CHAPTER-III
REVIEW OF RELATED LITERATURE

• 3.1 Western Studies: Physiological & Psychological Health and Music experience.
• 3.2 Indian Studies: Physiological & Psychological Health and Music experience.
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CHAPTER-III

REVIEW OF RELATED LITERATURE

A review of related literature relating to any particular problem works as a launching pad for the further research to be taken up by new researchers in the same field and so similar subjects. The deeply conducted studies of related material some time proves eye-opener, because similar studies are already available in abundance and some time it makes the researcher a pioneer in the field as no study is found earlier on the topic. Both ways the study of related literature proves an ascent to the researcher. Thus, the review of literature helps to avoid duplication, provide theories & ideas for further investigation and the techniques & methods, which should be employed in the investigation. Therefore, the investigation attempts to review the literature that is directly or indirectly related to the present study.

The present study’s review of the related literature throws light on the research studies carried out so far to study the impact of music worldwide in curing and healing physiological and psychological problems. Music as a therapeutic tool has a comprehensive and vast area of research and it’s not possible to quote each and every study, so the investigator has restricted only to the studies which covers the scope of present investigation. For the convenience of understanding, the chapter has been divided into sections throwing light on the following:

- Western Studies: Physiological & Psychological Health and Music experience.
- Treatment of Anxiety and Stress through music.
3.1 WESTERN STUDIES: PHYSIOLOGICAL & PSYCHOLOGICAL HEALTH AND MUSIC EXPERIENCE

Various studies have examined the effects of listening to music on the brain. The study by Rauscher, et al. (1993) on the “Mozart effect” is one of the most famous studies and has had positive impacts on music therapy\(^1\).

Musical behavior is believed to invigorate several parts of the nervous system, as auditory information passes through the limbic and paralimbic systems including the thalamus, the hypothalamus, to the neocortex, and influences the pituitary gland; as a result physiological effects are induced. Much research has been done regarding the physiological effects of music, with results showing increases or decreases in respiration, heart rate, blood pressure, skin temperature, GSR (galvanic skin response), and electroencephalogram findings\(^2\) (Hodges, 1996).

Music process is used in order to restore, maintain, and improve emotional, physical, physiological, spiritual health and well being \(^3\) (Aldridge, 2000). Nayak, Wheeler, Shiflett & Agostinelli (2000) reported significant effects of music therapy on social interactions, mood and traumatic brain injury patients\(^4\).

Hunter et al. (2001) found that music has good effect in reducing pain of the body\(^5\). Standley & Prickett (2001) experimented with people suffering from high or low blood pressure and found fast melodies having sharp notes are effective in normalizing the low blood pressure while slow melodies having soft and flat notes are helpful in lowering the blood pressure of the patient suffering from high blood pressure\(^6\). He also concluded that the patient who

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received music treatment showed submissive behaviour and some of them recovered fully of their diseases.

White (2001) found that the music can be an effective intervention, because music causes the mind to deviates from unpleasant stimulations. Sloboda; O'Neill; & Ivaldi (2002) studied the effect of music on the physiology of human body and as a result, he concluded that music effects the blood circulation and so regulates the blood pressure.

The most significant finding has been that music enhances synaptic changes in the brain. In other words, studies comparing musicians and non-musicians and music learners and non learners have clarified that music brings about cerebral plasticity. Music affects neuronal learning and readjustment (response of brain cells to sound and music stimuli, and changes in cell counts), and this effect lasts for a long period (Abbott, 2002). For example, even when neurodegenerative diseases such as Alzheimer’s disease cause memory loss, patients can still remember music from the past and listening to music can facilitate the recovery of other memories. This type of memory recovery is accompanied by the reconfiguration of existing neuron networks, which may allow access to long-term memory.

Western countries in the past two decades have seen the emergence of intense interest in music therapy or music as a healing factor in medicine and clinical settings. This has included descriptions of music therapy interventions and research of various types to identify the effectiveness of music and music therapy (McDermott & O’Callaghan, 2004).

Barranco-Schnitzler & Rosenberg (2004) suggests that the use of individualized Music Therapy together with verbalized relaxation and visualization techniques can be an effective treatment for decreasing sleep

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onset latency and maintaining sleep during the night with chronic insomnia patients \textsuperscript{11}.

As people listen to music that they like, their feelings of well-being are usually enhanced \textsuperscript{12}, reported by Juslin & Laukka (2004).

\textit{Good; Anderson; Stanton-Hicks; Grass; & Makil (2004)} conducted a research as ‘The Efficacy of Music’ on vital signs and pains after Surgery, and found that music therapy is an effective tool in reducing pain \textsuperscript{13}.

Studies of self-selected music listening in daily life report that the functions of music listening frequently relate to mood regulating strategies and support a range of activities \textsuperscript{14} (North et al., 2004).

Music has long been used to enhance wellbeing and to reduce suffering \textsuperscript{15} (Kemper & Denhauer, 2005).

Peretz & Zatorre (2005) concluded that neurological studies have identified music as a valuable tool for evaluating the brain system \textsuperscript{16}.

Standley (2006) opined that music directly affects the mind, brain and body and the patient who have inclination towards music easily gets cured through it \textsuperscript{17}. Levitin & Tirovolas (2006) found that use of music gives the clients/patients holistic pleasure and experience of cohesion in their mind and body and provided them with general sense of well-being \textsuperscript{18}.

\textsuperscript{14} North, A.C., & Hargreaves, D.J. (2004). \textit{The social and applied psychology of music}. Oxford, University Press.
Research by Bernardi; Sleight & Porta (2006) from University of Oxford reported that music can bring different levels of arousal within an individual, with the heart rate and the breathing changing as per as the complexity and the tempo of the music. Son & Kim (2006) proves the efficacy of music therapy protocols for decreasing pain, anxiety, and muscle tension levels during burn dressing changes. Sausser & Waller (2006) concluded that music enhances self-expression and self-esteem.

According to Sacks & Flatow (2007) ‘Music is considered to be unique among the arts i.e., it is completely abstract and can be profoundly emotional, as it has the unique power to express states of feelings’.

