

# Effect of Adjuvant Music Therapy on Anxiety, Depressive Symptoms, and Cognitive Functions of Patients Receiving Electroconvulsive Therapy: A Preliminary Study

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## ABSTRACT

**Background and objectives:** Electroconvulsive therapy (ECT) is one of the most commonly used treatments for severe psychiatric disorders. Prior and during the ECT treatment, patients may experience varied degrees of anxiety, depressive symptoms, and cognitive impairments. Music therapy (MT) as an adjuvant psychiatric intervention has been successfully employed in many fields of medicine and psychiatry but unexplored in ECT indicative patient group. This study evaluated the effect of MT on anxiety, depression, and cognitive functions of patients receiving ECT.

**Materials and methods:** A sample of 29 patients who received ECT as per diagnostic and treatment needs were randomized into cases ( $n = 14$ ; receiving adjuvant MT) and controls ( $n = 15$ ; no MT intervention) after subjecting to set criteria. Hospital Anxiety and Depression Scale (HADS) and Montreal Cognitive Assessment (MoCA) were recorded a day before and 15 days after scheduled four sessions of ECTs were over. Music therapy intervention in the form of *Ahir Bhairav* raga improvisation, imagery of journey of good health, recovery, and relaxation was administered for cases. Paired  $t$  tests and independent  $t$  tests were used for intragroup and intergroup comparisons, respectively.

**Results:** Music therapy intervention resulted in within-the-group significant reduction in anxiety, depression, and improvement in cognitive functioning scores ( $p \leq 0.05$ ). Music therapy group also recorded a significant reduction in total HADS composite scores during the period of intervention. An intergroup comparison between the MT and the control groups resulted in a significant improvement in anxiety and total HADS scores.

**Conclusion:** The study results support that MT intervention can be used in clinical settings as an adjunct with ECT, to control anxiety, depression, and cognitive functions in mentally ill patients. More studies with larger sample size are needed to confirm these findings.

**Keywords:** Anxiety, Cognitive function, Depression, Electroconvulsive therapy, Music therapy.

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## INTRODUCTION

The World Health Organization (2001) reported that one in four people in the world and one in six in India are affected by mental disorders at some point in their lives. Globally, around 450 million people currently suffer from mental health issue conditions.<sup>1</sup> The morbidity rate for mental disorders is 13.7% with geographical variations among the Indian subcontinent.<sup>2</sup> Mental illness is a health condition which involves changes in cognition (thinking), emotion, or behavior and may affect one's ability to relate to others and function normally in their day-to-day life. The mental disorders are caused by a combination of genetic, biological, psychological, and environmental factors, and recovery of these conditions is not simply a matter of will and self-discipline. Mental health treatments require diverse approaches ranging from pharmacological to nonpharmacological interventions with adjunct alternative/cognitive behavioral therapies.<sup>1</sup>

Electroconvulsive therapy (ECT) is one of the hospital-based procedure commonly used in patients with severe major depression with high suicidality or bipolar disorder that failed to respond to standard treatments.<sup>3</sup> Electroconvulsive therapy involves a brief electrical stimulation of the brain given under anesthesia, which produces a seizure. Electroconvulsive therapy is an option to treat severe mental illness and has been associated with short-term memory loss and difficulty in learning or remembering things.<sup>3</sup>

Music has been used across all cultures in the world to help humans deal with difficult feelings due to its strong and immediate influence over our emotions, cognition, and behavior.

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Abundant literature exists on music being used as therapeutic intervention in mental disorders.<sup>4–6</sup> Music therapy (MT) is the skillful use of music and musical elements by an accredited music therapist to promote, maintain, and restore mental, physical, social, and spiritual health.<sup>5</sup>

Mental health and MT studies have shown promise for improving both motor control and emotional functions in patients with a wide range of diseases from schizophrenia to Parkinson's disease.<sup>7</sup> A randomized controlled trial reported that the use of musical tones in electroconvulsive therapies could potentially

replace other types of medicine or reduce the amount of medication required in mental disorder interventions.<sup>6</sup> Music therapy has been proved as a complementary therapy in treating depression, autism, schizophrenia, and dementia, as well as problems of agitation, anxiety, and sleeplessness.<sup>8</sup> Music therapy was shown to be useful in generalized anxiety disorder and depression.<sup>4,5</sup> Music not only reduced anxiety but also is reported to improve on memory miraculously in neurodegenerative autoimmune disorder.<sup>9,10</sup> Given the evidence of MT in improvement of mental health and definable research lacunae in MT intervention on patients undergoing ECT, we planned this study. The study evaluated on the effect of MT on cognitive abilities, anxiety, and depressive symptoms of patients who received ECT.

