

Original Research Article

Effects of Music Therapy on Cognitive Function and Mood in Patients with Middle Cerebral Artery Stroke

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ABSTRACT

Background: Stroke is the world's second leading cause of death. Stroke is a clinical syndrome consisting of rapidly developing clinical signs of focal disturbance of cerebral function lasting more than 24 hours. Music is one of the powerful sources of auditory stimulation which triggers a sequel of cognitive and emotional components. Hence, music therapy along with the traditional physiotherapy can be given to improve the cognitive functions and mood.

Objective: The aim is to find out the effect of Music therapy on attention, depression and anxiety in patients of Middle Cerebral Artery stroke.

Methodology: A convenient sampling of 15 middle cerebral artery stroke patients including 11 male and 4 female participants were taken from Pravara Rural Hospital. The participants were assessed for attention, depression and anxiety using 'Moss Attention Rating Scale', Hamilton Depression Rating Scale' and 'Hamilton Anxiety Rating Scale'. Later they were given Music therapy for 30 mins for 1 month including Sundays. After the music therapy, post test was done.

Results: Music therapy showed highly significant increase in the attention in participants after giving the protocol for 1 month ('t'=71.13, 'p'=<0.01) and in anxiety ('t'=7.17, 'p'=<0.01) and in depression ('t'=6.06, 'p'=<0.01)

Discussion and conclusion: The present study concluded that there is a significant improvement in the level of depression, anxiety and attention when treated with Music Therapy along with conventional physiotherapy treatment in the patients with Middle Cerebral Artery stroke.

Key words: Music therapy, Middle Cerebral Artery stroke, Attention, Anxiety and Depression

INTRODUCTION

The brain is one of the complex parts in our body. It coordinates all of our bodily functions, including behaviour, thought and emotions. One of the common causes of brain damage and death is referred to as a stroke. A stroke is similar to a heart attack, only in this case, blood flow to brain, rather than the heart, is blocked. [8]

According to WHO, stroke is defined as "a clinical syndrome consisting of rapidly developing clinical signs of focal(or global in case of coma) disturbance of cerebral function lasting more than 24

hours or leading to death with no apparent cause other than vascular origin" [9]

Arteries which supply the brain can be blocked on a permanent or temporary basis. If temporary than called Transient ischemic attack and if permanent than CVA. The common causes of stroke are high blood pressure, tobacco, heart disease, diabetes, thrombosis and hemorrhage. Other causes of stroke in younger adults are Trauma and migraine, which are found to be the common identifiable predisposing factor to cerebral infarction. [1]

After heart disease, Stroke is the world's second leading cause of death,

around 6,000,000 deaths annually. It is estimated that a person is having a lifetime risk of stroke of about 8% and 10%. [2] India is facing high incidence of stroke (CVA). Stroke comprised of 19% death in India in 2001-2003 and is estimated to rise up to 36% by 2030. [3]

Sudden weakness or loss of sensation of face, upper limb and lower limb mostly on one side of the body is a common symptom. Other neurological problems involved are altered consciousness, aphasia, dysphagia, altered emotional status i.e. euphoria, depression and cognitive dysfunction involving impairments in alertness, attention, orientation, memory or executive functions. Bowel and bladder dysfunction and DVT (Cardiovascular and pulmonary dysfunction) are other complications. [7]

Middle cerebral artery is a branch of Internal Carotid Artery and supplies lateral aspect of cerebral hemisphere. Symptoms include contralateral spastic hemiparesis and sensory loss of upper limb, lower limb and face. It also includes aphasia, apraxia, anosognosia, spatial disorganization and homonymous hemianopsia. Cognitive dysfunction includes impairment in attention, immediate and short term memory are common, confabulation, confusion, executive function, multi infarct dementia, delirium, hallucinations and agitation.

Stimulations including auditory, visual and olfactory stimuli enhanced motor as well as cognitive function. "Music is one of the powerful sources of auditory stimulation which triggers a sequel of cognitive and emotional components". [4]

According to WHO, "Music Therapy is the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship." [8] Music decreases pain, depression and disability. It also affects the mood of a person and social interaction. The power of music entails emotional balance no less than motor arousal. We listen to music because of its ability to move us, to induce feelings and moods, states of mind. How

someone reacts to music depends on person to person. It brings out different kinds of emotions. [5] Music therapy can improve the cognitive function, motor skills, emotional and affective development, behavior and social skills, and quality of life of the patients. [6]