Friedrick (2007) a famous psychoanalyst and music therapy specialist, believes that almost all courses and transactions inside our body’s structure act under influence of specific rhythm, but this function is not just for breathing and pulsation frequencies, but includes heart beating, cerebrospinal waves, and cycle of body’s hormones either. He concluded that melodies and music and smooth sounds, specially, have much influence on adjustment of these waves.

Sacks & Flatow (2007) suggests that music is a means of recovering personal feelings from which the listener has become alienated.

Ferrer (2007) investigated the effects of familiar live music on the anxiety levels of patients undergoing chemotherapy treatment. Randomly selected patients were assigned to experimental (n = 25) and control (n = 25) conditions. Pre and posttests consisted of questionnaires and the recording of the patient's states.

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heart rate and blood pressures. Results of the study showed statistically significant improvement for the experimental group on the measures of anxiety, fear, fatigue, relaxation, and diastolic blood pressure. Descriptive values indicated that, on average, the experimental group was influenced positively by the music intervention, and participants improved their quality of life while undergoing chemotherapy treatment.

Richards; Johnson; Sparks; & Emerson (2007) did an extensive review to identify the clinical benefit of using music therapy in the hospital settings and demonstrated that music therapy has the potential to improve the hospital experience of patients.

Clinical literature documenting the use of music in health care settings demonstrates that music is an effective intervention with patients of every age. This ranges from those born into the neonatal intensive care unit, for which music mediates medically necessary stress through those in hospice care at the end of life, who can use music to transcend physical symptoms to facilitate emotional expression and communication, and as a medium to work on a legacy project (Hilliard, 2007).

Klassen; Liang; Tjosvold; Klassen; & Hartling (2008) conducted a systematic review of the efficacy of music therapy on pain and anxiety in children undergoing clinical procedures and found that music proved effective in reducing anxiety and pain in children undergoing medical and dental procedures. Further, they concluded that music can be considered an adjunctive therapy in clinical situations that produce pain or anxiety.


Walworth; Rumana; Nguyen; & Jarred (2008) viewed that people undergoing surgery require less anesthesia, awaken from anesthesia more quickly and with fewer side effects, and heal more rapidly when music is played before, during and after the surgical procedure29.

Holm & Fitzmaurice (2008) determined the effect of music alone, aromatherapy alone, and music in addition to aromatherapy on anxiety levels of adults accompanying children to a pediatric emergency department waiting area. There was a statistically significant decrease in anxiety level on those days when music was played30.

Wu & Chou (2008) investigated the effectiveness of music therapy on reducing anxiety in patients on mechanical ventilators. The patients were divided into two groups. When compared with the control group, patients in the experimental group showed significant improvement in sense of anxiety31. In analyzing data from the two groups, it was found that the sense of anxiety and breathing rate in the experimental group decreased significantly following music therapy.

Lai; Hwang; Chen; Chang; Peng; & Chang (2008) studied the effects of music on the state anxiety and physiological indices among patients undergoing root canal treatment. Purposive sampling was used to recruit 44 adult subjects. The subjects were randomly assigned to the treatment and the control group. Subjects in the music group listened to selected sedative music using headphones throughout the root canal treatment procedure. The control group subjects worn headphones but without the music. Anxiety was measured before the study and at the end of the treatment procedure. The subjects in the music


group shows a decrease in anxiety score over time compared with the control group.

Schlaug (2009) a prominent neuroscientist whose lab specializes in the study of music and the brain, proved music to be the potential to fix the brain, by providing an alternative entry point into a broken brain system to remediate impaired neural processes or neural connections.

Hai, Yong & Li (2009) found significant effect of acupuncture with music therapy on cerebral palsy persons. Loud and sharp sounds increase the heart beating speed and blood pressure, and soft, mild and more regular sounds, adjust heart beating and blood pressure. Also, music can relief the muscle expansion, and raise the abilities (Jodiet, 2009).

Research by Gotell; Brown; & Ekman (2009) illuminated caregiver singing and background music as improving the patient's ability to express positive emotions and moods, and to elicit a sense of vitality on the part of the person with severe dementia. Thaut (2009) suggests that music, which is the rhythmically organized coding of sound over time, simulates the rhythmic neural synchronization required to process information in the brain.

Music has been used successfully to induce varying degrees of cognitive repair in patients with stroke, Parkinson disease, cerebral palsy, or traumatic brain injury (Thaut, Gardiner, Holmberg, Horwitz, Kent, Andrews, Donelan & McIntosh, 2009).

According to Tse, Chan, & Benzie (2009) it was found that music may reduce heart rate, respiratory rate, and blood pressure in patients with coronary heart disease\textsuperscript{39}. Benefits included a decrease in blood pressure, heart rate, and levels of anxiety in heart patients.

Stuhlmiller, Lamba, Rooney, Chait, & Dolan (2009) compared whether playing music during CCT reduces patient’s anxiety and found that music is a simple adjunct for use during CCT that may increase patient comfort and alleviate anxiety\textsuperscript{40}.

Findings of the researches conducted by Allred, Byers, & Sole (2010) shown that music has beneficial effect on Stress/Anxiety, High blood pressure (Hypertension), Alzheimer's disease, Substance abuse problems, Acute and Chronic pain, Heart attack (Cardiovascular Accident), Cerebral stroke (Cerebrovascular Accident)\textsuperscript{41}.

Many studies have shown the incredible effects that music has on chronic pain. People suffering from back pain, fibromyalgia, chronic fatigue syndrome, and pain from injuries; all benefit from using music. Physical therapy is much more effective when combined with music\textsuperscript{42} is reported by (Tan, Yowler, Super, & Fratianne 2010).

Hanser & Mandel (2010) summarizes that music is understood as a modality for the promotion of the broadest possible definition of health: used both to aid the sick and patients with conditions ranging from cancer to schizophrenia to


traumatic brain injury to support patients in staying well, by combating the debilitating effects of stress, sleeplessness, and chronic pain.

Kraus & Chandrasekaran (2010) summarized that "music training leads to changes throughout the auditory system that prime musicians for listening challenges beyond music processing." The research suggests music training does for brain what exercise does for body fitness. She says music is a resource that tones the brain for auditory fitness.

