Evaluation of the Effects of Music Therapy Using Todi Raga of Hindustani Classical Music on Blood Pressure, Pulse Rate and Respiratory Rate of Healthy Elderly Men

Samarpita Chatterjee (Mukherjee)¹, Roan Mukherjee²*

¹ Department of Hindustani Classical Music (Vocal), Sangit-Bhavana, Visva-Bharati (A Central University), Santiniketan, Birbhum-731235, West Bengal, India
² Department of Human Physiology, Hazaribag College of Dental Sciences and Hospital, Demotand, Hazaribag 825301, Jharkhand, India.

Abstract: Several studies have indicated that music therapy may affect cardiovascular health, in particular, it may bring positive changes in blood pressure levels and heart rate, thereby improving the overall quality of life. Hence, to regulate blood pressure, music therapy may be regarded as a significant complementary and alternative medicine (CAM). The respiratory rate, if maintained within normal range may promote good cardiac health. The aim of the present study was to evaluate the changes in blood pressure, pulse rate and respiratory rate in healthy and disease free males (age 50-60 years), at the completion of 30 days of music therapy intervention. Eighty healthy males were divided randomly into the experimental and the control group. Subjects of the experimental group were exposed to music therapy (a twenty minute instrumental session of Raga Todi of Hindustani Classical Music), whereas the control group were not exposed to the raga and were only kept quite at rest for the same period of time, during the period of intervention. Before and after the intervention, blood pressure, pulse rate and respiratory rate of the subjects were measured. It was found that the values of blood pressure, pulse rate and respiratory rate showed significant (p < 0.001) decrement in healthy/asymptomatic subjects exposed to music therapy. In the control group, the parameters under study did not vary significantly between the initial and afterward measurements (p > 0.05). Thus it may be concluded that raga Todi of Hindustani Classical Music have the potential to bring down the blood pressure levels and thereby may restrict the development of cardiovascular disorders.

Index Terms: Blood Pressure, Heart Rate, Respiratory Rate, Raga Todi, Hindustani Classical Music.

I. INTRODUCTION

Music may be regarded as the projection of ideas as well as emotions through significant sounds produced by instrument, voices, or both by taking into consideration different elements of melody, rhythm and harmony. Music plays an important role in everyone’s life. Music has the power to make one experience harmony, emotional estasy, spiritual uplifting, positive behaviour changes and absolute tranquility. Annoyance in life may increases in lack of melody and harmony. Music is known to have healing power. Music has been found to be effective to combat pain (Cepeda et al., 2006), anxiety (Madhusudhan et al., 2018; Ghasemi et al., 2017; Jhon and Upendra, 2016), coronary artery disease (Hanser and Mandel, 2005), mental illness (Li et al., 2015), stress (Möckel et al., 1994), and several other forms of health ailments (Sarkar and Utpal, 2015). One of the major risk factor for cardiovascular diseases and cerebrovascular diseases is hypertension. These diseases increases the morbidity and mortality rates among adults. Increased blood pressure levels seen at childhood may extend into adult life as hypertension (McGill et al., 2001), which eventually leads to the damage of blood vessels of the body. Hypertension is externally asymptomatic and causes damage to certain internal organs of the body, therefore, it has been referred as ‘Silent Killer’ by the World Health Organization (WHO, 1992). In India, the incidence of hypertension has been found to be more among urban adults in comparison to rural adults. The estimated number of hypertensive Indians will reach two hundred million by 2025 (Bhalwar, 2009). Evidences gathered many studies suggest that music may bring positive changes in the blood pressure levels (do Amaral et al., 2016), and thus may lower the incidence of other diseases which are associated with
hypertension. The American Society of Hypertension in their study have noted that the blood pressure measured at regular intervals, as the individual move around, carrying out his/ her normal daily routine, that is, the 24 -hour ambulatory blood pressure (ABP), significantly reduced in mild hypertensive patients listening Indian classical raga for half an hour per day, for four weeks (Sherry, 2008).