The communication between neurons within our brains is the root of all our thoughts, emotions and behaviours. Brainwaves are formed by synchronized pattern of electrical pulses of neurons communicating with one another." There are varieties of waves present in brain. They are alpha, beta, delta, gamma, theta and infra low brain waves. According to work, the brain waves changes. We feel tired, slow, sluggish, or dreamy, when the slower brain waves are dominant. The higher frequencies are dominant then we feel wired, or hyper-alert. They are measured in Hertz. [9]

Alpha waves have the frequency of 8 to 12 Hz. They are ruling when a person is thinking quietly or flowing thoughts or in meditative states. It is having the "POWER OF BEING IN THE PRESENT" and the resting state of brain. Alpha waves is a cure of overall mental coordination, calmness, alertness, mind/body integration and learning. Delta brainwaves are low and loud frequency brainwaves. They are in deepest meditation and dreamless sleep. It also causes healing and regenerations. Theta brainwaves occur in sleep but are also dominant in deep meditation. Theta improves our ability to learn, memorize, and intuition.

Beta brainwaves are present when we are attentive. Gamma brainwaves are the fastest of brain waves (like a flute), and involves in processing of information from different brain areas. Gamma brainwaves pass information rapidly and quietly. The subtlest of the brainwave frequencies, the mind has to be quiet to access gamma. [9]

Purpose of the study:

Music is related to emotions and arousal, attention and memory system. It reduces stress, anxiety and depression in patients with somatic illness.

Along with physical impairment, mental functions also get affected in stroke; although the Music Therapy helps to improve the mental as well as physical illness, little research have been done in stroke in the aspect of cognitive dysfunction after application of Music therapy.

Aim: To find out the effect of Music therapy on cognitive function and mood in patients with Middle Cerebral Artery Stroke.

Objectives of the study:

1. To find out the effect of Music therapy on attention in patients of Middle Cerebral Artery stroke.
2. To find out the effect of Music therapy on depression and anxiety in patients with Middle Cerebral Artery Stroke.

METHODOLOGY AND RESEARCH DESIGN

Ethical clearance was obtained from the Institutional Ethical Committee. The study was an Experimental Study which involved Convenient Sampling. The samples were the In-patients and out-patients of Neuro-physiotherapy department of Dr.A.P.J. Abdul Kalam College of Physiotherapy, Pravara Institute of Medical Sciences, Loni. A sample size of 15 both dominant and non dominant side MCA stroke patients within the age group of 40 years to 70 years whose vitals were stable and who were able co-operate were included. The intervention period was of 4

weeks including Sundays and 1 session per day. Each session lasted for 30 minutes.

Outcome measures:

Clinical neuropsychological assessment was performed on the patients' pre and post-therapy. The patients were assessed for cognitive function (attention) and mood (depression and anxiety) pre and post-therapy. The scale used for assessing anxiety was Hamilton Anxiety Rating Scale. For assessing depression in the patients with MCA Stroke, Hamilton depression scale was used and for assessing attention, moss attention rating scale (MARS) was used. The patients were scored accordingly.

Intervention:

The intervention protocol was built to improve attention, reduce depression and anxiety in the Middle Cerebral Artery stroke patients in order to improve their cognitive functions and mood. The protocol consists of Music therapy which is of 30 mins. The patients were assessed for cognitive function (attention) and mood (depression and anxiety) using Hamilton depression rating scale, Hamilton anxiety rating scale and Moss attention rating scale. The scales were performed by the therapist on basis of their everyday. The ratings were given on the basis of the interaction with patients on the previous days in which the therapists have treated/interacted with the patients. Music Therapy was given for half an hour each day for one month including Sundays. After a month, Post-test was done.

