Original Research

Effect of Neurobic exercises on cognitive function related to Post –Stroke

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A R T I C L E I N F O

A B S T R A C T

Background: Stroke is the most common neurological disorder that represents a major cause of disability. According to WHO stroke is defined as " Acute onset of neurological dysfunction due to an abnormality in cerebral circulation with resultant signs and symptoms that correspond to involvement of focal areas of brain lasting more than 24 hours. Post-stroke Cognitive impairment after Stroke is common and cause disability .Vascular dementia is most common problem in Post-stroke.

Cognitive impairment and Memory loss are common after Stroke. Stroke affects the cognitive domain which includes attention, memory ,language and Orientation. It include problems like planning organizing difficulty in following direction, feeling of slowness or confusion ,trouble in concentrating associated with memory ,loss of apathy and depression ,difficulty in spatial awareness.

Neurobic exercise program for brain include various exercises with combination of physical senses. Neurobic exercises activates new brain circuit and enhance neurotrophin .production which strengthens nerve connection and helps nerve cells and synapses to stay stronger. Cognitive therapy exercise leads to improve loss of perceptual attention and decreases loss of reduction in motor control. Neurobics means" Neuro + aerobics = Neurobics." This program for brain with non routine or unexpected experiences using various combination of your physical senses.

Objective: To find out effect of Neurobic exercises on memory and quality of life in patients with post stroke.

Materials and Methods: The study was conducted Dept. of Medicine who referred patients for Neurophysiotherapy PIMS,LONI, Tal- Rahata, Dist: Ahmednagar . Total 40 patient in between age group 50 to 80 years individual who having Stroke . This Study was performed with Randomized control trial (permuted block randomization) . The participants were explained their role in the study and written consent was taken from the patient. The MOCA (Montreal cognitive assessment scale) and SIS (stroke impact scale) were explained to patient and the score taken.

Result: MOCA and SIS showed significant p value (< 0.005) within the experimental group post Intervention. The P value significance both within and in between group. Statistical analysis done by using descriptive and inferential statistic using student's paired and unpaired 't' test and SPSS 24.0 version used for analysis and Graph pad prism 7.0 version and $p< 0.05$ as level of significance.

Conclusion: Neurobics exercises effective to improve cognitive function as well as Quality of life.

INTRODUCTION

Stroke is the most common neurological disorder that represents a major cause of disability. It is a significant health problem . According to WHO stroke is defined as "Acute onset of neurological dysfunction due to an abnormality in cerebral circulation with resultant signs and symptoms that correspond to involvement of focal areas of brain lasting more than 24 hours.1 Stroke is a global health problem. It is second most common cause of death and fourth leading cause of disability in worldwide.

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Incidence approximately each year 20 million people suffer from Stroke and 5 million people do not survive. Post-stroke Cognitive impairment after Stroke is common and cause disability .Vascular dementia is most common problem in Post-stroke.

Cognitive impairment and Memory loss are common after Stroke. Approximately 30% of Stroke develops dementia within 1 year of Stroke onset. Stroke affects the cognitive domain which includes attention, memory ,language and orientation. The neuroanatomical lesion areas like hippocampus and white matter lesion leads Cerebral bleed in CVA. Study suggest that an increase in GABAnergic activity of the extracellular protein activity regulated in bilateral hippocampus as well as white matter lesion and lacunar stroke are predictor of cognitive decline.

Age is the most common risk factor after the age of 65 years most common for cognitive decline.Cognitive symptoms of Vascular dementia vary from person to person and its types. It include problems like planning organizing difficulty in following direction, feeling of slowness or confusion ,trouble in concentrating associated with memory ,loss of apathy and depression ,difficulty in spatial awareness.Neurobic exercise program for brain include various exercises with combination of physical senses. Neurobic exercises activates new brain circuit and enhance neurotrophin .production which strengthens nerve connection and helps nerve cells and synapses to stay stronger. Cognitive therapy exercise leads to improve loss of perceptual attention and decreases loss of reduction in motor control as well as dual task. Neurobics means" Neuro + aerobics = Neurobics." This program for brain with non routine or unexpected experiences using various combination of your physical senses. It includes

activities that shaken up your routine and make your senses more agile and flexible.

Aims: To find out effect of Neurobic exercises on memory and quality of life in patients with post stroke

Objectives:

Primary: To find out the effect of Neurobics exercises to improve memory in patients with post Stroke

Secondary: To find out effect of Neurobic exercise quality of life in patients with post stroke.

