical treatment for these diseases cannot affect the root cause. The medicine causes relief in only part of affected portion. Medication may also cause side effect which may further hamper the body part. Music can play a powerful position in assisting us to lead better, fruitful lives. Listening to precise sorts of song notes at precise instances of the day has been proven to be beneficial in preserving top health. Indian songs, with its many Ragas, is understood to be specially healing value. The healing strength of song emanates from the resonance of sure ragas on hormonal and glandular capabilities which produce secretions that preserve the frame balanced and contamination free. This work describes the influence of music therapy on brain for different Indian music. The results showed that the music therapy causes improvement for subject's blood pressure Improvement over a period of three months' time.*

Keywords: *music therapy, Indian music, blood pressure*

1. **Introduction**

The Indian music therapy, it is the sequences of decided on notes (swaras) that lend suitable `mood' or emotion in a selective combination. Depending on their nature, a raga may want to set off or accentuate pleasure or sorrow and/ or peace and it is this characteristic that forms the premise for musical application. Thus, an entire variety of feelings and their nuances can be captured and communicated

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inside sure rhythms and melodies. Playing, showcasing or even being attentive to suitable ragas can paintings as a healing medicine. Various ragas were identified to have exact effect on sure ailments. To verify the effects of melotherapy with scientific proof, experimental studies have been carried out on the basis of EEG (electroencephalogram) analysis.

An EEG is an electroencephalogram (EEG) as shown in Fig 1, is a method used to evaluate the electrical activity in the brain. Neurons communicate with each other through electrical impulses. The EEG device tracks and records these neuron communication patterns. Electrodes are attached to the scalp that acquires the signals and these signals are then analysed.

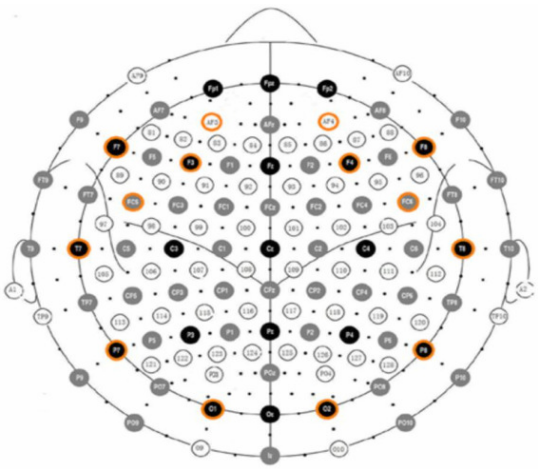


Fig 1. *10-20 Electrode system*

2. Literature review

The patients' EEG information was converted right into a coordinate in Thayer's arousal-valence emotion plane. The EEG information processing was stimulated through Ramirez and Vamvakousis (2012) in which it's miles proven that the computed arousal and valence values certainly include significant records that approximate the user's emotional state.

Artefact detection/removal was carried out through visible inspection of the given signal. EEG information became normalized to keep away from inter-subject variability. Using the EEG sign of a subject, his/her arousal stage became computed

to be the ratio of the beta (12–28 Hz) and alpha (8–12 Hz) brainwaves Electroencephalography information received confirmed that the total valence levels reached within the individuals EG (experimental group) became substantially better on the ending of the MT (song training) consultation as compared to the beginning stage (p = 0.0004). The opposite case was of the CG (manipulate group) in which no massive distinction in valence stages could be found. This end result is therefore to be interpreted as a lower level of relative alpha pastime within the left frontal lobe of the EG individuals, which can be interpreted as a development of temper or a lessening of depressive temper.