3.2 INDIAN STUDIES: PHYSIOLOGICAL & PSYCHOLOGICAL HEALTH AND MUSIC EXPERIENCE

There is an unexplored, highly scientific field of Indian music, that is, the effect of Rasas in curing human ailments. A number of successful experiments have been made to assess the effects of Indian music or Rasas on human beings by playing particular combinations of sounds and also particular Rasas. Health cure with the help of classical Rasas with their specific emotional sentiment has also been experimented.

Altekar (1968) observed that Rasas like Shankara, Patdeep, Hindol and Kafi have proved good in bringing behavioural changes in children of 8 to 18 years of age. He also observed a significant change in the mood from irritating to normal after administration of music to them.

Deva & Virmani (1968) concluded that because of its impact on the energy chakras, classical music not only vibrates and soothes the mental strings, but also energizes and balances the organs of the body.

Deva & Virmani (1968) experimented by using four musical excerpts consisting of twenty minute recordings on Ravi Shankar’s Sitar recitals of four Rasas viz. Kafi, Puriya Dhanashri and Rageshri. Students numbering 37 between the age...

ranges of 20 to 30 years acted as respondents. Osgood’s Semantic differential technique was used for measuring the psychological meaning of things in music. The basic question in the minds of the researchers was “what do you think this music is like”? The responses received from the experimental listeners are as follows:

<table>
<thead>
<tr>
<th>Raga</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rageshri</td>
<td>Evening, Dark, Sombre, Deep</td>
</tr>
<tr>
<td>Kafi</td>
<td>Gaiety, Devotion, Romance and Pleasantness</td>
</tr>
<tr>
<td>Puriya Dhanashri</td>
<td>Physically tired, longing, grave, dark and Sombre</td>
</tr>
</tbody>
</table>

Pathak (1969) concluded that depending on its nature, a Raga could induce or intensify joy or sorrow, violence or peace, and it is this quality which forms the basis for musical application.

Bhattacharya (1970) reported the experiments conducted by Ambujan & Raman in the U.S Hospitals using Carnatic Ragas and identified the responses as follows:

<table>
<thead>
<tr>
<th>Raga</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khamas</td>
<td>Sensual Love</td>
</tr>
<tr>
<td>Nandanmakriya</td>
<td>Gentleness</td>
</tr>
<tr>
<td>Neelambari</td>
<td>Sleep, Relaxation</td>
</tr>
<tr>
<td>Hansdhwani</td>
<td>Exhilaration</td>
</tr>
<tr>
<td>Madhyamavati</td>
<td>Great aesthetic, Equilibrium</td>
</tr>
</tbody>
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47 Ibid.
Tiwari (1980) quoted that there are several historical examples of the immense remedial power of Indian Ragas. For instance, in 1933, when the Italian dictator Mussolini was terribly suffering from insomnia, no medicine or therapeutic mode could help him get sleep. Pt. Omkarnath Thakur, a great musician was visiting Europe around that time. When he heard of Mussolini’s affliction, he agreed to perform remedial musical programme to allay the latter’s sufferings. His performance of the Raga Puriya indeed worked magically and Mussolini went into deep sleep within half-an-hour.

Maudgalya (1980) reported that music can be a cure if the singer/listener chooses the Raga based on which chakras he wants to concentrate on. Hence while singing/listening, based on the dominant swaras in that raga, the corresponding chakras vibrate more. The singer/listener should concentrate on the chakra while singing/listening. Music is also one form of meditation, which enhances the power of chakras by raising Kundalini Shakti.

It has been reported by Thakur (1981) that malaria, hysteria, insomnia, tuberculosis, constipation, typhoid and many other diseases can be cured through various Ragas like Hindol, Marwa, Puriya, Bilawal, Tilang, Ramkali, Multani, Kalingara, Sohni, Kamod, Paraj, Todi, Bhiaravi, Malkauns, Piloo, Bihag, Darbari Kahnara, Khamaj, Desh etc. He believed that there is a growing awareness that Ragas could be a safe alternative for many medical interventions. He also reported that the effects of Raga Bhairavi as observed by Pt. Ravi Shankar is quiet extensive as it arouses the emotions of the listeners. The Raga produces vibrations which have direct impact on the human nerves and muscles. It is believed that during one impulse of the musical note the muscles and chakras of the body are contracted during which blood flows out of that area. There is relaxation in the interim period and a state of ease is


produced in this area as the pressure eases. By repeating this process the blood flow and energy in the area is enhanced, thereby healing the affected area\textsuperscript{52}.

Chopra (1989) took up a study on ‘Feature analysis of responses to the Indian Classical music and concluded that the Indian *Ragas* have certain specified moods and thus have typical responses\textsuperscript{53}.

Thambe (1994) had used music therapy as an integral treatment of the holistic health therapy-with the combination of Ayurveda, Yoga and Spiritualism, along with simple food and living style. Research was carried out by playing specific *Ragas* from Hindustani classical music for certain diseased and they proved effective in curing ailments ranging from ordinary stomach ache to menstrual disorders and serious maladies like schizophrenia and epilepsy\textsuperscript{54}. According to him, music worked quickly on the hormone system and cured the disease.

Sharma (1996) reported the positive effects of music relaxation on extroversion and neuroticism patients\textsuperscript{55}.

According to Menuhin; Yehudi & Davis (1998) although western classical music is being used in some studies, its applications are limited to certain kinds of diseases/disorders and are also of much lesser significance in terms of the intensity and impact of positive effects as compared to the Indian classical music\textsuperscript{56}.

Bandopadhyaya (1999) determined the immediate cardio-respiratory effects of classical music in preterm neonates as a mode of ICN related stress relaxation and found that listening to classical music, as used in this study, was associated with a significant (5-5.6%, p<0.05) lowering of the resting heart rate and a consistent improvement of oxygen saturation (by 1-1.4%). These effects appear

\textsuperscript{55} Sharma, Archana. (1996, Apr 22). The sound of music, *Times of India*.
to persist beyond the MT and may play a useful role to achieve stress relaxation for babies in the ICN\textsuperscript{57}.

Bansal (2002) summarized that the impact of music could be easily gauged on emotions and thereby on mind, it can be used as a tool believed to control the physiological, psychological and even social activities of the patients\textsuperscript{58}.