## MATERIALS AND METHODS

A prospective study was conducted for a period of 5 months at the Department of Psychiatry and Center for Music Therapy Education and Research at Mahatma Gandhi Medical College and Research Institute based in Puducherry, South India. The study was initiated after obtaining clearance from institutional human ethics committee. A written informed consent was obtained in the local language from patients and caretakers. The patients were explained about the ECT procedure prior to its commencement.

All patients admitted to the Department of Psychiatry and receiving ECTs for any indication as decided by the consultant and who have given a written informed consent for ECT and MT intervention were included in the study. Minimum of 15 days of hospitalization and two ECTs per week for 2 weeks were considered for inclusion in the study, thus summing up to four ECTs per subject in the MT group. Patients who were hard of hearing, uncooperative, violent, or disturbed to receive MT or those patients who were receiving any psychiatric treatment for cognitive disorders were excluded from the study.

This is a simple randomized controlled study design, where in the cases ( $n = 14$  who received MT) and controls ( $n = 15$  no MT) were randomly allocated by computer-generated sequencing. Both groups underwent ECT as per indication as decided by the treating consultant. Hospital Anxiety and Depression Scale (HADS)<sup>9</sup> to rate anxiety and depressive symptoms and Montreal Cognitive Assessment (MoCA)<sup>10</sup> were administered to rate their cognitive functions in both the groups. Assessment was done a day before the commencement of the first ECT and after 15 days when the scheduled four ECTs were over.

Electroconvulsive therapy was given for all patients using the standard protocol. Electroconvulsive therapy was given using the Niviqure Brief Pulse ECT machine (Niviqure Meditech Pvt. Ltd., Bengaluru, India). All patients received at least four sessions of ECT with a dose range of 120–360 mc (average of 240 mc). In all the sessions, patient had an adequate duration of seizure (mean duration of 24 seconds) as measured by the cuff method. Electroconvulsive therapy was given by a consultant psychiatrist having nearly 10 years of experience along with consultant anesthetist and trained nurses in a well-equipped hospital setting.

Music therapy intervention in the form of music, imagery, and relaxation was administered by a qualified music therapist. The music therapist selected music in the form of vocal, relaxing raga. The *Ahir Bhairav* raga improvisation in consonance with the time theory of ragas<sup>11–13</sup> relating to the time of the day between 7 am and 9 am was adopted. The relaxation music was administered for 20 minutes before each ECT session along with the imagery by the

music therapist. The morning raga *Ahir Bhairav* improvisation using the signature melodic phrases (within the grammar of rendering a raga) was employed during stated time period. This raga used was mainly considered relaxing because of the slow tempo, soft timbre, predictable rhythm, and clear musical form.<sup>14</sup> The guided imagery used with music was relating to a journey of hope and health. The patients in the control group were asked to close the eyes and remain calm for about 20 minutes before the commencement of all ECT sessions. MT intervention took place in a separate room allocated to ensure that there is no spillover of music to the patients allocated to the control group.

## Statistical Analysis

Descriptive data for frequencies are presented as percentages and proportions. All the comparisons before and after MT were evaluated by Student's  $t$  tests. All the analyses were done in Epi Info (version 7, Center for Disease Control and Prevention, Geneva, Switzerland). For all tests, a  $p$  value of  $<0.05$  was considered for statistical significance.

## RESULTS

The patients recruited for the study were in the age group of 20–60 years. The MT group comprised 66.7% of males and 33.3% of females. The control group comprised 73.3% of males and 26.7% of females. Patients with schizophrenia proved to be the most frequently occurring indication for receiving ECT with 46.7% in the MT group and 60% in the control group. However, 33.3% patients in the music group and 6.7% in the control group were patients diagnosed with depression. Patients with bipolar disorder were 20% in the MT group and 33.3% in the control group (diagnosis as per International Classification of Diseases-10).

In the MT group, there was a significant improvement in the anxiety and depression scores pre- and post-ECT treatment ( $p = 0.001$ ). There was also a significant reduction in the composite scores of HADS ( $p = 0.001$ ) and MoCA scores ( $p = 0.003$ ). In the control group also, there is a significant improvement in the anxiety ( $p = 0.017$ ), depression ( $p = 0.001$ ), and total HADS scores ( $p = 0.001$ ) but not MoCA scores ( $p = 0.05$ ) (Table 1). However, when intergroup comparisons were made with independent  $t$  test, there was a statistically significant reduction in anxiety scores and total HADS score ( $p = 0.001$ ), respectively (Table 2).