PURPOSE:

Dementia after Stroke involves vascular, neurodegenerative or mixed processes . It is in combination of large and small vessels disease as well as non-vascular neurodegenerative pathology.The development of dementia depends on several factor including location and volume of Stroke and neuronal degree damage associated with cerebral pathology and most of the time it is combination of Alzhiemer's disease.Cognitive impairment after Stroke is frequent but neglected consequence compared to other neurological deficits such as Sensory or Motor impairment but Stroke significantly increases the risk of dementia and there is paucity in literature to improve cognitive function in the form of Neurobics exercises to improve cognition.

MATERIALS AND METHODS

The study was conducted Dept. of Medicine who referred patients for Neurophysiotherapy PIMS, LONI, Tal- Rahata, Dist: Ahmednagar . Total 40 subjects in between age group 50 to 80 diagnosed with Stroke of either gender as well as who is ready to give written consent who having post Stroke depression Mini mental status examination (MMSE>22) , with higher Brunnstrorm's recovery stage as well as who having Barthel Index more than 12. Patient with other

neuromusculoskeletal condition,with other psychiatric illness as well as with hearing and visual deficit, hemodynamic instability with uncontrolled HT and with progressive metabolic diseases are excluded.

Data collected by principal investigator with a Randomized controlled trial with permuted block randomization . Montreal cognitive Assessment scale and Stroke impact scale were explained to patient and the scores pre and post intervention was used as outcome measure.

The participants were divided into two groups.

Procedure

Experimental group taking Neurobic exercises along with conventional physiotherapy.Control group taking conventional physiotherapy. Intervervention assessment done after 4 weeks , treatment session given 3 days in a week. Data analysis will be after pre and post intervention assessment.Cognitive exercise therapy includes motor cognitive intervention which strengthen physical as well as cognitive function . Neurobics means" Neuro + aerobics = Neurobics." It is unique brain exercise program present in the combination of Physical senses including vision,hearing taste,smell, touch as well as emotional sense with varying routine regularly.

It stimulates neuronal activity to strengthen and grow brain cells continuously and increases blood supply of brain. Neurobic exercise involves directly with the cortex and hippocampus directly located at the medial temporal lobe that is useful to memory enhancement. It helps to stimulate natural brain nutrients called neurotrophin that increases complexity and size of dendrites to improve memory.This program for brain with non routine or unexpected experiences using various combination of your physical senses. It includes activities that shaken up your routine and make your senses more agile and flexible. They are as follows: Morning Roulette- In that brush your teeth or combing or shaving with non-dominant hand., Visit a farmer's market : Relish the diversity of shapes, colours, aromas and taste, eating meal by non-dominant hand ,Waking up with different smells like e.g. Vanilla,Rosemerry., Touch of style: Try to choose clothes with eyes closed, Identify food on your plate by smell, touch and taste, Dialling the numbers with non-dominant hand.

DISCUSSION

The main purpose of study to find out ' Effect of Neurobic exercises on cognitive related function after post Stroke'. Most of the studies have focused on Stroke rehabilitation of individual. There is insufficient evidence of studies which have assessed cognition related function . The result obtained in this study indicated that there was significant increase in Memory and Quality of life in both the groups. It means that the result of Neurobics exercises was more effective than cognitive exercise group.

There is significantly changes occur in mean MOCA score at in post treatment experimental group was 18.35 ± 4.36 as compare to conventional group was 11.70 ± 3.31. By using student's unpaired 't' test statistically significant difference was found. Mean QOL score in conventional group at pre treatment 60.80 ± 8.34 and in experimental group 64.35 ± 8.30. There was no significant difference .As well as mean QOL score in conventional group at post treatment was 65.65 ± 8.96 and in experimental group it was 73.35 ± 9.14 . By using student's unpaired 't' test statistically significant difference was found in mean QOL score at post treatment among of two groups.(t= 2.68,p= 0.11).

Table 1: Age wise distribution of patients

Age Group(yrs)	No of patients	Percentage
51-60 yrs	6	30
61-70 yrs	5	25
71-80 yrs	9	45
Total	20	100
Mean±SD	66.05±8.82(51-77 years)	

30% of the patients were in the age group of 51-60 years, 25% in the age group of 61-70 years and 45% of the patients were in the age group of 71-80 years.