From time to time, continuously, the blood pressure targets have been redefined (Pradhan and Vishwakarma, 2017), to facilitate early detection of individuals at risk of developing hypertension and to expedite the treatment strategies, which could be either drug based for hypertensive patients, and non-pharmacological therapies and techniques for subjects who are not hypertensive but are at the risk of developing hypertension in future.

The conventional non-pharmacological strategies to lower blood pressure includes life style modifications such as reduction of body weight, dietary modifications, restriction in the intake of salts, lowering of stress levels, and participation in exercises / physical activity. In recent times, the use of complementary and alternative medicine (CAM) to reduce blood pressure have gained importance. The CAMs include meditation, yoga, and music therapy (Mcelroy et al., 2012).

II. MUSICOLOGICAL ANALYSIS OF INDIAN MUSIC THERAPY

In Sama veda and ancient music therapy related Indian music literatures, it has been mentioned that ragas such as Todi, Bhupali, Ahir Bhairava, Puriya, Hindol, Bhimpalas and Kausi Kanada are effective in lowering blood pressure (Kunikullaya et al., 2016).

In Indian context, a subject may be said to be exposed to music therapy when sound (nada), note (swara), melody (raga), music interval (shruti), beat (tala), rhythm (laya) are rightfully and systematically intonated, clinging to the asthetic emotion/ mood (rasa) and format / mode (thaat) (Sharma, 2007). It may be mentioned that there are seven notes Sa, Re, Ga, Ma, Pa, Dha and Ni of swara. The individual notes may be of decreased pitch or higher pitch. If the note is in decreased pitch, it is referred as flat note (komal) whereas if the note is in higher pitch, it is referred as or sharp note (teevra). The natural/ suddha/ pure swars are the Shadja (Sa) and Panchama (Pa) with no displacement or distortion (immovable: achalit swars), and the notes Rishabha (ri), Gandhara (ga), Madhyama (ma), Dhaivata (dha), and Nishada (ni) may be either suddha (movable : vikrut/ chalit), komal or teevra. All together there are 12 notes (Chaitanya, 1973). Thaat is the format of sequence of selected swaras with variation in suddha, komal and teevra swaras (Sobhana, 1989).

Raga is an array of swaras that inputs suitable rasa / asthetic emotion/ mood in a song/ music. A raga have the ability of inducing or magnifying feeling of excitement, joy / rejoice, peace, love, compassion, peace, courage , sorrow, and mental / emotional calmness (Karuna et al., 2013). This makes raga appropriate for music therapy. A particular raga have a definite number of komal or teevra swaras, based on which the thaat can be easily recognized (Sobhana, 1989). Positive physical / physiological / psychological changes have been found to be induced by positive emotions (Tugade et al., 2004), which can be elicited by raga therapy.

III. PRESENT CONCEPT OF HYPERTENSION IN ADULTS

Conventionally, systolic blood pressure (SBP) > 140 and diastolic blood pressure (DBP) > 90 mm Hg is widely accepted as hypertension (Sadiq et al., 2017). In the year 2018, guidelines framed by the European Society of Cardiology (ESC) / European Society of Hypertension (ESH), defined hypertension using the same values of SBP and DBP (Williams et al., 2018). Subjects having systemic arterial blood pressure more than it are generally exposed to treatment.

Treated blood pressure must be about 130/ 80 mm Hg, if the patient is able to tolerate drug treatment. In the guidelines (2017) provided by American College of Cardiology (ACC) and American Heart Association (AHA), SBP > 130 and DBP > 80 mm Hg were referred as hypertension. Generally, health care professionals recommended that all subjects should maintain their blood pressure below 140/ 90 mm Hg. However, the European as well as American guidelines suggests that blood pressure should be maintained at < 130/ 80 mm Hg.