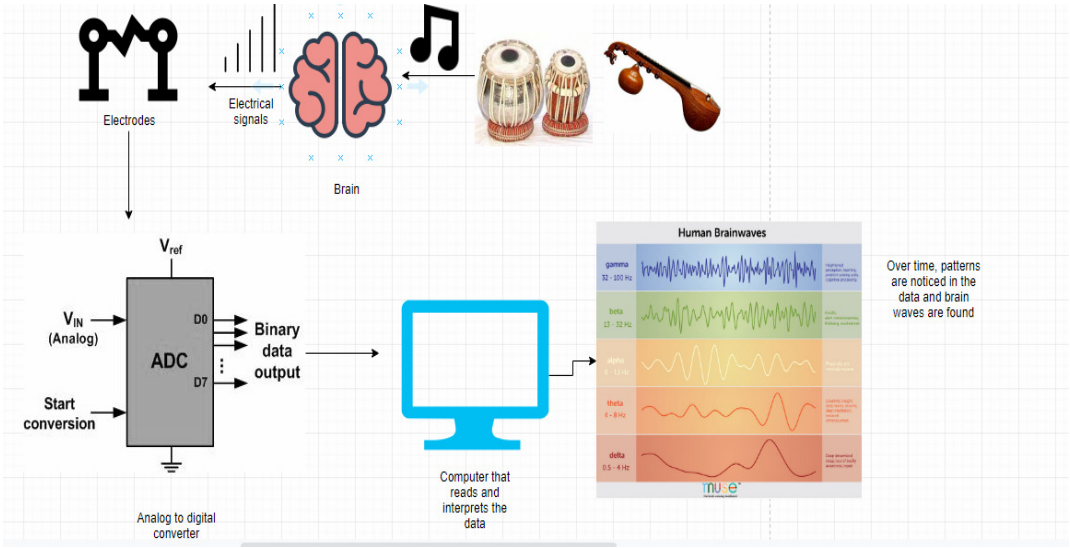


Fig.2. *Block Diagram*

3. Methodology

From our work, we have gathered that when music is first played, the sensory organ i.e our ears receive the musical notes and the brain processes it. Our objective is to obtain useful EEG signals and therefore we do so with the help of electrodes. The electrodes collect the electrical signals emitted by the brain and transmit it to an ADC. The analog-to-digital converter converts these analogous electrical signals to digital signals. These digital signals are then given as input to a computer that reads and interprets the data. We keep track of the interpreted data and observe patterns. When a pattern is found to be particularly useful, i.e. high difference in valence levels before and after the raga is played, we record that

brain wave and note the positive effect of that specific raga on the patient's condition. This is how we can correlate the ragas and medical conditions and thus use the ragas to help in improving the patient's health.

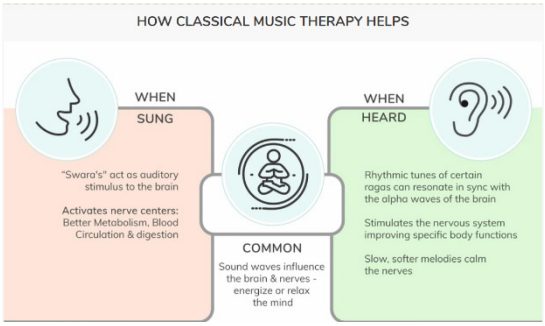


Fig 3. *Music Therapy*
(Courtesy: https://www.heyzindagi.com/blogs/health-care-dr-know/music-in-therapy#:~:text=The%20conditions%20in%20which%20classical,(PTSD)%20and%20many%20others.)

The 10 most recognized ragas and their main therapeutic uses *(Sarkar 2015, 11)* are:

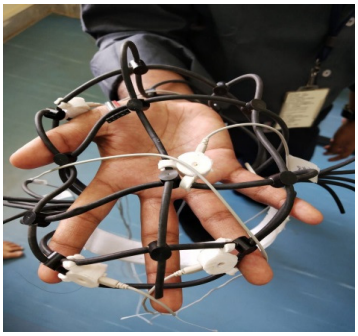
Raga	Disease	Therapy
Puriya Dhanashree	Acidity	Should be sung at time of transition from the afternoon to the evening to evoke a deep and stable state of mind and prevent acidity.
Raga Bageshri	Diabetes and Hypertension	Should be sung around midnight for treatment of diabetes and hypertension.
Darbari	Stress	Should be played at midnight to relieve patient of stress.
Todi	High Blood pressure	Should be played in the late morning, 9-12 to relieve patients with high blood pressure.
Ahir-Bhairav (Chakravakam)	High Blood pressure	Should be played at daybreak to bring down blood pressure
Malkauns	Low blood pressure	Sshould be played at late night, 12-3 to cure low BP.
Bhairavi	T.B, Cancer, Severe cold, Phlegm, Sinus, toothache.	Should be played in the morning to treat patients of various diseases.

Raga	Disease	Therapy
Malhar	Asthma and Sunstroke	Should be played during rainy season to cure asthma and sunstroke.
Hindol	Blood	Should be played after midnight or early morning for blood purification
Marawa	Blood	Should be played at sunset for blood purification

Table 1. *The 10 most recognized ragas and their main therapeutic uses*

4. Result

This study which is a repeated measure experimental randomized controlled design with subjects in the age of 18 to 70 years has been undertaken to understand the effect of listening to Indian classical instrumental music based on the time theory of Ragas on pre-hypertensive patients. i.e. systolic blood pressure (BP) between 120 and 139 mmHg or diastolic BP between 80 and 89 mm Hg.