Bhadhuri (2002) states that certain ragas do have a tendency to move the listeners, both emotionally as well as physically. An involuntary nod of the head, limbs or body could synchronize with lifting tunes when played\textsuperscript{59}. Bagchi (2003) reported that Saint Musician Thyagaraja is said to have brought a dead person back to life with Bilahari Raga, and Muthuswamy Dikshitar cured stomach aches with his Navagraha Kritis\textsuperscript{60}.

Bhardwaj (2003) found that hypertension is another health ailment that responds positively to music. Ragas such as Ahirbhairav and Todi have been recommended for patients with high blood pressure. On the other hand, low blood pressure is healed with the feminine Raga Malkauns, believed to have supernatural energy\textsuperscript{61}.

According to an ancient Indian Swara Sastra (oneness of breath, mind and senses, the renunciation of all existence), the 72 Melakarta Ragas (musical scales) control the important 72 nerves of the body\textsuperscript{62} viewed by Bagchi (2003).

Mathur (2003) found music increases the metabolic activities within the human body. It accelerates the respiration, influences the internal secretion, improves the muscular activities and as such affects the Central Nervous System and Circulatory System of the listener and the performer\textsuperscript{63}.

Charles & Angliki (2004) experimented music therapy with two groups of mentally retarded patients. They used Indian music on one group and western

\textsuperscript{60} Bagchi, Kalyan. (Ed) (2003). \textit{Music, Mind and Mental Health}. New Delhi.
music on the other. They chose gay, cheerful and lively Ragas for therapy and similar types of western compositions. After the specific time of therapy, they found that the group who received music therapy through Indian music performed better than the patients who were subjected to western music.64

Sairam (2004) explored that by stimulating the moods and controlling the brain wave patterns, ragas could work as a complementary medicine.65 According to Sairam (2004) ‘Indian classical music can cure the problems of the digestive system, liver including the diseases like jaundice’.66

Sairam (2004) researched on the somatic or physiological impact of ragas for cancer patients, children with ADHD, pain management, reduce depression, to calm and to ease muscle tension and found music to be an effective aid. Not only psychological impact, but also somatic or physiological impact of ragas has come to light in some recent works. For instance, digestion is reported to be activated with Raga Deepak which is believed to cure acidity. For constipation, the musical folk remedy is Raga Gunkali or Raga Jaumpuri. Raga Malkauns is said to control fever. For headaches, relaxing with the ragas like Raga Darbari Kannada, Raga Jaijaiwanti and Raga Sohni is said to be beneficial.67

Jane (2005) remarks that Indian music rhythmically vibrates the tissue-membranes of the ear and, relaxes the nerves and muscles beneath the temple and in the brain; as a result of which the sensory and motor systems are energized and activated.68

Sairam (2005) used music as remediation and found that it stimulates the pituitary gland, the master gland in the endocrine system. His claims are borne out by numerous studies done at the Raga Research Centre at Chennai. He also experimented on the impact of raga on mentally-retarded (MR) children and

has noticed change in his behaviour while listening to music towards positive signs\textsuperscript{69}.

\textit{Gupta & Gupta (2005)} studied the effects of \textit{Raga Desi-Todi} played on a flute by a renowned Indian musician, Hari Prasad Chaurasia on three physiological (alpha EEG frequency, systolic and diastolic blood pressure and heart rate) and three psychological (depression, state and trait anxiety, and four components of anxiety: somatic, cognitive, behavioral and affective) assessments. The postgraduate male university students served as subjects. The subjects listened to instrumental music (without lyrics) for 30 minutes a day for 20 days. A pre and post treatment procedure was adopted for recording physiological and psychological assessments. The results showed that the instrumental music led to a significant increase in the alpha EEG frequency and a significant decrease in the scores on depression, state and trait anxiety, and the four components of anxiety; the systolic and diastolic blood pressure and heart rate, however, remained unaffected\textsuperscript{70}.

\textit{Sairam (2006)} observed that a group of London based physicians has scientifically experimented on different aspects of music therapy. In their views, the \textit{Ragas} could induce healing of all kinds of ailments. They argue that the immediate benefits these \textit{Ragas} offer is mental peace by alleviating tensions and providing an enchanting and creative diversion to the mind. The smooth and increased flow of vital energy rejuvenates the mind and empowers the immune system as well as the auto-regulatory healing mechanism of the body\textsuperscript{71}.

High fevers, says \textit{Sairam (2006)} such as malaria have been arrested through \textit{Hindol} and \textit{Marva Ragas}. Headaches can be banished by any of the three


ragas-Darbari-Kanhara, Jaijaiwanti or Sohni. Insomniacs will be lulled to sleep by Bageshri and Darbari ragas\textsuperscript{72}.

Khandekar (2006) a consulting psychiatrist found that Indian music can provide permanent relief can be provided to the patients suffering from psychological and nervous disorders without going for long medication treatments\textsuperscript{73}.

Control over anger and inner violence, according to Sairam (2006) can be attained with the use of Carnatic ragas such Punnagavarali and Sahana. Even stomach-related disorders can be settled through ragas from the Hindustani system-Raga Deepak for acidity, Gunkali and Jaunpuri for constipation, Mian ki Malhar and Darbari Kanada for Chronic asthma, Bhairavi for Sinusitis, Todi and Poorvi for Headache and anxiety, Kafi and Khamaj for sleep disorders are tested Raga therapies\textsuperscript{74}.

Bhandari (2008) quoted in his article ‘Sangit and Ayurveda, that ‘the nature of Raga plays an important role in curing many diseases. He recommended the use of the Ragas having the shrutis of different Jatis. The Raga having Alapini, Madanti, Rohini, Ramya Shrutis increases the Kaf Prakriti (nature) and to overpower this Prakriti, the Ragas having Raudri, Krodhi, Vajrika Shrutis should be sung. The Ragas having Rishabha Swaras a Vadi is also beneficial to cure the Kafa Prakriti and curing weakness, fatigue and low blood pressure. Same way, the Vai and Pitt Prakriti can be cured by singing or listening to the Ragas having Kafa Prakriti. The Ragas like Khamaj, Tilang, Des etc, are said to have good effects in arousing the Prakriti of Pitta and Vata’\textsuperscript{75}.