Subjects of any age may become hypertensives. However, with age the prevalence of hypertension has been seen to rise. Hypertension is mainly of two types- Primary hypertension (essential hypertension) and Secondary hypertension. Primary hypertension is most common and is found in majority (90 - 95 %) of hypertensive patients. It has no single identifiable causes; its causes are unknown and is multifactorial in nature. Genetics, sedentary lifestyle, high intake of salts, alcohol intake, smoking, stress, insulin resistance, aging, and obesity have a role in its development. Secondary hypertension is less prevalent type, affecting 5-10 % of hypertensives. It may occur due to different underlying medical conditions such as diseases of kidneys, heart, endocrine system and even by drugs (Mohamed et al., 2013).

IV. BRIEF LITERATURE SURVEY

In a study conducted on primary educators (age >30 years) with hypertension at Puducherry, it was found that raga aih bhariv was effective in reducing the blood pressure. In the study, raga Ahir Bhairav was administered to the study subjects by using CD for 20-30 minutes (Angeline, 2018).

An Indian study among male and female subjects found that listening to Indian classical music for an hour, along with the intake of regular anti-hypertensive medications causes significant lowering of blood pressure at the completion of four months from the start of music therapy (Kulkarni and Chittapur, 2017).

Similarly, another study at Nellor, India, found music therapy effective in the regulation of blood pressure, heart rate and respiratory rate, after neurosurgery, in patients of traumatic brain injury (Reddy et al., 2017).

Raga Bhupali, an evening raga, has been found to be useful for lowering heart rate and modulating other cardiac regulation factors by lowering the sympathetic activity and raising the vagal tone. Moreover, it may reduce anxiety levels and induce

Institute of Science, BHU Varanasi, India

Journal of Scientific Research, Volume 64, Issue 1, 2020

160
positivity in perceived feelings (Nagarajan et al., 2015).

In a sample of elderly adults (above 60 years of age) of Chennai, Tamil Nadu, administration of music therapy using raga Malkaus for a time period of 22 minutes, in the evening for 30 days was found to be significantly effective in lowering blood pressure (Lakshmi and Bhushan, 2015).

In another study, among prehypertensives or stage I hypertensives, lifestyle modification along with the listening of raga bhimpalas for three months, obtained promising results in terms of decrement in blood pressure (Kunikullaya et al., 2016).

A study carried out at Jawaharlal Nehru Medical College, Belgaum, showed that raga Todi was effective in lowering the blood pressure in adults (age > 40 years) of both sexes having essential hypertension, when administered for 20 minutes daily in the morning, for 30 days along with their regular medication (Kamat-Nadkarni, 2013).

In another study conducted among pre-hypertensive male (aged 35-40) adults, near Pondicherry, music therapy intervention (listening Ahir Bhairav using earphones for 20 minutes per day) for 40 days significantly reduced the blood pressure (Sobna et al., 2013).

A Sri Lankan study on 45 and 65 years aged male and female subjects, found that listening Hindustani Classical Music for certain duration in healthy individuals effectively improved cardiovascular and respiratory health, evaluated in terms of SBP, DBP, Pulse rate and Breathing rate (Siritunga et al., 2013).

Studies have reported that listening to Indian classical instrumental music while gastroscopy may reduce blood pressure, heart rate and breathing rate (De Oliveira et al., 2009).

In a study conducted on elderly adults of India, living in old age homes, it was seen that music therapy intervention employing raga Anandabhairavi of Carnatic music was successful in decreasing the blood pressure (Mathew, 2008).

In a foreign study on adolescents, it was found that relaxing nature of the music may cause lowering of heart rate. Such findings may be of relevance for the maintenance of good cardiovascular health (Escher and Evéquoz, 1999).

Thus by analyzing the available studies, it is seen that minimal studies have been conducted, to investigate the therapeutic efficacy of Indian ragas in controlling blood pressure in healthy/asymptomatic subjects. Hence, the objective of this present study was to investigate the impact of Raga Todi of Hindustani Classical Music (Instrumental) on systemic arterial blood pressure, pulse rate and respiratory/breathing rate in such group of individuals.

