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Original Article

Music Therapy Session as Stress Buster among Diabetic: An Analysis by Heart Rate Variability

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Abstract

Introduction: Heart rate variability (HRV) is one of the important non-invasive measures to monitor the autonomic dysfunctions. Stressful experiences have been implicated in the modification of non-communicable diseases such as diabetes lifestyle modification and many adjunct modality such as music therapy contribute significantly apart from the pharmacological measures in the management of the diabetes. Music has been used with therapeutic purposes since ancient ages. In India, it is known as Raga Chikitsa. It is one of the effective nonpharmacological measures to combat the stress. There is paucity of data for use of raga-based Bollywood songs for music therapy; hence, we used collection of raga-based Bollywood songs for the session.

Materials and Methods: We evaluated 30 diabetics for the immediate effect of Music Therapy session by doing analysis of HRV using cardiac autonomic neuropathy analyzer. The data were subjected to Kubios analysis.

Result: It was found that there was fall in heart rate after (84.71 ± 9.13) MT session compared to before (93.9 ± 4.41) the session. The difference was statically significant (t = 6.31 and $P < 0.05$). The *t* test revealed statistically significant difference ($t = 2.77$ and $P < 0.05$) in the blood sugar level before (164 ± 39.8) and after (143 ± 23.3) music therapy session. The increase in the PNS index was statistically insignificant (t = 4.30 and $P > 0.05$). There was statistically significant decrease (t = 3.03 and $P < 0.05$) in the SNS index which is indicator of sympathetic activity of the body. Before session of therapy the overall stress index was 32.41 ± 5.1 it became 14.83 ± 5.46 after the session. The reduction in stress was statistically significant at 5% level (t = 2.91 and $P < 0.05$).

Conclusion: Hence, it can be concluded that music therapy using sessions of specific raga-based Bollywood songs can be stress buster among diabetics.

Key words: Diabetic, Heart rate variability, Music therapy

INTRODUCTION

Diabetes mellitus is one of the most common chronic disease all over the world. In 2020, according to the International Diabetes Federation, 463 million people have diabetes in the world and 77 million people belongs to India.[1] Stressful life, sedentary lifestyle, lack of exercise, eating habits, dietary factors, and environmental factors are some of the major reasons for rising trend of the diabetes worldwide. Stress management through lifestyle modification has become integral part of the diabetes treatment. Certain non-pharmacological measures such as music therapy restore the balance between sympathetic and parasympathetic and combat the stress. Music has been used worldwide for this purpose. Mozart,[2] in western, and Raga Chikitsa,[3] in Indian, subcontinent has been used widely for therapeutic purposes.

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Background of Music Therapy

Music therapy dates back to Pythagoras, who discovered that harmonic music is able to soothe people and cure ailments of the spirit, body, and soul. He believed that the mathematical nature of music influenced the mind and the body and termed it "musical medicine".[2]

Bruscia defined music therapy as systematic process of intervention, wherein the therapist helps the patient

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to achieve health, using musical experiences and the relationships that develop through them as dynamic forces of change.[4] Raga Chikitsa was written in the ancient times, which highlighted the usage of ragas for treatment of various ailments and the methodology to listen to such ragas for cures. Music deployed in a calibrated dosage which evokes a neural response. For the therapist, music as sound is – an instrument for creating the sensation of hearing, a transmission of controlled energy that is perceived by the ear, processed by the brain, and resonates in the energy centers of the body for restoring homeostasis.[5]

Practice of Music Therapy in View of Modern Medicine

Dr. Kinjalk founded the Kinjalk School of music therapy in 1996 to undertake clinical research in the field of music therapy. It focuses on the use of Indian musical forms as an adjunct to allopathic medicines. The technique invented by him KIMMA is used for identifying appropriate music for participants or patients as per their history, mood, suitability, and ailment. Patients are provided with an environment of medicine and music that have been reported to potentially help them in the management of stress-related disorders, hypertension, diabetes mellitus, depression, insomnia, anxiety state. KIMMA has been recognized as a landmark contribution in the field of music therapy.[6]

Apart from it, nowadays, many national organizations working in area of diabetes are also looking forward for the research in the field of adjunct modality in the management of diabetes. Dr. Sairam's Indian, music therapy association now started notion of music therapy in hospital set up. The local organizations in Chhattisgarh region such as Bilaspur Diabetes Society from Bilaspur CG, Yoga Research Unit from Govt CIMS Bilaspur, Department of Anatomy from AIIMS Raipur are taking special efforts for spreading awareness for prevention of diabetes and its management through lifestyle modifications and adjunct treatment modalities such as yoga, exercise, and music therapy. In diabetes, control of heart rate is affected. It is evident from various studies that heart rate responses are closely associated with brainstem regulation through the Autonomic Nervous System.[7] Evaluation of heart rate variability (HRV) can give bird's eye view to autonomic status of body. Hence, to evaluate autonomic functions, the present study was intended to evaluate effect of music therapy among diabetic by evaluation of HRV.