A pilot study on effects of Indian classical music on quality of sleep in depressed patients by Deshmukh; Sarvaiya; Sethalakshmi & Nayak (2009) was


conducted on 50 individuals diagnosed by Major Depressive Disorders. They were consecutively allocated into two groups. One group listened to selected *Ragas*, while the other group was treated with hypnotic medication for a month. The results showed that music was found to be better as compared to hypnotic medication in improving the sleep in depressed patients and can thus act as an adjunct in the management of depression.\(^{76}\)

*Pandey & Rathore (2009)* experiment the effect of various *Ragas* on the body and found that “Frequency of each ‘Raga’ pulsates with ‘Chakras’ or energy powerhouses within our body,” she explains, pointing out each person responds differently to different *Ragas*.\(^{77}\)

It has been reported by *Singh (2009)* that playing, performing and even listening to appropriate *Ragas* can work as a medicine.\(^{78}\)

*Sharma (2009)* found classical musical compositions to have significant positive effects on the mind-body system and also have the potential to awaken the otherwise dormant faculties.\(^{79}\)

*Vaid (2010)* examined many empirical studies on therapeutic evaluation of the classical *Ragas* have shown interesting results.\(^{80}\) Singing or engrossed listening of *Raga Bhairavi* has been found to uproot the diseases of *Kapha Doshas* e.g. asthma, chronic cold, cough, tuberculosis, some of the sinus and chest related problems etc. *Raga Asavari* is effective in eliminating the impurities of blood and related diseases. *Raga Malhar* pacifies anger, excessive mental excitements and mental instability. *Raga Jaijaiwanti* has also been found effective in curing mental disorders and calming the mind. *Raga Hindol* helps sharpening the memory and focusing mental concentration. It has been proved effective in curing liver ailments.


Vijayalakshmi et al. (2010) found that the frontal EEG coherence increased during verbal learning with an Indian musical template. Under the influence of Indian music, great reduction in feelings of stress and an increased sense of physical relaxation was observed81.

Chakorvarty (2011) reported that apart from the classical ragas played on musical instruments, the rhythmic sounds of temple bells and shankha (conch shell or bugle) produced during devotional practices have also been found to have therapeutic applications82.

Lal (2011) examined work conducted in M.S University, Baroda, for the correction of aggressiveness, heart ailments, mentally disturbance and slow learners, with the help of music, and beneficial effects of various Ragas like Bihag, Kafi, Malkauns, Ramkali, Hindol, Bahar, Deshkar, Lalit and Jaijaiwanti were recorded. It was observed that there was a significant improvement in the conditions of such persons83.

Patel (2011) concluded from ancient theory that sound waves create certain changes in the brain. While listening to them, changes the mood from bad to good or vice versa. Researchers also found that combination of few musical cards can make the necessary changes in the brain system and possible positive effects in the overall health system84.

Sengupta (2012) argued that several studies have shown that production of serotonin is elevated in the brain when a person is engrossed in the music85. It's a sleep inducing hormone which also acts as an anti-depressant. Secretion of serotonin takes place when brain is exposed to positive shock, like music,

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poetry, movies, etc. When mind is tuned to the notes of Indian classical music then one can automatically sense a pleasing aura around. The soothing vibe that one feels around oneself is the outcome of serotonin which is released under the effect of classical music. Scientists also say that, classical music can bring down the levels of hormone cortisol, whose excessive presence can cause anxiety, stress and depression. He concluded that instrumental classical music from India and other Eastern countries has a spell binding effect on the brain. Classical music played with instruments, like Santoor, Sarod, Sitar and Flute can rejuvenate the mind instantly. The harmony in the notes and the soft melody played can improve concentration power. One can resort to this form of music while suffering from anxiety, exhaustion and restlessness. It was found that Indian Classical music also encourages creative instincts, which is a direct outcome of the effects it has on the brain.

*Kelkar (2012)* viewed that listening to Indian instrumental music can have a tremendously relaxing effect on our minds and bodies, especially slow, quiet classical music. They concluded that is type of music can have a beneficial effect on our physiological functions, slowing the pulse and heart rate, lowering blood pressure, and decreasing the levels of stress hormones.\(^{86}\)

*Bandopadhyaya & Bhattacharya (2012)* studied the effect of two Indian Ragas i.e. *Raga Yaman* and *Raga Malkauns* on the conditions of heart and found hey researched on the effect of music on human ANS, and found that fast renditions, whether in *raga Yaman* or in *raga Malkauns*, always play a positive role in minimizing the stress of mind.\(^{87}\) They also concluded that from musical point of view, that use of the minor tones or *Komal swaras* always create positive impact in minimizing the stress of mind. But the use of *Tivra swaras* mostly failed to be effective especially when applied on IRM ignorant persons.

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The raga showed positive effect in fast renditions when applied to IRM knowledgeable persons.

Geethanjali; Rajsekaran & Adalarasu (2012) experimented the effect of music (Carnatic, hard rock and jazz) on brain activity during mental work load using electroencephalography (EEG)\textsuperscript{88}. Eight healthy subjects without special musical education participated in the study. EEG signals were acquired at frontal (Fz), parietal (Pz) and central (Cz) lobes of brain while listening to music at three experimental condition (rest, music without mental task and music with mental task) and found that Carnatic music significantly improves brain function as compared to hard rock during mental task.

According to Kumar (2012) music can accelerate metabolism, increase or decrease muscular energy and regulate respiration besides producing marked effects on pulse and blood pressure. Psychiatric patients who are given group music therapy show remarkable change in behaviour\textsuperscript{89}.

A lot of research in the recent past has been conducted on certain ragas which are believed to have curative properties and known to affect the vocalist and the listener, restore sagging spirits and bestow a feeling of well-being both on the singer and the audience. Raga Ahir Bhairav is found to be effective in providing de-stressing, transcendental bliss\textsuperscript{90} reported by Bharathi (2007). Raga Asavari is considered to build confidence levels\textsuperscript{91} cited by Sundaram (2004). Raga Bageshri to be effective in reflecting moods of midnight; feelings of darkness, depth, calm; and can help insomnia\textsuperscript{92}, reported by Sundaram (2004). Raga Bhairavi useful in reducing violent form of schizophrenia\textsuperscript{93}, cited by Tambe (2002). Raga Brindabani Sarang is helpful in depression; Raga


\textsuperscript{90} http://schoolofeverything.com/teacher/ranipal

\textsuperscript{91} Ibid.