Graph 1: Age wise distribution of patient
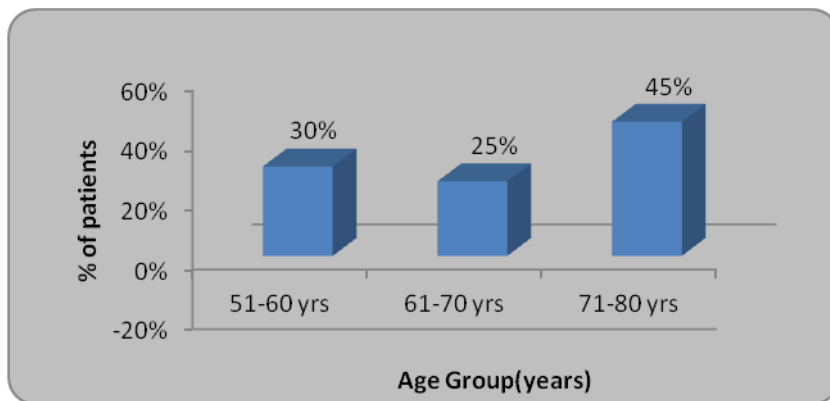
Table 2: Gender wise distribution of patients

Gender	No of patients	Percentage
Male	10	50
Female	10	50
Total	20	100

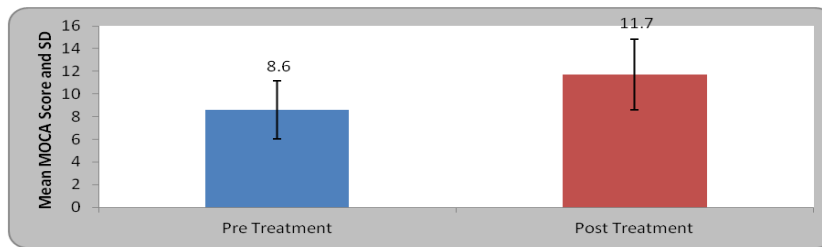Each 50% of the patients were male and females
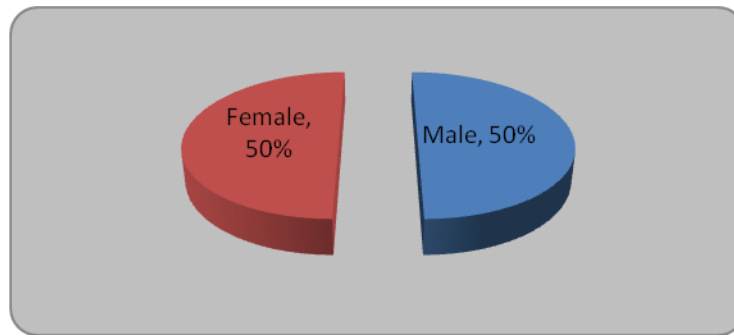
Table 3: Comparison of MOCA in Conventional Group   pre   and post operatively
Student's paired t test

	Mean	N	Std. Deviation	Std. Error Mean	Mean Difference	t-value
Pre Treatment	8.60	20	2.56	0.57	3.10±1.83	7.56
Post Treatment	11.70	20	3.13	0.70		P=0.0001,S

Mean MOCA score at pre treatment was 8.60±2.56 and at post treatment it was 11.70±3.13. By using Student's paired t test statistically signficant difference was found in mean MOCA score at pre and post treatment(t=7.56,p=0.0001).

Graph 3: Comparison of MOCA in Conventional Group   pre and post operatively
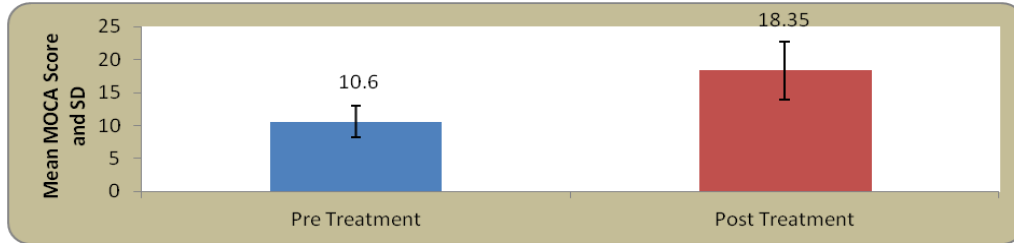

Table 4: Comparison of MOCA in Experimental Group pre   and post operatively
Student's paired t test

	Mean	N	Std. Deviation	Std. Error Mean	Mean Difference	t-value
Pre Treatment	10.60	20	2.32	0.52	7.75±3.71	9.33
Post Treatment	18.35	20	4.36	0.97		P=0.0001,S

Mean MOCA score at pre treatment was 10.60±2.32 and at post treatment it was 18.35±4.36. By using Student's paired t test statistically significant difference was found in mean MOCA score at pre and post treatment (t=9.33,   p =0.0001).