METHODOLOGY

The present study was carried out in the Department of Physiology attending Music Therapy Clinic. Recording for each participant was done in the morning hours between 9.00 A.M and 11.00 A.M. The participants were instructed to avoid tea, coffee intake, and strenuous physical exercise at least 2 h before the test. Each participant reported to the laboratory after a light breakfast. In the laboratory, after preliminary briefing, the participant was asked to lie down in the supine position and breathe in a relaxed manner, without going off to sleep. After a 10 min rest and confirmation of proper RR wave in the resting ECG the HRV recording in Kody's cardiac autonomic neuropathy (CAN) analyzer for 5 min started to have baseline HRV recording, the subjects were given 20 min session of music therapy using popular Indian Bollywood Songs of specific raga such as Hansdhwani, Yaman Puria Dhaneshree, Darbari, Bageshree, and Shudh Kalyan again after music therapy session a 5 min ECG recording for HRV analysis was done.

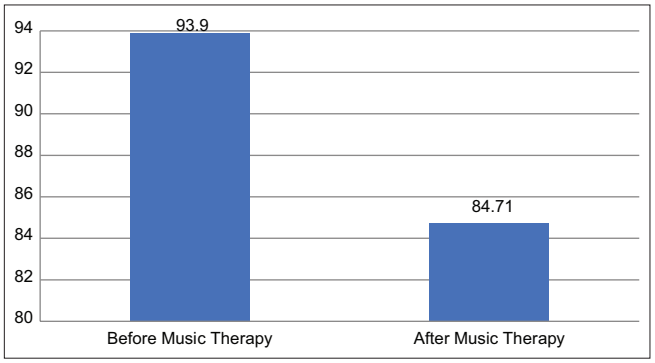
RESULTS AND ANALYSIS

The vital parameters such as temperature, pulse, respiration, oxygen saturation blood pressure, and blood sugar were noted before and after therapy session. The ECG was recorded before and after music therapy session for evaluation of HRV. The data collected from Kody's CAN analyzer were subjected to Kubios analysis.[8] Table 1 depicts the few of the important parameters.

The comparison for heart rate among diabetics before (93.9 ± 4.41) and after (84.71 ± 9.13) the music therapy session revealed that there was decrease in the heart rate after music therapy with the standard error of 2.55 (before) and 5.27 (after) music therapy session. When the difference was analyzed by *t*-test, it was significant with t-value 6.31 and $P < 0.05$. The details are depicted in Table 1 and Graph 1.

Table 1: Parameters before and after music therapy

Parameter	Before MT	After MT	t value	*P*-value
Heart rate	93.9±4.41	84.71±9.13	6.31	<0.05
Blood sugar	164±39.8	143±23.3	2.77	<0.05
PNS index	−2.22±0.13	−1.45±0.62	4.30	>0.05
SNS index	5.51±0.70	2.08±1.44	3.03	<0.05
Stress index	32.41±5.1	14.83±5.46	2.91	<0.05



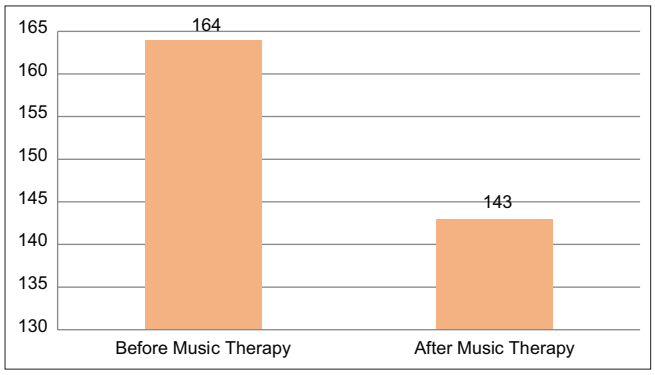
Graph 1: Changes in heart rate before and after session of music therapy

When blood sugar was compared among diabetics before (164 ± 39.8) and after (143 ± 23.3) the music therapy session, it revealed that there was decrease in the blood sugar after music therapy session with the standard error of 16.27 and 9.53 for before and after music therapy session, respectively. When the difference was analyzed by *t*-test, it was significant ($t = 2.77$ and $P < 0.05$). The details are depicted in Table 1 and Graph 2.

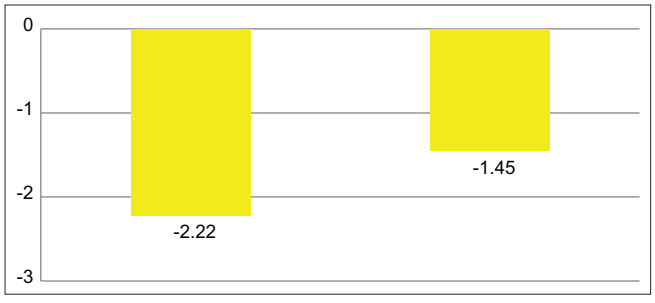
Regarding PNS index, although there was increase in the PNS index after the session of music therapy that the increase in the parasympathetic component was statistically insignificant when analyzed by *t*-test (t = 4.30). It was −2.22 ± 0.13 before which became −1.45 ± 0.62 after the session of music therapy. The details are depicted in Table 1 and Graph 3.