V. MATERIALS AND METHODS

A. Participants

After receiving the approval from the Institutional ethics committee and informed consent from the participants of the study, 80 male subjects satisfying the inclusion and exclusion as criteria mentioned below was randomly selected for the study. The study was carried out in a private health care unit at Burdwan, West Bengal.

B. Inclusion Criteria

1. Individuals between 50-60 years of age.
2. Individuals with systemic arterial pressure less than 140/90 mm Hg.

C. Exclusion criteria

1. Individuals who were lower or above 50-60 years.
2. Individuals with hypertension that is, having systemic arterial pressure > 140/90 mm Hg.
3. Individuals who were taking medications or were under long term treatment for any illness.
4. Smokers and alcoholics.
5. Individuals who were under life style or dietary modifications for treatment of health related conditions.

D. Study protocol

A control group (n = 40) and an experimental group (n = 40) was formed with the participants. The control group were simply exposed to a resting period for 20 minutes. The subjects of the experimental group on the other hand was exposed to a 20-minute session of Raga Todi of Hindustani Classical Music (Instrumental), employing headphones in a sitting posture.

All the subjects of the study were asked to remain at rest for 5 minutes in sitting posture, before the start of the study so that various physiological parameters of the body remain at a steady level. The intervention of maintenance of resting state in case of control group, and exposure to music in case of experimental group was continued daily (once a day) in the morning hours for a time period of 30 days.

At the first day (Pre test- Before Intervention) and on the 30th day (Post test- After Intervention), the determination of blood pressure (SBP and DBP), pulse rate and respiratory rate of the control group and the experimental group subjects were carried out. The blood pressure was measured in the sitting position by using digital blood pressure apparatus (OMRON HEM-7130). The average of two consecutive measurement, at an intervals of 5 minutes in the upper arm of the subject were taken to be the final blood pressure of an individual.

The determination of respiratory rate was done by counting the respiratory movements of the chest for one minute from a distance (Kumar and Clerk, 2001; Michel, 1995).

It is necessary to mention that initially, a pilot study were conducted for pretesting the study design and for feasibility. Then necessary alterations were made before the final study. All the measurements of the pre test and post test were done at a similar timing of the day to restrict circadian effects and promote reliability of the collected data.

Raag Todi (morning raga) used on the experimental group is a Sampurna raga and permits seven notes in ascent and seven in descent. This deep raaga is known to create an atmosphere full of Karun and Bhakti ras.

Statistical Analysis: All the data obtained was expressed as mean ± SD (standard deviation). Comparison of the parameters under study was done by using t-test. A p value of ≤ 0.05 or lower were considered significant.
VI. RESULTS

The complete characteristics of the study participants have been presented in Table 1. From the table, it was seen that majority of the participants were graduate, married and were private sector employees. The mean age of the participants were 57 ± 6.

Table 1: Distributions of Participants by Characteristics

<table>
<thead>
<tr>
<th>No.</th>
<th>Category</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>10 + 2</td>
<td>7</td>
<td>8.75</td>
</tr>
<tr>
<td>2</td>
<td>Graduate</td>
<td>44</td>
<td>55</td>
</tr>
<tr>
<td>3</td>
<td>Post Graduate</td>
<td>23</td>
<td>28.75</td>
</tr>
<tr>
<td>4</td>
<td>Higher Degrees</td>
<td>6</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>1</td>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Married</td>
<td>75</td>
<td>93.75</td>
</tr>
<tr>
<td>2</td>
<td>Unmarried</td>
<td>5</td>
<td>6.25</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>1</td>
<td>Employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Government employees</td>
<td>22</td>
<td>27.5</td>
</tr>
<tr>
<td>2</td>
<td>Private employees</td>
<td>28</td>
<td>35</td>
</tr>
<tr>
<td>3</td>
<td>Business</td>
<td>25</td>
<td>31.25</td>
</tr>
<tr>
<td>4</td>
<td>Others</td>
<td>5</td>
<td>6.25</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Mean Age</td>
<td></td>
<td>57 ± 6</td>
</tr>
</tbody>
</table>

