Original Research Article

The effect of mental imagining training for improving upper extremity function in subacute stroke patient

Vandana J. Rathod[1*], Prakash Patel[1], Namrata Patel[2]

[1]Lecturer, SPB Physiotherapy College, Surat, Gujarat, India
[2]C-1002, Stuti Icon, Palanpur Jakat Naka, Surat, Gujarat, India
[*]Corresponding author email: **vannu6686@gmail.com**

International Archives of Integrated Medicine, Vol. 2, Issue 9, September, 2015.

Available online at http://iaimjournal.com/
ISSN: 2394-0026 (P) **ISSN: 2394-0034 (O)**
Received on: 10-08-2015 **Accepted on:** 25-08-2015
Source of support: Nil **Conflict of interest:** None declared.

Abstract

Background: Over 50% of patients with upper limb paresis resulting from stroke face long-term impaired arm function and ensuing disability in daily life. The incidence of stroke increases dogmatically with age, doubling in the decade after 65 years of age. Early rehabilitation treatment in the first phase of stroke is currently advice in clinical guidelines and little evidence is available on such treatment for improving arm/hand function in the same period. Unfortunately, the number of effective treatments aimed at improving arm function due to stroke is still low.

Aim: This study aimed to evaluate a new therapy for improving upper extremity function in sub-acute stroke patients based on mental practice theories and functional task-oriented training, and to study the predictors for a positive treatment result.

Material and methods: 30 sub-acute stroke patients with upper limb paresis were selected by simple random sampling in this study. The experimental group undertook 12 week, individually tailored therapy regime focused on improving upper extremity function using mental practice. Primary outcome measures assessed upper extremity functioning with Action Research Arm Test, Fugl Meyer Test, and Modified Asworth Scale. ANOVA was used in this study. Null hypothesis with alpha level was set at 0.05.

Conclusion: Mental imagining training resulted in significant improvement in upper extremity function in sub acute stroke patient. However the improvement obtained in upper extremity function found no significant difference after mental imagining training between the groups.

Key words

Upper extremity function, Mental imagining training, Sub acute stroke patient, Fugl Meyer test, Modified Asworth Scale, Action Research Arm Test.

Introduction

Stroke is the third leading cause of death and the most common cause of disability among adults [1]. There are an estimated 5, 40000 Stroke survivors, or 2.6 percent of the population [2]. Although early rehabilitation treatment in the first phase of stroke is currently advised in clinical guidelines and little evidence is available on such treatment for improving arm/hand function in the same period [3, 4]. Hemorrhagic stroke results from intra cerebral hemorrhage, subarachnoid hemorrhage and arteriovenous malformation [3]. Sudden and serve cerebral bleeding can result in death within hours, because intra cranial pressure rise rapidly and adjacent cortical tissues are compressed or displaced as in brainstem herniation [5]. Rehabilitation of stroke patient includes many aspects like management of sensory deficits and skin care, pain, exercise training – strength and conditioning and flexibility exercise, management of spasticity, management of coordination and balance deficits, locomotors training, functional training, management of speech and swallowing [6-13]. Andrea and schlatter suggested that, different rehabilitative approaches are used for post-stroke treatment. One of them mental imagination (MI) has been adopted in rehabilitation programs for person with stroke to support motor recovery [6, 11]. Evidence from the health psychology also provides supports of potential benefits of motor imagery training [12-15]. This study was to establish the effectiveness of daily research of imagine of movements with the affected U.E. result in increasing recovery of that upper extremity.

Material and methods

This experimental study was conducted in Bodyline Hospital, Ahmedabad and approved by institutional ethical committee. On the basis of inclusion criteria, sub acute stroke subjects were selected and voluntary decision to participate in the research was consented by subjects after explaining about the procedure of the study. Subjects between 20-80 years of both genders with greater than 4-6 month duration stroke were included by simple random sampling in the study. Excessive pain in affected upper extremity, still enrolled in any form of physical rehabilitation, participating in any drug studies and unconscious patient were excluded from study.