Graph 4: Comparison of MOCA in Experimental Group   pre   and post operatively

Table 5: Comparison of QOL Score in Conventional Group   pre and post operatively
Student's paired t test

|	Mean	N	Std. Deviation	Std. Error Mean	Mean Difference	t-value
Pre Treatment	60.80	20	8.34	1.86	4.85±3.68	5.88
Post Treatment	65.65	20	8.93	2.00		P=0.0001,S

Mean QOL score at pre treatment was 60.80±8.34 and at post treatment it was 65.65±8.93. By using Student's paired t test statistically significant difference was found in mean QOL score at pre and post treatment (t=5.88, p =0.0001).

Table 6: Comparison of QOL Score in Experimental Group   pre and post operatively Student's paired t test

	Mean	N	Std. Deviation	Std. Error Mean	Mean Difference	t-value
Pre Treatment	64.35	20	8.30	1.85	9±4.58	8.77
Post Treatment	73.35	20	9.14	2.04		P=0.0001,S

Mean QOL score at pre treatment was 64.35±8.30 and at post treatment it was 73.35±9.14. By using Student's paired t test statistically significant difference was found in mean QOL score at pre and post treatment (t=8.77, p =0.0001).

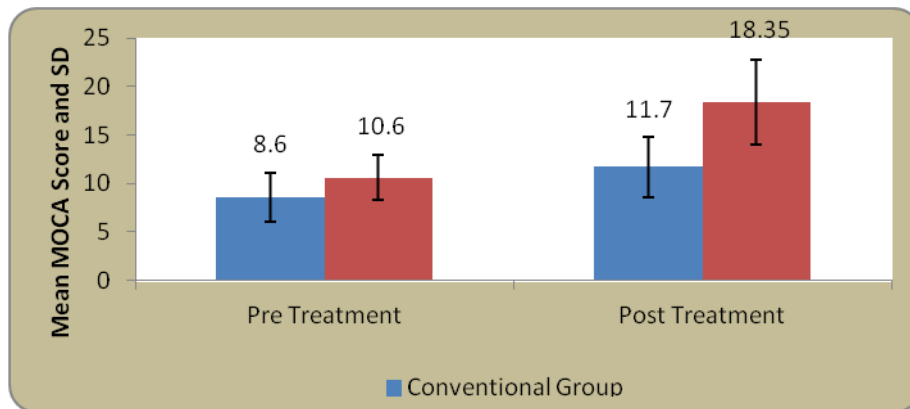**Graph 6: Comparison of QOL Score in Experimental Group pre   and post operatively**
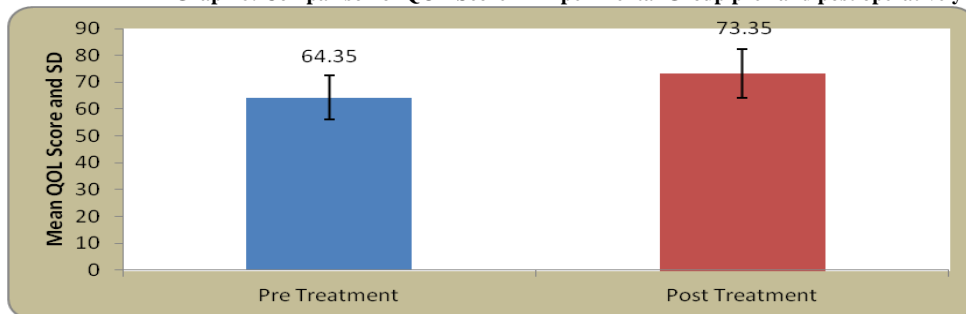
Table 7: Comparison of MOCA Score in Conventional and Experimental   Group pre and post operatively

Student's unpaired t test

	Conventional Group	Experimental Group	t-value
Pre Treatment	8.60±2.56	10.60±2.32	2.58 P=0.014,S
Post Treatment	11.70±3.13	18.35±4.36	5.53 P=0.0001,S

Mean MOCA score in conventional group at pre treatment was 8.60±2.56 and in experimental group it was 10.60±2.32. By using Student's unpaired t test statistically significant difference was found in mean MOCA score at pre treatment among patients of two groups(t=2.58,p=0.014).