The blood pressure before and after music therapy in the experimental group, and the blood pressures of the control group initially and after intervention (rest) have been presented in Table 2, and illustrated in Figure 1A and 1B. It was found that after music therapy intervention in the experimental group, the systolic blood pressure was reduced to 130.2 (mm Hg) from 136.3 (mm Hg) and the diastolic blood pressure was reduced to 80.5 (mm Hg) from 86.2 (mm Hg). The observed drop in blood pressure were significant (p < 0.001).

The pulse rate and respiratory rate before and after music therapy in the experimental group, and the same in the control group initially and after intervention (rest) is presented in Table 3, and illustrated in Figure 2 and 3. It was seen that the pulse rate was lowered to 79.8 (bpm) from 85.2 (bpm) and the respiratory rate dropped to 13.6 (per minute) from 15.7 (per minute), after music therapy in the experimental group. These variations were significant (p < 0.001).

The variations of SBP, DBP, pulse rate and respiratory rate observed in the control group after exposure to the resting period was very less and were not not significant (p > 0.05) (Table 3).

Table 2: Analysis of blood pressure in the Control Group (initially and after resting period), and Experimental Group (before and after exposure to music)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control Group (Mean ± SD)</th>
<th>Experimental Group (Mean ± SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre test-</td>
<td>Post test-</td>
</tr>
<tr>
<td>SBP (mm Hg)</td>
<td>Initial level</td>
<td>Initial level</td>
</tr>
<tr>
<td>137 ± 1.26</td>
<td>136.5 ± 1.53</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>DBP (mm Hg)</td>
<td>87.1 ± 1.62</td>
<td>&gt; 0.05</td>
</tr>
</tbody>
</table>

VII. DISCUSSION

The present study evaluated the effects of raga Todi of...
Hindustani Classical Music (instrumental) on vital physiological variables (blood pressure, pulse rate and respiratory rate) concerned with cardiovascular and respiratory health. The findings revealed that healthy / asymptomatic elderly males experienced decrement in systolic blood pressure, diastolic blood pressure, pulse rate and breathing/ respiratory rate on exposure to music intervention (listening to raga Todi) for a time period of 30 days, in the morning hours of the day. An earlier study found significant lowering of blood pressure on exposure to long term raga therapy, in chronic hypertensive patients (Kulkarni and Chittapur, 2017). This earlier study to prevent monotony among the subjects, exposed them to six different ragas such as Asavari, Ahir Bhairavi, Hansadhwni, Bhipalas, Darbari and Todi. However, each of the raga was allowed to be listened for 1 week alternatively for 1 hours a day for a time period of 6 months. In contrast, since the present study was only of 30 days duration, no such measures were taken to prevent monotony.

Table 3: Analysis of pulse rate and respiratory rate in the Control group (initially and after resting period) and Experimental Group (before and after exposure to music)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control Group (Mean ± SD)</th>
<th>Experimental Group (Mean ± SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre test- Initial level before resting period of 20 minutes, in no music condition</td>
<td>Post test- After resting period of 20 minutes, in no music condition</td>
</tr>
<tr>
<td>Pulse Rate Per Minute</td>
<td>85.4 ± 1.87</td>
<td>85.2 ± 1.82</td>
</tr>
<tr>
<td>Respiratory Rate/ min.</td>
<td>16.2 ± 0.53</td>
<td>16.0 ± 0.62</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre test- Before Music Therapy Intervention</th>
<th>Post test- After Music Therapy Intervention</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse Rate Per Minute</td>
<td>85.3 ± 1.85</td>
<td>79.8 ± 2.39</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Respiratory Rate/ min.</td>
<td>15.7 ± 0.82</td>
<td>13.6 ± 1.06</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