The eligible subjects were allotted randomly in to control group and experimental group. In control group subjects received general physiotherapy includes mat exercise, stretching exercise, strengthening exercise, gait training. Total treatment session had 45 min duration. In this group of patient was given the mental imagining practice combine with general physiotherapy treatment. Total duration of study was 12 weeks and general evaluation took place at 6^{th} week and at 12^{th} week. Fugl -meyer assessment scale [16, 17, 18], Modified Asworth scale [19, 20], and action research arm test [17, 21] were taken as an outcome measure for this study.

Results

The data were analyzed by using Statistical Package for Social Sciences Version 17 with rrepeated measure ANOVA was used with alpha level set at 0.05. The mean age of the participants was 56.9 (SD 10.5) years as per **Table - 1**.

Table – 1: Distribution of experimental and control group.

	Experimental	**Control**
Participants	15	15
Male	10	11
Female	5	4
Mean age (years)	55.6 ±8.04	58.27±12.64
Age range	44-67	21-70

Descriptive statistics as per Modified Asworth scale was as per **Table – 2** and **Graph – 1**. Univariate test suggested the presence of main effect and interaction effect was not there. A statistically significant main effect for factor MAS [$F (2, 56) = 19.419$, $p < .001$], and There

was no statistically significant MAS*Group interaction effect [F (2, 56) = 0.000] as per **Table - 3**. Descriptive statistics as per Fugl-Meyer test was as per **Table – 4** and **Graph - 2**. Univariate test suggested the presence of main effect and interaction effect was not there. A statistically significant main effect for factor FMA [F (2, 56) = 49.132, p < .001], and There was no statistically significant FMA*Group interaction effect [F (2, 56) = 1.233, P=0.299] as per **Table - 5**. Action research arm test was as per **Table – 6** and **Graph – 3**. Univariate test suggested the presence of both a main effect and an interaction effect. A statistically significant main effect for factor ARAT [F (2, 56) = 46.555, p < .001], and a statistically significant ARAT*Group interaction effect [F (2, 56) = 4.173, p =0.020] as per **Table - 7**.

Table – 2: Modified Ahworth scale.

Descriptive Statistics

	Group	Mean	Std. Deviation	N
MAS1	0	2.6000	.50709	15
	1	2.2000	.67612	15
	Total	2.4000	.62146	30
MAS2	0	2.5333	.51640	15
	1	2.1333	.63994	15
	Total	2.3333	.60648	30
MAS3	0	2.1333	.63994	15
	1	1.7333	.45774	15
	Total	1.9333	.58329	30

Graph – 1: Modified Asworth scale.

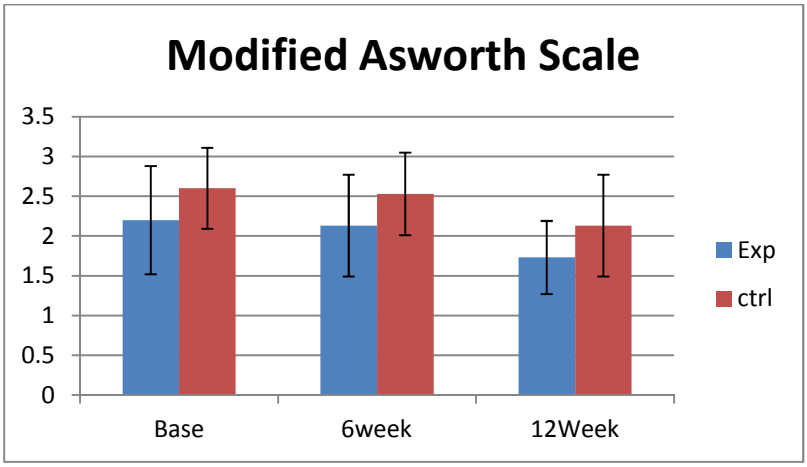

Table – 3: Univariate test.

	Sum of squares	Df	Mean square	F	Significance
MAS	3.822	2	1.911	19.419	0.000
MAS*Group	0.000	2	0.000	0.000	1.000
Error	5.511	56	0.098		

Table – 4: Fugl Meyer test.

Descriptive Statistics				
	Group	**Mean**	**Std. Deviation**	**N**
FMT 1	0	30.3333	3.92186	15
	1	31.8667	5.56605	15
	Total	31.1000	4.79475	30
FMT 2	0	30.8667	4.38938	15
	1	32.9333	6.19293	15
	Total	31.9000	5.37780	30
FMT 3	0	32.6000	4.46894	15
	1	34.0000	5.51621	15
	Total	33.3000	4.98377	30

Graph 2: Fugl-Meyer test.