\textsuperscript{92} Ibid.

\textsuperscript{93} Ibid.

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Chandrakauns could improve Anorexia\textsuperscript{94} (Sundaram 2004). Raga Hindol cures Arthritis, Spondylitis and backache\textsuperscript{95} as reported by Mythili (2002).

3.3 ADOLESCENTS: LEARNING & BEHAVIOURAL PATTERNS AND MUSIC EXPERIENCE

McKinney (1990) reported that music improves creative activity and the memorizing of image material amongst children\textsuperscript{96}.

Studies on interest in music and relative strength of musical abilities in children with autism (Thaut, 1988; Applebaum, 1979; Blackstock, 1978), and anecdotal reports on the quality of music as a means of nonverbal communication, social contact, and self-expression (Schuhmacher, 1994; Alvin & Warwick, 1991; Nelson, 1984; Nordoff & Robbins, 1968), suggests that music therapy is a suitable treatment option for adolescents with ASD\textsuperscript{97}.

Feurstein; Labbe; & Kuczmierczyk (1986) found that by listening to or playing music regularly aids in the development of the processes and patterns of the brain. This provides evidence that music impacts the body and should be included in classrooms\textsuperscript{98}.

Music is found to be the most preferred leisure time activity for many adolescents\textsuperscript{99} by Fitzgerald (1995).

Dharam & Richard (1997) summarized that adolescents are constantly under the stress of studies and examinations, in short, they are entangled in the web of academic stress and are often ill-equipped to cope with stress during transitions from childhood to preadolescence, and from preadolescence to adolescence.

\textsuperscript{94} http://schoolofeverything.com/teacher/ranipal
phases. Music helps to maintain a positive balance of mind all such critical phases. 

Magee (1999) found self esteem and self-confidence are factors found to be improved with the application of music as a therapeutic tool in an adolescent life.

North & Hargreaves (1999) found music as a useful tool which influences development and identity of adolescents.

North & Hargreaves (2000) viewed that music is a tool and it has many proven benefits and connections to the body, brain and can aid in academic achievement of adolescents.

Hallam & Godwin (2000) concluded that fast exciting music has the most dramatic effect which can be detrimental to good behaviour.

Giles (2001) suggests that most pupils function very well in a classroom situation with music in the background and the right music at the right time can make them less stressed, more relaxed, happier and more productive. She found that the most effective music for improving children’s performance was what they liked.

McKelvie & Low (2002) reported a study by Rauscher Shaw in 1993 measuring the spatial reasoning abilities of N = 36 college students after participants listened to a Mozart sonata, a relaxation tape, or sat in silence. The researchers found a temporary enhancement of spatial reasoning abilities among children.

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after participants listened to Mozart. This phenomenon received national attention and became known as ‘The Mozart Effect’.

Routier (2003) concluded that there is a connection between music and the brain. ‘Music’s physical vibrations, organized patterns, engaging rhythms, and subtle vibrations interact with the mind and body in many ways, naturally altered the brain in a manner that dimensional rote learning cannot do’.

Research by Jackson; Mary; Joyce; & Donna (2003) shows that when listening to music, there is an increase in concentration and speech abilities, an improvement in reading and language skills of those who listen to music regularly or receive music instruction, and there are evidences that SAT scores are much higher in students who sing or play an instrument.

Gold; Voracek; & Wigram (2004) examined the overall efficacy of music therapy for children and adolescents with psychopathology. The analysis revealed that music therapy has a medium to large positive effect (ES = .61) on clinically relevant outcomes that was statistically highly significant (p < .001) and statistically homogeneous.

Research by Savan (2005) demonstrated improved behaviour and a greater concentration on school work when background music was played during the science lessons of 10 children with learning and emotional and behavioural difficulties. To assess the extent of physiological changes in the children measures of systolic and diastolic blood pressure, pulse rate and temperature were made before, during and after the lessons when the music was being

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played. All showed a significant increase in concentration when background music was played.\textsuperscript{110}

\textit{MacGeorge; Samter & Gillihan (2005)} found that student life coincides with adolescence and stress can manifest in children as reaction to the changes in life in addition to academic pressure and academic stress. Academic stress is the product of a combination of academic related demands that exceed the adaptive resources available to an individual. If a student is unable to cope effectively with academic stress, then serious psychological, social, and emotional health consequences may result. The music plays a vital role in coping with stress.\textsuperscript{111}

\textit{Wigram & Gold (2006)} found that children and adolescents with autistic spectrum disorder (ASD) presenting with significant limitations in conventional forms of verbal and non-verbal communication respond positively to music therapy intervention involving both active, improvisational methods and receptive music therapy approaches. Outcomes have been found to facilitate motivation, communication skills and social interaction, as well as sustaining and developing attention.\textsuperscript{112}

\textit{Rickson (2006)} compared the impact of instructional and improvisational music therapy approaches on the level of motor impulsivity displayed by adolescent boys (n = 13) who have Attention Deficit Hyperactivity Disorder (ADHD).\textsuperscript{113} A combination of a multiple contrasting treatment and an experimental control group design was used. Over the period of the study, both music therapy treatment groups significantly improved accuracy on the STT, and teachers reported a significant reduction in Conner’s DSM-IV Total and Global Index

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subscale scores. These findings tentatively suggest that music therapy may contribute to a reduction in a range of ADHD symptoms in the classroom.

Sairam (2006) findings lend support to the theoretical assumptions in the literature that high self-esteem and supportive social relationships influence academic stress through the use of music in classrooms. The investigation was undertaken to examine music therapy as an intervention on self-esteem of adolescents to eliminate stress and results shows that music therapy proves to be an effective self-esteem booster.

Stuessy (2007) experimented music therapy on 10 spastic adolescent children. He concluded that music therapy had positive effects on all types of mentally retarded children.

Research has found that adolescents report listening to music for the following reasons: satisfy emotional needs (MacDonald; Hargreaves; & Miell 2002), mood regulation (Schwartz & Fouts, 2003); identity with peer group (North et al., 2000); self-identity (Christenson & Roberts, 1998).

Student life coincides with adolescence and stress can manifest in children as reaction to the changes in life. Many researchers have explored music importance to adolescents and concluded that adolescents actively use music to satisfy social, emotional and developmental needs (Hargreaves & O’Neil, 2008).