Raga Todi has been found to be effective in lowering blood pressure in essential hypertension patients by an earlier study (Kamat-Nadkarni, 2013). In traumatic brain injury (TBI) patients, after neurosurgery, Raga Todi, Hindola and Kalyani have been seen to cause improvement of respiratory rate, heart rate, and SBP, in a study conducted at Tertiary Hospital of Nellore, India (Reddy et al., 2017). A meta-analysis study, which evaluated several other studies indicated that listening to music may result in improvement in the systolic blood pressure levels and music should be given due importance during the treatment of hypertension (do Amaral et al., 2016). Based on several earlier studies (Angeline, 2018; Kulkarni and Chittapur, 2017; Kunikullaya et al., 2016; Nagarjana et al., 2015; Sobna et al., 2013; De Oliveira et al., 2009; Mathew, 2008), it may be said that music may be used as a supplement to the main treatment of hypertension. Turkish classical music have also been found to have positive effects on blood pressure in Turkish elderly patients with hypertension (Bekiroglu et al., 2013).

Much similar to the present study, a study were conducted in Sri Lanka but with a different raga. In the study at Sri Lanka, a test group formed of asymptomatic male and females of age 45 and 46 years were made to listen to Rag Darbari Kanada of Indian classical music for twenty two minutes whereas the control group were not exposed to music and were simply maintained at silent state for the same duration of time. Before and after-test comparison were made. A significant decrease in the blood pressure, pulse rate and respiratory rate were observed in the test group after listening to the music (Siritunga et al., 2013).

Lowering of the blood pressure (by two - six mm Hg) and heart rate may reduce the risk of developing cardiovascular diseases such as coronary artery disease (CAD), hypertension, stroke (MacMahon, 2000). Individuals having resting heart rate greater than 84 bpm have increased risk of developing cardiovascular diseases (Reil et al., 2011; Singh, 2003). At rest, the normal respiratory rate range is about 8 - 20 breaths per minute. But nowadays in adults the lower end of respiratory range have been raised to 15 breaths per minute from 8 breaths per minute. It may be mentioned that heart disease patients are seen to have respiratory rate up to about 15 breaths per minute. Hence, individuals should strive to maintain their respiratory rate below 15 breaths per minute to reduce their risk for cardiovascular diseases and associated medical conditions (Siritunga et al., 2013; Rakhimov, 2011). The results of the present study showed that listening to music may be effective in maintaining a respiratory rate below 15 breaths per minute.

The reduction in blood pressure, heart rate and respiratory rate...
due to application of music intervention may be attributed to the
influence of music on central nervous system, autonomic
nervous system and endocrine system. More specifically, music
may lower sympathetic drive and enhance vagal control / parasym pathetic drive. Simultaneously, music by lowering stress
hormone levels such as serum cortisol and adrenaline may
reduce stress (Mockel et al., 1994) and promote relaxation. Slow
tempo music with soothing notes may be responsible for
parasympathetic activation (Nagarajan et al., 2015). Rhythms of
music brings beneficial adaptations in the physiology of bodily
rhythms (Mac Donald et al., 2009). It has been known that, the
tempo of music may modulate the dynamics of cardio vascular
system, promoting cardio vascular health (Bartlett, 1996).
Cardiac vagal tone may have a role in sustainability of
attentiveness and modulation of emotional aspects of behaviour
(Porges et al., 1994). This may lead to positive changes in the
mind, lowering stress and thus benefitting cardiovascular health.
Sedative music may lower tension. Physiological parameters
such as heart rate, respiration and blood pressure may be lowered
calm music (Bernardi et al., 2006). Furthermore, the calm
mood promoted by such music may relax the body and brain.
The calm brain will lead to the stimulation of the body to
liberate Nitric oxide (NO), which in turn acts on the blood
vessels and lowers the blood vessel tone, dilating the blood
vessel, and hence reducing the blood pressure. Additively, music
causes the release of endorphins, a hormone responsible for
imparting pleasure and lowering of stress / tension. This may
allow achieving of a better steady state of the cardiovascular
and respiratory system. Even religious music therapy intervention
have been found to lower the systolic and diastolic blood
pressure in hypertensive patients (Bustami, 2018).
Positive changes in the respiratory system may influence the
prime brain centers concerned with emotion, thought and related
behaviour (Adhana et al., 2013; Matayan et al., 2009). Lower
respiratory / breathing rates may lower blood pressure by
enhancing the sensitivity of baroreceptor reflex in patients of
hypertension. Thus lower breathing rate achieved by music in
the present study is a significant finding in relation the the
management of high blood pressure. Moreover, the stimulation
of the parasympathetic drive and reduction in the sympathetic
drive by slow breathing may reduce both the resting heart rate as
well as blood pressure (Abd El-Kader Mohamed, 2013; Oneda,
et al., 2010).