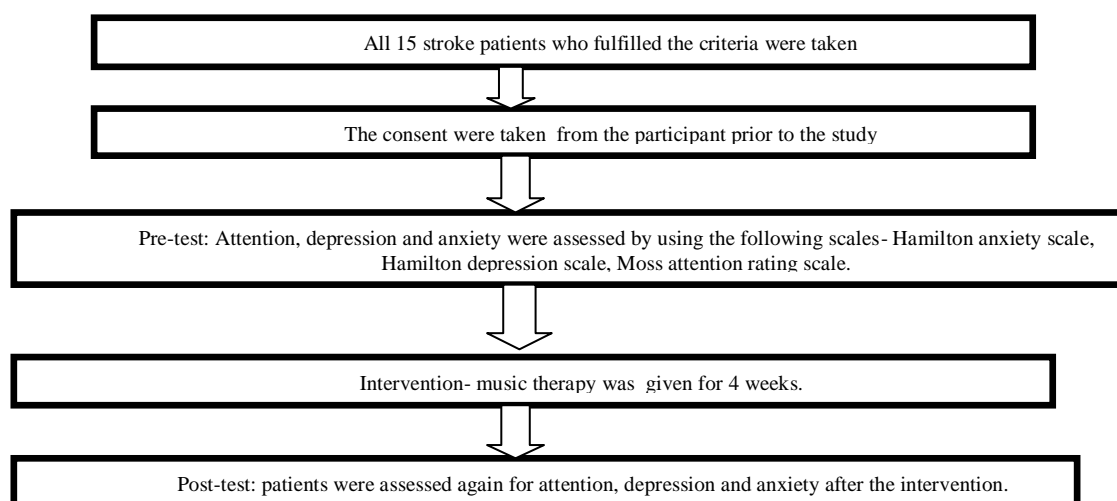




Figure 1: Out-patient listening to the music

Statistical Analysis

The objective of the study was to find out the effect of Music Therapy on attention, depression and anxiety in Patients of Middle Cerebral Artery stroke along with the conventional physiotherapy treatment for stroke for improving the cognitive functions and mood which were analyzed on the basis of the results obtained from Moss attention rating scale (MARS), Hamilton depression rating scale(HDRS) and Hamilton anxiety rating scale(HARS).

Statistical analysis was done using the Microsoft Excel. Various statistical measures such as mean, standard deviation [S.D.] and test of significance such as Student's Paired 't' test were utilized to analyze the data. The results were concluded to be statistically highly significant with $p < 0.01$. Paired 't' test was used to compare the difference in scores between the pre-intervention and post-intervention values in a group.

Demographics

A total of fifteen participants were screened and eligible for the study considering the inclusion and exclusion criteria. The participants who agreed to participate in the study were selected. There was no drop out of participants during the intervention.

The mean age of the participants in group was 61.6 ± 7.14 years

The gender ratio in the Group was 11:4(11 men and 4 women).

The baseline demographic data was comparable.

Table 1: Showing demographic profile in the group.

Group item	Age(years)	Gender(M/F)
Participants	61.66 ± 7.14 years	11(73.3%)/4(26.7%)

Hamilton Depression Rating Scale (HDRS)

The Depression in the participants was measured using Hamilton Depression Rating Scale(HDRS)

The pre-intervention mean average score and standard deviation for Hamilton Depression Rating Scale in the participants was 15.4 ± 2.20 . After 4 weeks of intervention period the mean average score and standard deviation for these participants was 9.4 ± 1.64 . The mean average difference in the pre and post intervention score and standard deviation of Hamilton Depression Rating Scale was 6 ± 0.56 .

There was statistically significant difference in the mean average scores of the Pre and Post Intervention values of Hamilton Depression Rating Scale in the participants treated with intervention along with conventional physiotherapy ('t'=6.06, $df=14$, 'p'= <0.01).

Hamilton Anxiety Rating Scale (HARS)

The anxiety in the participants was measured with the help of Hamilton Anxiety Rating Scale (HARS)

The pre intervention mean average score and standard deviation for Hamilton Anxiety Rating Scale in the participants was 16.07 ± 1.94 . After 4 weeks of intervention period the mean average score and Standard deviation for Hamilton Anxiety Rating Scale for these participants was 9.67 ± 1.50 . The mean average difference in the pre and post intervention

score and Standard deviation of Hamilton Anxiety Rating Scale was 6.4±0.44.

There was statistically significant difference in the mean average scores of the Pre and Post Intervention values of Hamilton Anxiety Rating Scale in the participants treated with intervention along with conventional physiotherapy ('t'=7.17, df=14, 'p'=<0.01).

Moss Attention Rating Scale (MARS)

The attention level in the participants was measured with the help of Moss Attention Rating Scale (MARS)

The pre intervention mean average score and standard deviation for Moss Attention Rating Scale in the

participants was 62.53±3.09. After 4 weeks of intervention period the mean average score and Standard deviation for Moss Attention Rating Scale for these participants was 71.13±2.80. The mean average difference in the pre and post intervention score and Standard deviation of Hamilton Anxiety Rating Scale was 8.6±0.29.

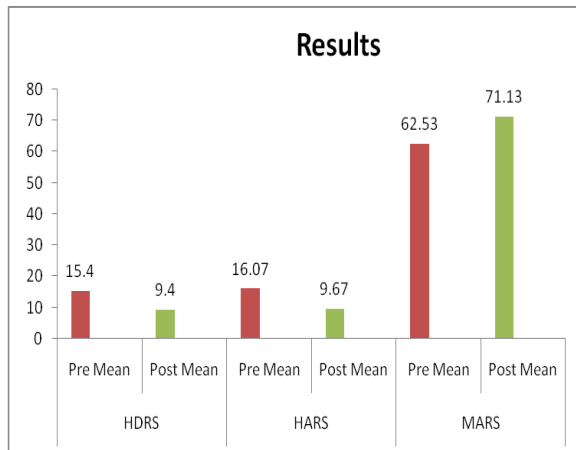
There was statistically significant difference in the mean average scores of the Pre and Post Intervention values of Hamilton Anxiety Rating Scale in the participants treated with intervention along with conventional physiotherapy ('t'=5.66, df=14, 'p'=<0.01).