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Many researchers have explored music importance to adolescents and have explored how adolescents actively use music to satisfy social, emotional and developmental needs (North; Tarrant & Hargreaves, 2008).

*Southgate & Roscigno (2009)* examined the association between music involvement and academic achievement in both childhood and adolescence using three measures of music participation: in school, outside of school, and parental involvement in the form of concert attendance. Music participation, both inside and outside of school, is associated with measures of high academic achievement among children and adolescents (Southgate, D. E., & Roscigno, V. J. (2009). The Impact of Music on Childhood and Adolescent Achievement. *Social Science Quarterly*, 90: 4–21).


*Rauscher, Shaw & Kay (2010)* examined that music helps strengthening spatial reasoning and sensory motor skills. It facilitates cognitive skills including reading, abstract spatial abilities and creativities. This enables children to use their senses and motor skills simultaneously which further develops gross motor coordination.

*Hallam & Price (2010)* research indicated that the children were the most productive when the background music was playing. Before the introduction of background music, there was were many occurrences of disruptive behaviors, which included: tantrums, crying, verbal and physical aggression and over-activity. However, when the music was playing, the students became noticeably more calm and cooperative. The research results found that when

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the music was playing “there were significant changes in body temperature, blood pressure, breathing rate, and pulse rate.”

In children, music can be an effective intervention to enhance cognitive abilities, facilitate verbal and nonverbal communication, and influence physiology as reported by Naylor; Kingsnorth; Lamont; McKeever & Macarthur (2011).

Sloboda; & O’Neill (2012) reported listening to one’s favourite music can help activate internal energy and concentration. They view that ‘right kind of music can help students beat stress during Board examinations. While loud music can be a source of noise or distraction for many students, health experts (psychiatrists) say music can also be used as a pill to de-stress students during exam time.

3.4 TREATMENT OF ANXIETY AND STRESS THROUGH MUSIC

Research by Rosenbaum & Prinsky (1991) found that adolescents preferred listening to music to get relaxation and free them from stress.

A study of Thaut & Davis (1993) researched the influence of subject versus experimenter chosen music on affect, anxiety and relaxation & found that all participants received increase relaxation scores regardless of their selection of music or no music selection.

Music has been used on pain, anxiety and stress during gynecological procedures (Davis, 1992), and to decrease preoperative anxiety (Robb et al., 1995).

In a review of music’s use in hospitals, Standley (1995) identified reducing pain, anxiety or stress; enhancing the effects of anesthetic /analgesic drugs or reducing their usage; and reducing the length of hospitalization as the most common applications. Music was found to have a favorable impact on almost all of the medically-related conditions studied with children responding more positively than adults and infants and females more positively than males.

Watkins (1997) concluded music can stimulate the production of endorphins, the body’s natural opiates, as well as reduce levels of cortisol and noradrenaline, hormones related to stress.

White (1999) found a greater impact on reduction in heart rate, respiratory rate, myocardial oxygen demand and anxiety following heart attacks when music is played in the recovery environment.

Tansik & Routhieaux (1999) studies observed a decrease in anxiety of preoperative anxiety and gynecological procedures with the use of music and relaxation techniques.

Robb & Carpenter (2000) stressed sedative music to be used in conjunction with relaxation techniques to achieve increased relaxation. Other relaxation techniques used with music include diaphragmatic breathing, rhythmic

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breathing, progressive muscle relaxation, imagery, Guided Imagery through Music (GIM) and deep breathing visualization relaxation instruction.

*Khalfa; Bella; Roy & Peretz (1999)* compared whether relaxing music as compared to silence might facilitate recovery from a psychologically stressful task. To this aim, changes in salivary cortisol levels were regularly monitored in 24 students before and after Social Stress Test. The data show that in the presence of music, the salivary cortisol level ceased to increase after the stressor, whereas in silence it continued to increase for 30 minutes.

*Iwanaga & Moroki (1999)* reported that music has very powerful effects on our moods and emotions. Favourite music has been shown to lower subjective feelings of tension whatever its nature, although physiological responses may be in the expected direction.

*White (1999)* investigated the effects of music for 20 minutes on anxiety of patients getting dental treatment. The results showed that stress after intervention and one hour after, in music group decreased immediately, rather than other groups (calm environment group and instance group).

In one experiment, *Brennan et al. (2000)* attempted to study music’s practicality in reducing stress by bringing music into the workplace. They studied the effect music has on self-reported stress levels and the immune system. The researchers obtained baseline levels of self-reported stress and measured the presence of salivary immunoglobin A (S-IgA) in the blood of the participants. S-IgA indicates levels of immune system activity. After playing smooth jazz in the participant’s high-stress newsroom workplace, they again measured the participant’s levels of self-reported stress and the levels of S-IgA.


in the blood. Music was shown to have a striking and lasting reduction on the participant’s perceived level of stress\textsuperscript{140}.

\textit{Standley} (2002) compared the impact of music on health of premature babies. In comparison with groups not provided with background music, exposed groups gain weight, increase food intake and reduce their length of stay in hospital\textsuperscript{141}.

\textit{Mok} & \textit{Wong} (2003) examined the results of research and found that stress levels meaningfully decreased in music group than instance group\textsuperscript{142}.

\textit{Bare} \& \textit{Dundes} (2004) summarized that anxiety relating to dental treatment can be reduced through background music. It can also assist in promoting relaxation to aid recovery\textsuperscript{143}.

Numerous studies have indicated that music can help to alleviate stress in patients waiting for treatment. \textit{Cooke et al.} (2005) found that listening to selected preferred music during the pre-operative wait reduced anxiety in day surgery patients\textsuperscript{144}.

\textit{Hays} \& \textit{Minichiello} (2005) concluded that older people report that music reduces anxiety and stress levels, increasing thresholds for pain endurance, reducing recovery and shortening convalescent periods after surgical procedures. Listening to recorded music is also important providing ‘inner happiness, inner contentment and inner peace’\textsuperscript{145}.

