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THE EFFICACY OF MENTAL IMAGERY TRAINING TO ENHANCE THE MOTOR RELEARNING IN POST STROKE.

Physiotherapy

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KEYWORDS

INTRODUCTION

A stroke known medically as cerebro vascular accident or brain attack is rapidly developing loss of brain functions due to disturbance in the blood supply to the brain[41]. According to the world health organization in the 1970's stroke is defined as a neurological deficit of cerebro vascular dysfunction that persists beyond 24 hrs (or) is interrupted by death in with 24 hrs[49].

There are two main categories of stroke of which 10% of hemorrhagic and 90% of ischemic stroke. The thrombotic type is the most common followed by embolic and lacunar types respectively. The major cause of the stroke is HTN, small heart disease ,diabetes and the stroke risk is increased by 4-6 times in patients with high blood pressure (elevated above 160/95 mm of hg),cardiovascular risk increased with high elevated total blood cholestral and low density lipoprotein cardiac diseases such as Rheumatic heart vascular disease, Endocardities and cardiac surgery[11].

Most stroke recovery occurs in the first 2 to 3 months, but recovery can continue for many years. Recovery is most rapid in the first 3 months following stroke, but continued improvement at a slower pace often is seen beyond the first year. Motor recovery tends to reach plateau more quickly than functional recovery. Over 50% of patients with upper limb paresis resulting from stroke face long -term impaired arm function and ensuring disability in daily life. Different approaches are used in this field of rehabilitation. One of them takes the form of neurologic facilitation intervention, which is designed to bring about changes in the underlying neural structure affected by stroke, such as neuro-developmental treatment, motor relearning approach and more recently, constraint induced movement therapy[20].

This study aims to evaluate a new therapy for improving arm function in acute stroke patients based on mental practice theories and functional task oriented training and to study the predictors for a positive treatment results. Movement imagery has emerged, targeting the cognitive processes associated with enhanced motor performance and specific skilled movement in healthy persons[20]

OBJECTIVE OF THE STUDY

The purpose of the present study is to analyze the effectiveness of mental imagery training in improving motor functions and daily activity performance in post stroke subjects.

HYPOTHESIS: Mental imagery training may be effective in improving motor functions and daily activity performance in post stroke subjects

REVIEW OF LITERATURE

Magdalena Ietswart et al march 4_2011 did a study evaluated the therapeutic benefit of mental practice with motor imagery in stroke patients with persistent upper limb motor weakness. Mental rehearsal of movement can produce effects normally attributed to practicing the actual movements. Imaging hands movements could stimulate restitution and redistribution of brain activity, which accompanies recovery of hand function, thus resulting in a reduced motor deficit. This randomized controlled sequential cohort study included 121 stroke patients with a residual upper limb weakness within 6 months following stroke.

Sjoerd de Vries et al:-2011)[42] did a study investigate whether motor imagery ability recovers in stroke patients and to see what the relationship is between different types of imagery and motor functioning after stroke. Unilateral stroke patients were measured at 3 and 6 weeks post stroke on 3 mental imagery task Arm hand function was evaluated using Utrecht arm hand task and the Brunn strom and fugl Meyer scale. Implicate motor imagery ability and visual motor imagery ability improved significantly at 6 weeks compared to 3 weeks post stroke. This study shows that motor imagery can recover in the first weeks after stroke .This indicates that a group of patients who might not be initially selected for mental practice can, still later in the rehabilitation process participate in mental practice programs more over our study shows that mental imagery modalities can be differently affected in individual patients and overtime.

San Antonio 2010) In the group aged 45 to 54 years blacks had almost a 2.5 times higher stroke incidence compared with whites at 192 per 1,00,000 vs 74 per 1,00,000. ([40]A study is done to evaluate whether mental practice is an effective intervention to improve upper-limb recovery after stroke. Result Suggest that mental practice combined with physical practice improves upper-limb recovery. (Dawn m. Nilsen et al_2009)[5].