Table 2: Outcome measures of HDRS, HARS and MARS.

Scales	Pre-intervention	Post-intervention	Change scores [post-pre]	'p' value ^b	Result
HDRS	15.4[2.20] ^a	9.4[1.64] ^a	6[0.56] ^a	<0.01	Highly Significant
HARS	16.07[1.94] ^a	9.67[1.50] ^a	6.4[0.44] ^a	<0.01	Highly Significant
MARS	62.53[3.09] ^a	71.13[2.80] ^a	8.6[0.29] ^a	<0.01	Highly Significant

Where: a-Values expressed as mean [SD]

b-Analyzed by Student's paired 't' test



RESULT & DISCUSSION

The present result of the study suggests that giving Music Therapy improves the attention, decreases anxiety and depression which is common in post stroke patients. Music Therapy for 4 weeks resulted in significant improvement in their cognitive functions and mood.

The middle cerebral artery is the largest channel which supplies fresh blood to the brain. It supplies to lateral areas of the frontal, temporal, and parietal lobes. They affect the functions of the temporal lobe, the parietal lobe, the internal capsule, the

thalamus and a portion of the frontal lobe. Hence the functions of this areas are compromised in Middle Cerebral Artery Stroke.

Hamilton depression rating scale for depression

In the Hamilton depression rating scales cores there was a highly significant improvement seen in the mood of the patient who received Music Therapy along with conventional physiotherapy.

According to a study conducted by Christopher Bergland, he concluded that alpha waves reduces depression and induces creativity.

Listening to music reduces the stress hormone cortisol and increases the neurotransmitter i.e. dopamine which is a motivational. The improvement is seen due to the Music therapy which helps in relaxing your mind. While listening to music our brain produces different types of waves i.e. alpha, beta and theta waves, which is normally produced by occipital lobe which makes the mind in a relaxed state and clear of thoughts. Hence, whenever Music therapy is given the patient was instructed to

avoid thinking or having any unwanted thoughts in their mind and relax. Therefore, music therapy is an effective way of reducing depression.^[10]

Hamilton Anxiety Rating Scale (HARS)

In the Hamilton Anxiety Rating Scale scores there was a highly significant improvement in anxiety level of the participants receiving Music Therapy along with conventional physiotherapy.

As said before, listening to music makes the mind calm and relax which indeed help in reducing the anxiety issues. It is a very useful way of reducing anxiety and depression.

Moss Attention Rating Scale (MARS)

The level of attention is normally affected in post-stroke patients. By giving the Music Therapy, there was a highly significant improvement seen in the attention level of the participants post intervention using the MARS scores.

Meditation and mindful relaxing increases the attention span in individuals. Brain waves increases during meditation which is the reason of improving the attention. It improves your mind's quality of concentrating. Thus this protocol resulted in significant improvement in the improving the attention span.

Limitations Of This Study

- Only 40 to 70 years of patients were included.
- There is a lack of long term follow-up.
- The study was time bound.

Recommendations For Future Study

- Study can be expanded to large sample size and in multi centers with patients from various geographical locations.
- The age group less than 40 years can be considered.
- Studies can also be done in patients with other territory lesions.
- Further studies with long term follow - up are needed.

- More research is needed to explore better results.

CONCLUSION

The conclusion based on the results of difference in pre-post mean scores of Hamilton depression rating scale, Hamilton anxiety rating scale and Moss attention rating scale shows that there is a significant improvement in the level of depression, anxiety and attention when treated with Music therapy along with conventional physiotherapy treatment.

According to this study, Music therapy can be included in a treatment protocol clinically for improving the cognitive functions and mood in the middle cerebral artery stroke patients.

Hence the null hypothesis is rejected and the alternate hypothesis is accepted which states "There will be significant effects of Music Therapy on cognitive function such as attention and on mood (depression and anxiety) in patients with Middle cerebral artery stroke".

Clinical Implication:

This therapy can be used to improve the cognitive functions and mood in middle cerebral artery stroke patients. This technique is cost effective and don not require the assistance of any trained professional and hence, can be continued by the patients even at home.

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