\textit{Lai et al.} (2006) concluded that music found to contribute to improving the occurrence of quiet sleep states, reduces the extent of crying and lowers mother

\begin{itemize}
\item \textsuperscript{142}Mok, E., \& Wong, K.Y. (2010). Effects of music on patient anxiety. \textit{AORN}, 77,396-410.
\end{itemize}

\textit{Flaten et al. (2006)} investigated and found calm background music to have a direct impact on biological indicators of stress such as cortisol and blood pressure\footnote{Flaten, M.A., Asli, O., & Simonsen, T. (2006). The effect of stress on absorption of acetaminophen. \textit{Psychopharmacology}, 185(4), 471-8.}.

\textit{Labbe; Schmidt; Babin; & Pharr (2007)} researched that listening to classical and relaxing music after exposure to a stressor should result in significant reductions in anxiety, anger, and sympathetic nervous system arousal, and increased relaxation compared to those who sit in silence or listen to heavy metal music\footnote{Labbe, E., Schmidt, N., Babin, J., & Pharr, M. (2007, Dec). Coping with stress: the effectiveness of different types of music. \textit{Applied Psychophysiological Biofeedback}, 32(3-4), 163-8.}. Fifty-six college students, 15 males and 41 females, were exposed to different types of music genres after experiencing a stressful test. Several 4 x 2 mixed design analyses of variance were conducted to determine the effects of music and silence conditions (heavy metal, classical, or self-selected music and silence) and time (pre-post music) on emotional state and physiological arousal. Results indicate listening to classical music, after exposure to a stressor, significantly reduces negative emotional states and physiological arousal compared to listening to heavy metal music or sitting in silence.

\textit{Lai; Hwang; Chen; Chang; Peng; & Cheng (2008)} examined the effect of music on examination anxiety among nursing students. A randomized crossover classroom-based trial was conducted. Thirty-eight students were randomly assigned to either a music/silence or a silence/music group sequence. The students in the music group were given a 40 minutes group-based music intervention in a classroom, whereas the students in the silence group received the regular test without music. The findings indicated that music intervention
effectively decrease examination anxiety and state anxiety as well as reduced pulse rate. The results suggest that music is effective at anxiety reduction\textsuperscript{149}.

\textit{Nilsson et al. (2008)} found musical interventions to have been used in healthcare settings to reduce patient pain, anxiety, and stress, although the exact mechanism of these therapies is not well understood. Music intervention had positive effects on reducing patients' anxiety and pain in approximately half of the reviewed studies\textsuperscript{150}.

\textit{Yang et al (2009)} concluded background music can contribute to alleviate anxiety in pregnancy and stress in childbirth\textsuperscript{151}.

\textit{Klassen; Liang; Tjosvold; Klassen & Hartling (2009)} conducted a systematic review of the efficacy of music therapy (MT) on pain and anxiety in children undergoing clinical procedures. Overall, MT showed a significant reduction in pain and anxiety\textsuperscript{152}.

\textit{Mok & Wong (2010)} pointed that undergoing surgery with local anesthesia is stressful because patients often are aware of their surroundings. Their study investigated music as a method of reducing patient’s anxiety during minor surgery with local anesthesia. For this study, researchers assessed the effectiveness of music as a relaxation modality by measuring patient’s vital signs and self-reported anxiety before and after surgery. Study results indicate that patients who listened to their choice of music during surgery experienced significantly lower anxiety levels, heart rates, and blood pressure than patients who did not listen to music\textsuperscript{153}.

Winter; Paskin & Baker (2010) found many patients in the Surgical Holding Area become stressed and anxious. In a hospital setting music reduces patient’s anxiety. This study determined that music can reduce the anxiety and stress of patients in the Surgical Holding Area. In this study, one group of subjects listed to music while a second group did not. Subjects who listened to music while in the Surgical Holding Area had significantly less stress and anxiety than did those who did not listen to music. Both groups spent similar lengths of time in the Surgical Holding Area. The results strongly suggest that if music were available to all patients in the Surgical Holding Area, most would select this option, and they would experience less anxiety154.

Pouyamanesh (2011) examined the effects of music on elevated state of anxiety during diagnostic procedures. The study was conducted on 104 consecutive patients undergoing GI endoscopy. Patients were randomly assigned to two groups regardless of sex, age and underlying disease. One group of 54 patients was made to listen to a recorded Indian classical instrumental music before and during the procedure, while the other group of 50 patients did not. Blood pressure, heart rate and respiratory rate were recorded at the beginning of consultation and end of procedure. Perception of procedure using a three point attitude scale was assessed. The results indicate that the background Indian classical music is efficacious in reducing psychological distress during a gastroscopic examination. They suggested that music could be applied to other medical situations as well, which tend to generate undue psychological stress and anxiety155. Music, as a familiar personal and culture medium, can be used to ease anxiety, to act as distractor, to increase discomfort and pain threshold.


Nilsson; Rawal; Unestahl; Zetterberg & Unosson (2011) reported that the use of music or has produced positive results in some studies in the form of reduction of fatigue, pain, and anxiety\textsuperscript{156}.

Scheufele (2011) studied the effectiveness of relaxation and music therapy in reduction of anxiety. Outcomes of this research showed that both of the two intervention methods decrease anxiety\textsuperscript{157}.

CONCLUSION

The review of related literature discussed above reveals that use of music as a healing and therapeutic tool is of utmost importance in treatment of various physiological and psychological problems. Also, music has a very powerful impact on arousal, emotions and moods and as a result can influence behaviour. The studies have shown positive results which prove that music irrespective of belonging to any country or part thereof is a valuable tool in the hands of doctors, psychotherapists, counselors, clinicians etc.

It can be concluded on the basis of research studies quoted above that though music therapy is a fast growing field based on scientific lines in western countries, and a lot many research have already been conducted worldwide ranging from clinical problems; curing ailments; controlling sugar, blood pressure; treating cancer patients; reducing anxiety, stress and depression etc, very less work have been done in India so far. It is very clear from the above studies that whatever handful of research on the use of Indian music has been done in India have shown positive and effective results but they have been mainly concentrated on the effectiveness of a particular Raga.

To the best of the investigator’s knowledge hardly any work has been done with the combination of these three kinds of Indian music in reducing anxiety and stress level of adolescents. So, the lack of a comprehensive research has


inspired the investigator to see the impact of Indian music on anxiety and stress level at adolescent stage of human development and to test the comparative effectiveness of three kinds of Indian music used in the present investigation.