(Karen p.y.liu.et al 2009)[21]To study the efficiency of mental imagery for promoting generalization of the task skills learned in a training environment to trained and untrained tasks carried out in a novel Environment. Selected thirty five sub- acute post stroke patients were randomly assigned to the mental imagery or conventional functional rehabilitation. The mental imagery was 3 week standardized practice and daily task using the chunking –regulation –rehearsal strategies. Out comes measurements were the performances on trained and un trained tasks in the training and novel environments. And this study showed significant better performances on 4 of 5 trained task. Mental imagery intervention was useful for improving patients ability on performing the task which they did not previously trained on and in places different from the training environment. These involved generalization of the skills termed at the task performance level

METHODOLOGY

RESEARCH DESIGN: Pre post experimental design
Sampling method: Simple random sampling.
Source of Data: Medical research hospitals in Bangalore.
Population: The population for the study were unilateral stroke subjects with ischemic middle cerebral artery infarction, Diagnosed by neurologist using the neuro imaging procedure (CT scan/M.R.I)
Sample: Sample size of 30 subjects, includes 15 in each group.
Selection Criteria:

- Unilateral stroke subjects
- Both genders are included
- Stroke duration of less than 6 months
- Age between 40 to 60 years were selected
- Patients who are medically stable
- Diagnosed as having first unilateral cerebral infraction.
- Independent in performing daily activities before admission

Exclusion Criteria:

- Patients with excessive pain in the affected upper limb
- Patient with cognitive and perceptual impairments.

Procedure:
After initial screening, informed consent form was taken from the subjects prior to the treatment. The subjects in the experimental group were provided training in the mental imagery program, functional retraining and conventional physiotherapy. The patients received training for a total of 3 weeks with five 1 hour sessions each week.

The subjects in the controlled group were given one hour routine physiotherapy which includes stretching of the affected limb muscles,

walking, general strengthening exercise and active assisted and active exercises five days per week for 3 weeks.

Fugl Meyer motor assessment scale and 7-point Likert scale were administered to assess the recovery of affected extremity for the group before intervention and after intervention.

DATA ANALYSIS

The data analysis was computed with SPPS. The outcome measures used are upper extremity and lower extremity sessions of Fugl Meyer motor assessment scale and 7 point likert scale. Wilcoxon signed ranks test is used to test the significant difference in the outcome of Fugl Meyer scale and 7 point likert scale within the groups. Mann Whitney "U" test is used to test the significant difference in the outcome measures between the experimental and control group. The level of significance is fixed as 5% fix the present study.

Table - 1

No. of Subject		N=30
Age (Mean)		55.7
Side Involved		Right : 12 Left: 18
Sex	Male	20
	Female	10

Table – 2

Comparing the pre and posttest means of Fugl Meyer motor assessment scale scores in the control group.

FMS Scores	N	Mean	Z Value	P Value
Pretest score	15	43.46	52.2098	0.05
Post test score	15	62.66		

From the above table, P-value shows the significance differences between the pre and posttest means of Fugal Mayer scale in the control group.

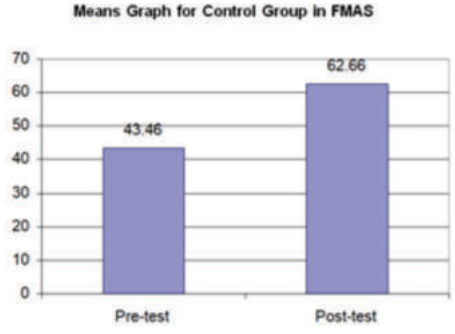

Figure – 1
Means Graph for Control Group in FMAS

The above graph shows that means of pretest is less than posttest means and it infers that conventional physiotherapy is effective.

Table – 3

Comparing the pre and posttest means of Fugl Meyer motor scores in the experimental group.

FMS Scores	N	Mean	Z Value	P Value
Pretest score	15	43.33	101.699	0.05
Post test score	15	82.86		

From the above table, P-value shows the significant difference between pre and posttest means of fugl Meyer scale in experimental group.

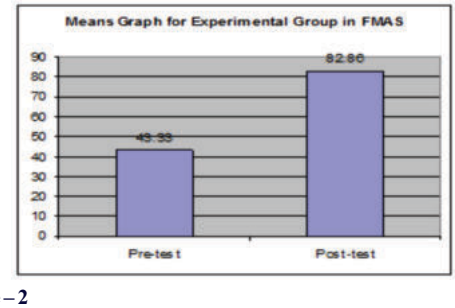

Figure – 2
Means Graph for Experimental Group in FMAS

The above graph shows that means of pretest is less than posttest means and it infers that mental imagery training is effective.

Table – 4

Comparing the posttest means of Fugl Meyer assessment scale scores between the control group and experimental group.

FMS Scores	N	Mean	Z Value	P Value
Experimental group post test score	15	82.86	37.998	0.05
Controlled group Post test score	15	62.66		

From the above table, P value shows the significant difference between the posttest means of experimental group and posttest means of control group.