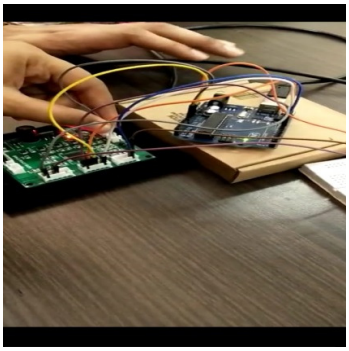


Fig. 1–3. *Actual research pictures*

We took the alpha mind waves of the participant and transformed it right into the required digital signal with the assist of an ADC (analog to digital converter). This is certainly visible within the pictures wherein we've used the microcontrollers to get the input from the participant in addition to offer an input to the laptop for interpretation of the data. Electroencephalography (EEG) is a method for measuring electrical output generated within the mind, which opens a window for exploring neural activity and mind functioning. The EEG sign is measured with the usage of electrodes located at the scalp, which documents the electric region generated via means of the nerve cells. Changes within the brain's electrical activity arise very quickly, and extraordinarily excessive time resolution is needed to decide the proper moments at which those electric dynamics take place. Today's EEG machines can correctly discover brain activity at a decision of a millisecond or less not like the rest of the electric recording gadgets that require placing electrodes into the brain, EEG electrodes are simply caught onto the scalp. In addition, EEG system is exceptionally cheaper in comparison with different gadgets and easy to operate. Another manner that researchers use EEG alerts for reading the mind is to take a look at responses to stimuli and different occasions. This technique is primarily based on the idea that once a selected occasion happens we see a acquainted face, for instance, some thing adjustments withinside the mind's ordinary pastime. A collection of unique responses to a stimulus can imply the time route of diverse neural methods invoked so one can manner the stimulus, apprehend it, and determine on the best reaction. In this manner, researchers can examine the mind's responses to diverse forms of stimuli, etc as we carry out specific tasks, after which we draw approximate conclusions on the brain methods concerned in every one of those situations. EEG rhythms are categorized into 4 fundamental types: (i) Delta (1/2 - four cycles in step with second), (ii)Theta (four-7 cycles in step with second), (iii)Alpha (8-thirteen cycles in step with second), and (iv)Beta (thirteen-forty cycles in step with second. It has been determined that exceptional track produces a lower with inside the alpha strength on the left frontal lobe and unsightly track produces lower with inside the alpha strength on the proper frontal lobe. When topics pay attention to exceptional track, adjustments arise with inside the EEG pattern, and there's an growth with inside the frontal midline (Fm) theta power**.** Picking the right note of music increases the power at theta and alpha frequencies of the human EEG signal. The right *raga* and s*wara* is hence crucial as the EEG spectral power depends on the intensity and style of music.

The Four Categories of Brainwaves are:

1. *Beta brainwaves* (14 to 32 Hz alert, focused):
   Advantages of a Beta State: The brain wave for higher concentration and alertness, enhanced logic, reasoning and critical thinking.
2. *Alpha brainwaves* (7 to 14 Hz relaxed, meditative)
   Advantages of alpha state: Our human brain hemispheres come to be obviously synchronized, or in-pace with one another. Enables us to take into account our goals and meditative states: multiplied vividness blessings innovative visualization and triggers imagination, multiplied reminiscence retention, concentration & consciousness for first rate studying.
   Health advantages include: decreased anxiety, alleviates strain and depression, reduces continual pain, discount of excessive blood pressure, multiplied cerebral blood flow, multiplied motivation, energy, and happiness.
3. *Theta brainwaves* (3.5 to 7 Hz deep relaxation)
   Advantages of Theta brainwaves: improved experience of internal peace and emotional stability, Deep relaxation, calms the chatter of your mind, Health advantages of Theta brainwaves: advanced bodily healing, Sleep onset and higher greater restful sleep, releases useful hormones associated with fitness and longevity, lessen intellectual fatigue, Lessens anxiety and stress.
4. *Delta brainwaves* (0.1 to 3.5 Hz deep sleep) *(*Bardekar, Gurjar 2017, 5192*)*
   Advantages of delta brainwaves include: deep, dreamless sleep

The blood pressure seems to have improved over a period of time as the patients have practiced the sessions of music / ragas of their choice and also keeping in view the time of listening.