CONCLUSION
Thus it may be concluded that music may have positive
impact on neuro endocrine system (Siritunga et al. 2013),
especially on the autonomic nervous system. It may be expected
that special and systematically designed music therapy intervention,
by altering the vagal tone may beneficially affect cardiovascular and respiratory regulation (Brandes et al., 2008),
thereby promoting a healthy living. The findings of the present
study may be considered significant, since it indicated that
listening to raga Todi of Hindustani Classical Music may act as
a preventive measure to restrain the rise of blood pressure in
asymptomatic subjects. This may lower the chance of
developing cardiovascular diseases. Future studies with large
sample size, involving both males and females may be helpful to
deeply understand the impact of music therapy on vital
physiological parameters such as SBP, DBP, heart rate and
respiratory rate.

ACKNOWLEDGEMENTS
We are thankful to all the participants of the study. We also
express sincere gratitude to Senior Physician Dr. Amal
Chatterjee, MD, Ex-Medical Officer, West Bengal Health
Services, for helping the authors to complete this study.

REFERENCES
Abd El-Kader Mohamed, L.A., Hanafy, N.F., Abd El-Naby,
A.G. (2013). Effects of slow breathing exercise on blood
pressure and heart rate among newly diagnosed patients with
essential hypertension. Journal of Education and Practice,
5(4),36-45.
The influence of the 2:1 yogic breathing technique on essentila
hypertension, Indian J Physiol Pharmacol., 57(1),38–44.
Hypertension among Primary Educators in Selected Schools
Press.
Effect of Turkish classical music on blood pressure: A
randomized controlled trial in hypertensive elderly patients.
Complementary Therapies in Medicine, 21, 147-154.
Bernardi, L., Porta, C., Sleight, P. (2006). Cardiovascular,
Cerebrovascular, and respiratory changes induced by
different types of music in musicians and non-musicians: The
importance of silence. Heart, 92, 445-452.
Text Book of Public Health and Community Medicine.1st
Edition. Pune: Department of Community Medicine, AFMC,
Pune in collaboration with WHO, India office,1216–1220.
Fischer. Effect of receptive music therapy on heart rate
variability in hypertensive patients. Psychosomatic Medicine
Bustami. (2018). Relaxed Music Can Reduce Blood Pressure In
Hypertension Patients. International Journal of Scientific and
Technology Research, 7(4), 171-173.
Government of India: Bigamudre Chaitanya Deva
Publications Division, Ministry of Information and
De Oliveira, Z.C.R., Jardim, P.C.B.V., Salgado, C.M., Nunes,
M.C., et al. (2009). Music therapy effects on the quality of
life and the blood pressure of hypertensive patients. Arq Bras
Cardiol., 93(5),495-540.


***