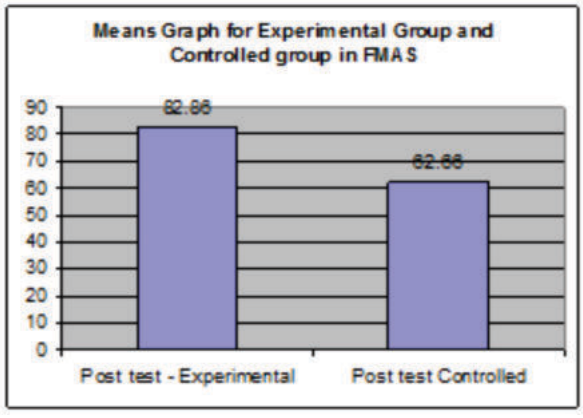

Figure – 3
Means Graph for Experimental Group and control group in FMAS

From the above graph, Posttest means of experimental group is more than the posttest means of control group and it shows that mental imagery training is more effective than with conventional therapy.

Table – 5

Comparing the pre and posttest means of 7-Point Likert scales scores in the control group for trained tasks.

7-Point Likert Scale	N	Mean	Z Value	P Value
Pre test	15	22.06	63.7215	0.05
Post test	15	42.13		

From the above table, P value shows the significant difference between pre and posttest means of 7-point Likert scale in the control group for trained tasks.

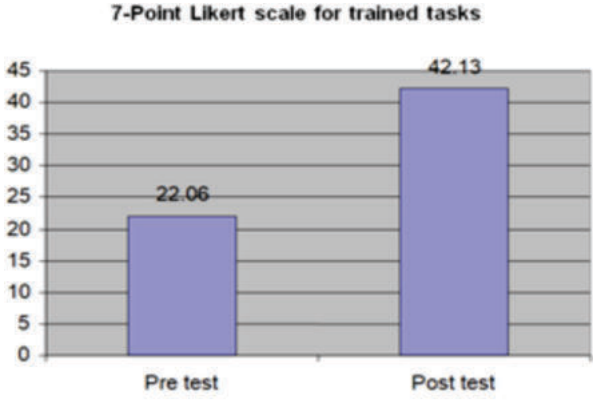

Figure – 4
Means Graph for 7-Point Likert Scale for Trained Tasks for Control Group

The above graph shows that mean of pretest is less than the posttest means it infers conventional physiotherapy is effective.

Table - 6

Comparing the pre and posttest means of 7-Point Likert scale in experimental group for trained tasks.

7-Point Likert Scale	N	Mean	Z Value	P Value
Pre test	15	22.93	10.2059	0.05
Post test	15	73.46		

From the above table P value shows the significant difference between pre and posttest means of 7-Point Likert scale in experimental group for trained task.

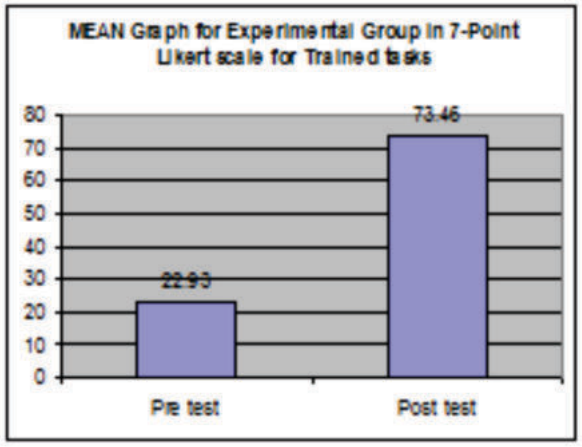

Figure – 5
Mean Graph for Experimental Group in 7 – Point Likert Scale for Trained Tasks

The above graph shows that mean of pretest is less than the posttest mean and it infers that mental imagery training is effective.

Table – 7
Comparing the posttest mean of 7-Point Likert scale score for trained tasks between the control and experimental group.

7-Point Likert Scale	N	Mean	Z Value	P Value
Experimental group Post test score	15	73.46	3.8717	0.05
Control group Pretest score	15	42.13		

From the above table, P value shows the significant difference between posttest means of experimental group posttest mean of control group.