Sl No	Subject	Age group	Music Played	Impact of Music
1	A	18-21	Indian Classical- Hindustani	Relieves stress
			shastriya sangeet -Melody	Induces the aesthetic mood-love
			Semi-Classical-Instrumental	Increases efficiency
2	B	22-24	Indian Classical- Hindustani	Relieves stress
			shastriya sangeet -Melody	Induces the aesthetic mood-love
			Semi-Classical-Instrumental	Increases efficiency
3	C	25-29	Indian Classical- Hindustani	Reduces blood pressure
			shastriya sangeet -Melody	Reduces cholesterol levels
			Semi-Classical-Instrumental	Reduces depression

Sl No	Subject	Age group	Music Played	Impact of Music
4	D	30-34	Indian Classical- Hindustani	Reduces blood pressure
			shastriya sangeet -Melody	Reduces cholesterol levels
			Semi-Classical-Instrumental	Reduces depression
5	E	35-40	Indian Classical- Hindustani	Reduces blood pressure
			shastriya sangeet -Melody	Reduces cholesterol levels
			Semi-Classical-Instrumental	Reduces depression
6	F	40-45	Indian Classical- Hindustani	Reduces blood pressure
			shastriya sangeet -Melody	Reduces cholesterol levels
			Semi-Classical-Instrumental	Reduces depression
7	G	45-50	Indian Classical- Hindustani	Reduces blood pressure
			shastriya sangeet -Melody	Reduces cholesterol levels
			Semi-Classical-Instrumental	Reduces depression
8	H	50-55	Indian Classical- Hindustani	Improves immune function
			shastriya sangeet -Melody	Produces a calming effect
			Semi-Classical-Instrumental	Improves memory
9	I	55-60	Indian Classical- Hindustani	Improves immune function
			shastriya sangeet -Melody	Produces a calming effect
			Semi-Classical-Instrumental	Improves memory
10	J	60-65	Indian Classical- Hindustani	Improves immune function
			shastriya sangeet -Melody	Produces a calming effect
			Semi-Classical-Instrumental	Improves memory
11	K	65-70	Indian Classical- Hindustani	Improves immune function
			shastriya sangeet -Melody	Produces a calming effect
			Semi-Classical-Instrumental	Improves memory
12	L	70+	Indian Classical- Hindustani	Improves immune function
			shastriya sangeet -Melody	Produces a calming effect
			Semi-Classical-Instrumental	Improves memory

Note: *The coordination of rhythm along with the melodies is a very complex activity which engages both left and right hemispheres of the brain.*

4. Future scope

The subject of melotherapy is in a consistent phase of change, relentlessly putting new objectives to be able to improve as a career and to enhance its acceptance.

Melotherapy is the precise healing intervention for reaching the holistic requirements of soothing care. More know-how and integration of melotherapy will be endorsed with collaborative works, academic workshops, and the usage of environmentally targeted techniques. The time concept of ragas, with extra experimental proof, may want to probably be used by paediatricians to gynaecologists or even surgeons for all types of treatments. While this subject has amassed its truthful proportion of essential achievements, its case studies stays in its incipient ranges and lots of work is yet to be done. Not just do the useful physiological results of ragas have to be considered, however additionally the probable unfavourable results related to its use, such as capability of distraction of physicians with inside the working room, the poor arousal results of vocal song, and the incompatibilities of various subject preferences. Furthermore, all music is not created equal, with classical and dichaotic song having very distinct results. Music may be a probable effective method for enhancing scientific effects with little to no threat while implemented correctly and judiciously. Whether melotherapy will come to be extensively standard as an adjunctive remedy will depend upon a higher know-how of its function via scientific and clinical experimentation (Conrad 2010, 1981).

Media portrayal of music therapy has vastly improved in the recent years and is well on its way to become an established solution for both psychiatric therapists and patients, provided that profound research is continuously carried out to link the time theory of ragas and their therapeutic uses. Although the literature inspecting the outcomes of raga remedy or melotherapy interventions in scientific medicine settings is each massive and growing, this literature is hard to summarize due to its diversity.

5. Conclusion

Looking at this subject from a medical point of view, music is a drug without side effects. While there is a firm belief that it could be a substantial break through solution, most of it is theoretical and more practical evidence is desperately needed. We can conclude that music therapy is a promising therapy and is a new paradigm. In clinical observation, the therapeutic use of music seems to be average yet beneficial; Neuroscientific research can assist in aid on the path to evidence-based melotherapy.

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