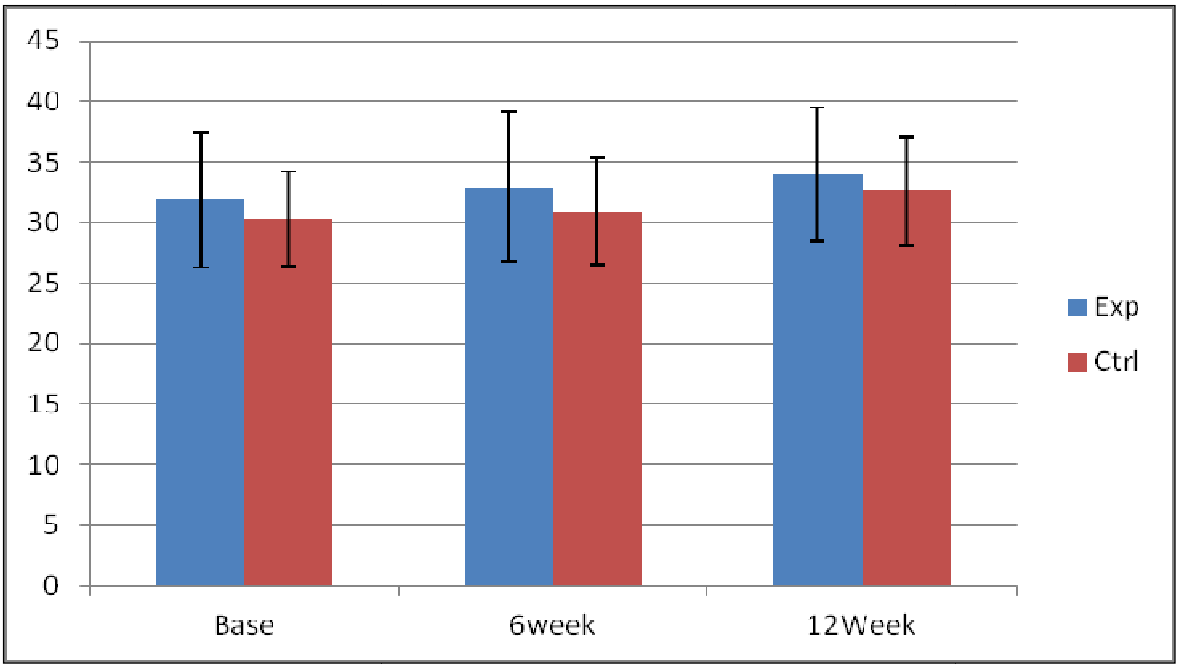

Table – 5: Univariate test.

	Sum of squares	**df**	**Mean square**	**F**	**Significance**
FMT	74.400	2	37.200	49.132	0.000
FMT*Group	1.867	2	0.933	1.233	0.299
Error	42.400	56	0.757		

Table – 6: Action research arm test.

Descriptive Statistics

	Group	Mean	Std. Deviation	N
ARAT1	0	26.7333	2.71153	15
	1	27.9333	4.25049	15
	Total	27.3333	3.55580	30
ARAT2	0	27.0667	2.96327	15
	1	29.6667	4.98092	15
	Total	28.3667	4.23844	30
ARAT3	0	29.0000	2.97610	15
	1	30.5333	4.54920	15
	Total	29.7667	3.85677	30

Graph – 3: Action research arm test.