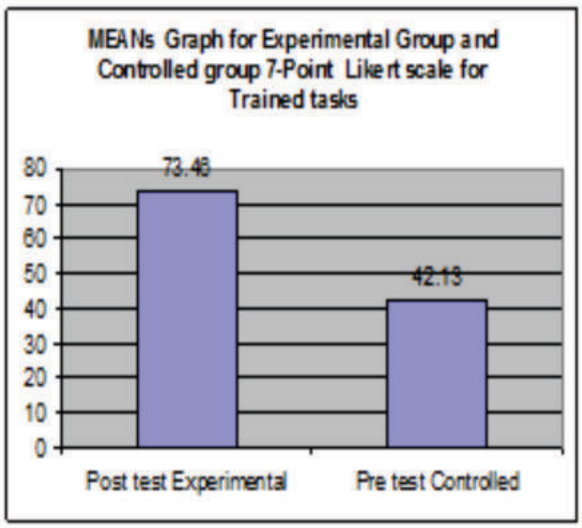

Figure – 6
Means Graph for Experimental Group and Controlled Group 7 – Point Likert Scale for Trained Tasks

From the above steps posttest mean of experiment group more than the posttest mean of control group and it shows that mental imagery is more effective than with conventional therapy.

Table - 8
Comparing the pre and posttest means of 7-point Likert scale in the control for untrained tasks.

7-Point Likert scale	N	Mean	Z Value	P Value
Pre test	15	8.13	21.5145	0.05
Post test	15	12.73		

From the above table, P value shows the significant difference between the pre and posttest means of 7-point Likert scale for untrained tasks in the control group.

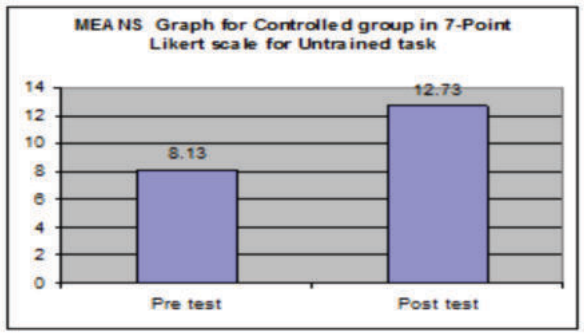

Figure – 7
Means Graph for Controlled Group in 7-Point Likert Scale for Untrained Task

The above graph shows that the mean of pretest is less than posttests mean and if infers that conventional physiotherapy is effective.

Table – 9
Comparing the pre and posttest means of 7-point Likert scale scores for un trained tasks in experimental group.

7-Point Likert Scale	N	Mean	Z Value	P Value
Pre test	15	8.93	88.997	0.05
Post test	15	24.46		

From the above table p value shows the significance difference between the pre and posttest means of 7-point Likert scale for untrained tasks in experimental group

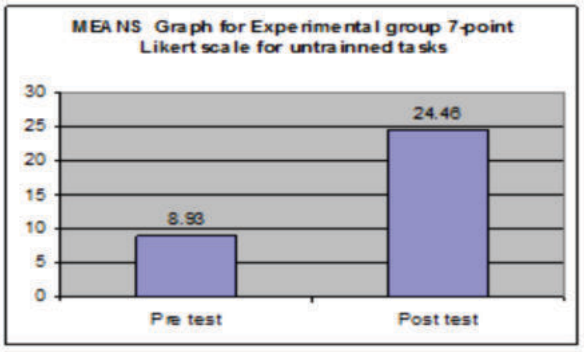

Figure – 8
Means Graph for Experimental Group 7 – Point Likert Scale for Untrained Tasks

The above graph shows that the mean of pretest is less than posttest means and infers that mental imagery training is effective

Table – 10
Comparing the posttest means of 7-point Likert scale score for untrained task between control group and experimental group.

7-Point Likert scale	N	Mean	Z Value	P Value
Experiment Post test score	15	24.46	75.7663	0.05
Control post test score	15	12.73		

From the above table p value shows significance difference between posttest mean of experimental group and posttest mean of control group

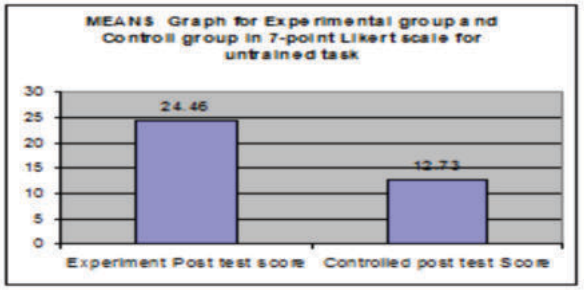

Figure – 9
Means Graph for Experimental Group and Control Group in 7 – Point Likert Scale for Untrained Task

From the above graph posttest mean of experimental group is more than posttest mean of the control group and it shows that mental imagery training is more effective with conventional therapy

DISCUSSION

A study done by Yamamoto S, Mukai H, supported Mental Imagery can be used as a training strategy to promote the relearning of daily tasks for people after an acute stroke. The imagery process is likely to improve the planning and execution of both the trained and the untrained tasks. The effect of its relearning appears to help patients to retain and generalize the skill and tasks learned in the rehabilitation program.