Mean MOCA score in conventional group at post treatment was 11.70±3.13 and in experimental group it was 18.35±4.36. By using Student's unpaired t test statistically significant difference was found in mean MOCA score at post treatment among patients of two groups(t=5.53,p=0.0001).


Graph 7: Comparison of MOCA Score in Conventional and Experimental Group pre and post

Table 8: Comparison of QOL Score in Conventional and Experimental   Group pre and post operatively Student's unpaired t test

	Conventional Group	Experimental Group	t-value
Pre Treatment	60.80±8.34	64.35±8.30	1.34 P=0.18,NS
Post Treatment	65.65±8.96	73.35±9.14	2.68 P=0.011,S

Mean QOL score in conventional group at pre treatment was 60.80±8.34 and in experimental group it was 64.35±8.30. By using Student's unpaired t test statistically no significant difference was found in mean QOL score at pre treatment among patients of two groups(t=1.34,p=0.18).

Mean QOL score in conventional group at post treatment was 65.65±8.96 and in experimental group it was 73.35±9.14. By using Student's unpaired t test statistically significant difference was found in mean QOL score at post treatment among patients of two groups(t=2.68,p=0.011).

Graph 8: Comparison of QOL Score in Conventional and Experimental   Group pre and post operatively
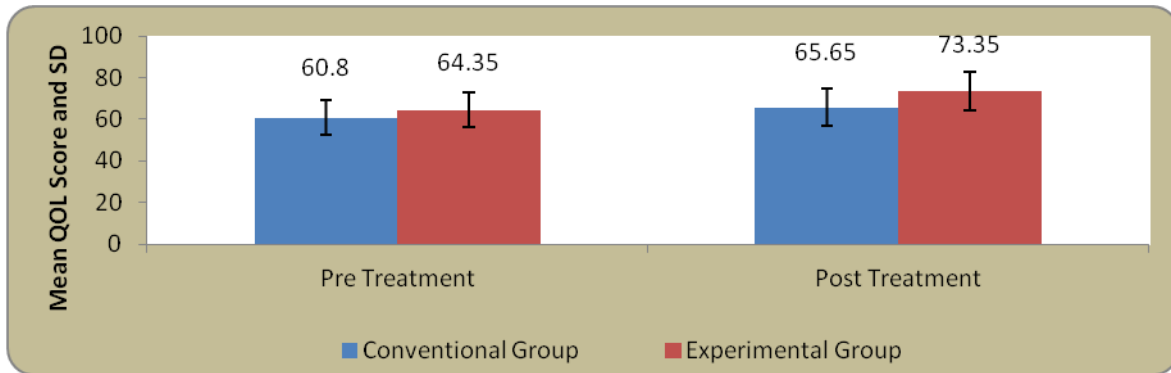
Statistical analysis was done by using descriptive and inferential statistics using Student's paired and unpaired t test and software used in the analysis were SPSS 24.0 version and GraphPad Prism 7.0 version and p<0.05 is considered as level of significance.

Saifon Kanthamalee et al 2013 suggest Neurobic exercises unique brain present in combination of physical senses ,including vision ,hearing,taste,smell,touch as well as emotional sense with changing daily routing regularly. Neurobic exercises activate Neural system to work and increase blood supply to brain .It involves directly with cortex and hippocampus located at medial temporal lobe that act as temprory store information to improve memory .Neurobics helps to stimulate the nerve cell to produce natural brain neutrients called neutrophins that increase in size and complexity of dendrites to stay younger and stronger to improve memory retention.

Filley et al, in 2002 help to stimulate a widespread network of thalamic and bihemisperic structures in frontal lobe enhance the ability of aging.

Kulsmann et al 2010 indicated improve memory from cognitive training as well as with Neurobics exercises in older people.

Tusch et al 2016 indicated enhance attention and influence brain function including learning and memory in elderly. Therefore future study is effective to produce Neurobic exercises to improve memory as well as quality of life in cognitive related function with the MOCA and SIS in Stroke rehabilitation particularly in elderly.

CONCLUSION: Neurobic exercises showed significant improvement with the help of MOCA and SIS to improve memory and quality of life in Stroke rehabilitation.

Abbreviations: QOL – Quality of life,

SIS – Stroke impact scale,

MOCA-Montreal cognitive assessment

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