## DISCUSSION

The results of this study indicate that a MT intervention in the form of raga improvisational and relaxation with guided imagery may help in reducing anxiety levels of patients receiving ECT. A study had concluded that the MT in the form of imagery and relaxation plays to be suitable in the long-term treatment for schizophrenia.<sup>15</sup>

Music therapy in the form of improvisational raga is a method where the patient while listening to music was guided to imagine being on a journey to good health and is recovering. Music and imagery is defined to be visualization, accompanied by recorded music, in which the music therapist helps the patient focus on either relaxing the body or regularize breathing patterns and facilitate deep breathing or visualization of images related to nature or treatment effects or positive images of what is personally important to the patient.<sup>15</sup> Music and imagery relaxing interventions as a pre-procedural support reduce symptoms of distress and anxiety, reduce stress, and increase relaxation in medical settings.<sup>16</sup> Music

**Table 1:** Comparison of the scores of anxiety, depression, cognitive functions (Montreal Cognitive Assessment), and total Hospital Anxiety and Depression Scale scores within the groups

Parameter		Music therapy		Control	
		Mean $\pm$ SD	p value	Mean $\pm$ SD	p value
Anxiety HADS	Pre	13.47 $\pm$ 4.29	0.001	8.93 $\pm$ 3.90	0.017
	Post	5.67 $\pm$ 2.71		6.47 $\pm$ 4.19	
HADS-depression	Pre	12.20 $\pm$ 6.06	0.001	11.27 $\pm$ 4.46	0.001
	Post	4.40 $\pm$ 2.61		6.00 $\pm$ 4.03	
Total HADS	Pre	25.67 $\pm$ 10.01	0.001	20.20 $\pm$ 5.79	0.001
	Post	10.07 $\pm$ 4.90		12.47 $\pm$ 7.65	
MoCA	Pre	19.47 $\pm$ 6.67	0.003	13.07 $\pm$ 5.32	0.050
	Post	24.80 $\pm$ 4.41		16.80 $\pm$ 6.70	

SD, standard deviation

**Table 2:** Comparison of reduction in scores of hospital anxiety and depression and cognitive functions between the groups

Parameters	Mean $\pm$ SD (n = 14)	Mean $\pm$ SD (n = 15)	p value
Anxiety	7.80 $\pm$ 3.93	2.46 $\pm$ 3.52	0.001
Depression	7.80 $\pm$ 4.63	5.26 $\pm$ 3.78	0.112
Total HADS	1.56 $\pm$ 7.41	7.73 $\pm$ 4.28	0.001
MoCA	5.33 $\pm$ 5.70	3.73 $\pm$ 6.73	0.490

SD, standard deviation

has been shown to release endorphins in the brain and activate the reward centers. Listening to music while using a guided imagery technique can increase the effectiveness of the delivered MT.<sup>15</sup> The patients undergoing ECT exhibit marked fear and anxiety of the treatment. The fear of ECT exceeds that of other medical procedures including surgical ones.<sup>5</sup>

The psychological scales to measure the study variables were HADS commonly used by psychiatrists to determine the levels of anxiety and depression that a patient is experiencing and MoCA widely used as a screening assessment for detecting cognitive impairment. The results indicated that there was a significant reduction in the individual anxiety and depression scores of the patients receiving MT and also reduction in the total HADS scores in the music group. The cognitive functioning in the music group also improved significantly. However, in the control group also, the anxiety, depression, and total HADS recorded a significant reduction. We were not able to interpret objectively the differences observed in both the groups from these results. Hence, we created a new variable "reduction in scores" in anxiety, depression, total HADS scores, and MoCA scores. The independent *t* tests for the reduction in the scores indicated that the anxiety levels showed a significant reduction between the groups, and the total HADS score also dropped significantly between the groups.

A review on various studies on MT had suggested music to be a component that can provoke complex neurobiological processes in the brain. Music was shown as an alternative treatment if not an adjuvant in treatments of depression, anxiety, schizophrenia, agitation, autism, insomnia, dementia, and substance abuse.<sup>16</sup> Studies have shown that participants receiving MT (20 biweekly sessions) plus standard care showed greater improvement than those receiving standard care in depressive symptoms.<sup>17,18</sup> In this study, however, there is no significant reduction in the depression scores between the MT group and the control group. The MT group

comprised patients diagnosed with severe depression. It takes a longer period of MT intervention to alleviate the symptoms of depression.<sup>17</sup> However, studies have indicated that most of the ECT patients liked listening to their preferred music before the treatment.<sup>19</sup>

The limitations of this study are the small sample size. However, point to be considered is that our study was a preliminary and a novel attempt for using MT intervention for ECT indicated patients. The future directions include a large sample, prolonging the duration of MT sessions, and standardizing on the adequate number of sessions needed to observe the difference between these groups.

## CONCLUSION

The study results support that MT intervention can be used in clinical settings as an adjunct with ECT, to control anxiety and depression in patients receiving ECT. Its effect on improving cognitive functioning is an added advantage as cognitive dysfunction still remains an important side effect of ECT.

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