A study done by Page SJ, Levial P, Sisto SA, in 2001 the patient was 56-years old man with stable motor deficits, including ULH; on his dominant side resulting from a right parietal infract that occurred 5 months previously. He received physical therapy for an hour 3 times a week for 6 weeks. In addition, 2 times a week the patient listened to an audio tape instructing him to imagine himself functionally using the affected limb.

The patient exhibited reduction in impairment (Fugl-Meyer scale) and improvement in arm function, as measured by ARA, STREAM, mental practice may complement physical therapy to improve motor function after stroke.

A study done by Francine Malouin, PhD, Sylvie Belleville, PhD, in 2004, to examine the relation between working memory and motor improvement obtained after a single training session combining mental and physical practice. A sample of 12 patient with stroke and 14 age and gender – matched health's subjects. Patients were trained with combined mental and physical practice to increase the loading on the affected leg while standing up and sitting down. The loading on the affected leg was improved after training. There results suggests that outcome of mental rehearsal with motor imagery depends on the ability to maintain and manipulate information in working memory.

Three men and women with moderate upper limb hemi paresis after stroke were randomized. 2 patients received mental practice and CIMT, 1 patient received only mental practice, and 1 received only CIMT. For these patients with chronic, moderate upper-extremity impairment after stroke, a 2-week regimes of CIMT or CIMT plus mental practice only (in 1 case) resulted in modest changes occurring as a decrease in impairment, with functional improvement. Mental practice along did not result in clinically meaningful improvement in upper limb impairment.

CONCLUSION

It shows that cortical re organization and functional improvement can be seen following mental practice with motor imagery. Neuronal network involved in movement execution also active during mental practice .Thus mental imagery training can be added in stroke rehabilitation, for improvement of valued activities of daily living.

SUMMARY

This study has been done to determine the effectiveness of mental imagery training and improving functional activities in chronic stroke subjects. The study was conducted in inpatient neurology department and the design was a clinical trial, thirty subjects had been included in this study after taking consent from the subject. The functional activities were assessed by upper extremity and lower extremity sections of Fugl Meyer Assessment Scale and 7-pont Likert Scale. The p value is 0.05 thus it concludes that mental imagery training improves functional activity in chronic stoke subjects.

REFERENCES

1. Adman B Agranff, MD, Stroke Motor impairment _2008.
2. Andrew Zimmermann-Schlatter -:Efficacy of motor imagery in post stroke rehabilitation_2008
3. Andrew J Butler, phD.PT.: Mental practice with motor imagery evidence for motor recovery and cortical reorganization after stroke _2006
4. Cleusa P. Ferry, Claudia Schoenborn -prevalence of stroke and related burden among older people living in Latin America, India, and China.
5. Dawn m Nielsen 2009,use of mental practice to improve upper limb recovery after stroke
6. Donnan GA, Fisher M. Maclead, Davis SM (May 2008) "Stroke" Lancet 371 (9624), 1622 -23.
7. Ellekjaer, H:Holmen J, Indreadevi K B, Terent a inhered Norway,_1994to 1996 :incidence and 30 days case fatality rate stroke 28(11):2180_2184
8. Feign VL stroke epidemiology in the developing work lancet 365(9478):2160_1,2005
9. Francine Malouin, PhD, Sylvie Belleville, PhD, Carlc. Richards, PhD, Johannes Desrosies, PhD: working memory and mental practice outcomes after stroke_2004.
10. Guillot A, collect. contribution from neurophysiology and psychology methods to the study of motor imagery.2005
11. Hankey gJ (august 1999) smoking and risk of stoke journal of cardio vascular risk 6(4)207_11
12. Jackson PL, Lafleur MR, Melvin f, Richards, Doyon J training in neurological rehabilitation. A new conceptualization of mental practice :arch phys med rehab 2001:82:1133_41
13. Jeanine A Verbunt. Mental practice based rehabilitation Training to improve arm function and daily activity performance in stroke patients_2008
14. Jeannerod M, Frank V. Metal imagery of motor activity in humans 1999.
15. Joachim Lipepert, Heike Bauder- treatment-induced cortical reorganization after stroke is humans_2000