The Kubios analysis revealed fall in SNS index, it was 5.51 ± 0.70 before the session which became 2.08 ± 1.44. The fall in the SNS index which is sympathetic component was statistically significant when compared by *t*-test (t = 3.03) and $P < 0.05$. The details are depicted in Table 1 and Graph 4.

It was observed that the stress index, which is holistic indicator of HRV analysis for autonomic functions found to be significantly decreased after the session of music therapy. It was 32.41 ± 5.1 before which became 14.83 ± 5.46 after the session of music therapy that the details are depicted in Table 1 and Graph 5.



Graph 2: Changes in blood sugar before and after session of music therapy



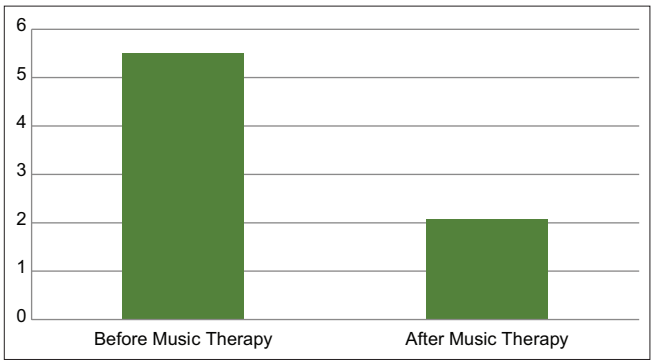
Graph 3: Changes in PNS index before and after session of music therapy

DISCUSSION

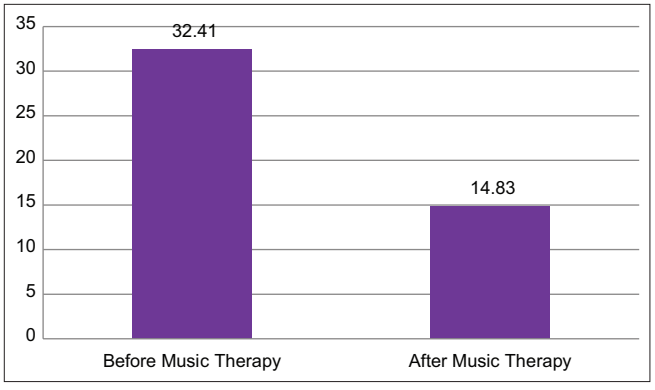
Raga is the sequence of selected notes (swaras) that lend appropriate "mood" or emotion in a selective combination. It is a yoga system through the medium of sonorous sounds. Depending on its nature, a raga could induce or intensify joy or sorrow, violence, or peace, and it is this quality which forms the basis for musical application.[9]

Music has been shown to be an efficient method of modulating emotions and autonomic nervous system activity and is potentially a low-cost and safe adjuvant for intervention and therapy. Sedative music induces both high relaxation and low tension subjectively in young adults. These relaxation effects of music are supported by a shift of the autonomic balance toward parasympathetic predominance in healthy adults. In addition, listening to pleasant music provokes parasympathetic activity compared with a resting condition. Thus, music may modify the autonomic nervous system.[10] Music is a powerful stimulus that evokes and modulates moods and emotions and can be used intentionally to regulate moods and emotions in daily life.[11]

As Ragas like Bageshree working as hypoglycemic,[12] hence, there was fall in blood sugar, the reduced heart rate can be



Graph 4: Changes in SNS index before and after session of music therapy



Graph 5: Changes in stress index before and after session of music therapy

attribute to anxiolytic Rag Hansdhwani, Yaman and Darbari as they ease tension. It also reflected as overall reduction in sympathetic component. Interestingly, in our study, we found reduction in sympathetic component significantly rather than the predominance of parasympathetic component after the music therapy session among the diabetic.

CONCLUSION

It can be concluded from the present study that there is significant effect on reduction of stress among diabetic after the music therapy session as we found that there was significant fall in heart rate, blood sugar after the session. The parasympathetic component the PNS index was increased after the session, but the change was statistically insignificant. There was statistically significant decrease in the SNS index which is indicator of sympathetic activity of the body. The overall stress index was also decreased to statistically significant level as reflected by Kubios analysis. Hence, it can be concluded that music therapy can be used as one of the nonpharmacological measures to combat the stress and sessions of specific raga-based Bollywood songs can be stress buster among diabetics.

Music therapy using raga-based Bollywood songs can be one of effective non-pharmacological measures in the armamentarium of adjunct modalities for battle against diabetes.

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