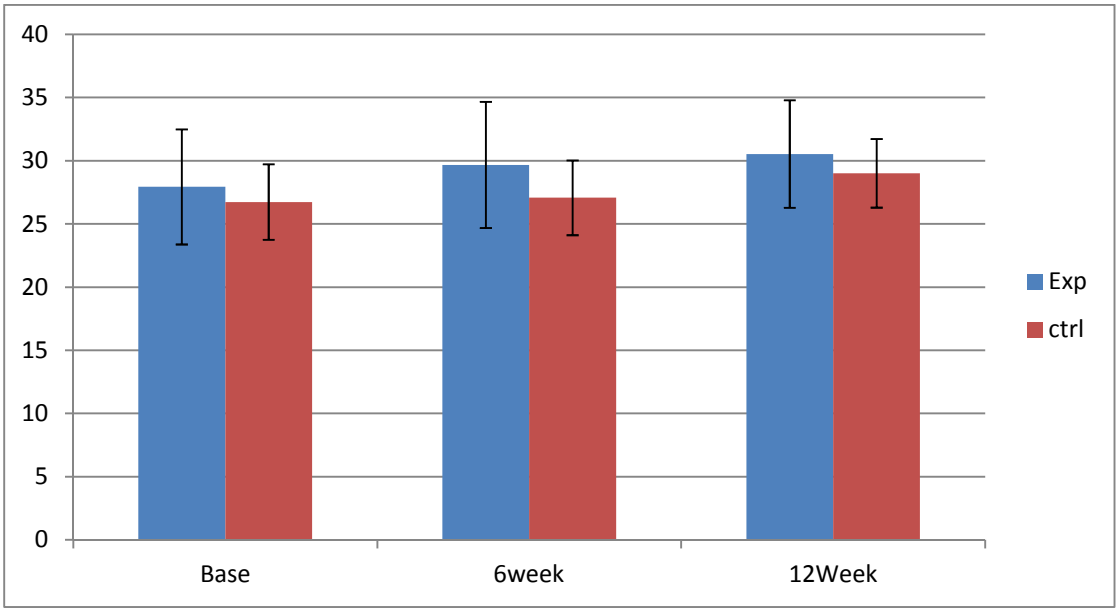

Table – 7: Action research arm test.

	Sum of squares	df	Mean square	F	Significance
ARAT	89.489	2	44.744	46.555	0.000
ARAT*Group	8.022	2	4.011	4.173	0.020
Error	53.822	56	0.961		

Discussion

The purpose of the study was to see the Effect of Mental Imagining training for improving upper extremity function in sub acute stroke patient with total 30 patients within 1 month protocol. In this study, the (cost) effectiveness of a mental practice based training regime in improving upper extremity function and daily activity performance in stroke patients will be evaluated. Previous study examined the efficacy of mental practice in stroke [4, 16]. This study has focused on mental practice in upper extremity stroke. In addition, prognostic factors for a strong training outcome will be examined. A number of issues

were taken into account in designing this study protocol.

We intended to include tasks that would be appealing for all patients. For this reason, ordinary different Fug-Meyer scale and action research arm test have been chosen. Individual patients will be designated an activity that is currently just out of the reach of their functional abilities; this ought to trigger motivation. Reaching a point where they can perform the task will directly result in an improvement and facilitation of daily life, which will be the participants' reward for good practice. In order to maintain this cycle, the tasks' complexity level will constantly increase depending on improvement in upper extremity function.

The current intervention training program was tested for feasibility. Patients who fulfilled the inclusion criteria and participated in an outpatient program were included. After a variable baseline period with training as part of usual care, mental imagining training was added to the program.

Thirdly, in choosing the current outcome measures, Fugl-Meyer assessment scale, Modified Asworth scale, and Action research arm test are shown result like there was no more any significance statistically difference shown between two group but there was statically difference with function level activity. And it will help in future stroke protocol .We can use the mental imagining training as conventional treatment for stroke patient.

To conclude, this study described the design of a randomized controlled clinical trial to study the effectiveness of mental imagining training aimed at improving upper extremity functioning in sub acute stroke patients. The results of this study will provide evidence as to the (cost) effectiveness of the training as well as indicators for effective mental imagining training in stroke patients. In this study for data analysis there was ANOVA test used. The test null hypothesis with alpha level set at 0.05. Univariate test suggests the presence of main effect and interaction effect is not there.

This study was limited to duration of stroke period. Further study can be done with randomization and more number of patients with stroke.

Conclusion

The present study concluded that mental imagining training resulted in significant improvement in upper extremity function in sub acute stroke patient. However the improvement obtained in upper extremity function found no significant difference after mental imagining training between the groups. Use of mental imagining training has been recommended for clinical application in rehabilitation of sub acute stroke patients if the treatment aiming to improve upper extremity function in early stage of stroke rehabilitation.

Acknowledgement

I express my thanks to all the contributors, friends and colleagues whose names I have not mentioned although they all deserve my gratitude. I would like to thank all participants of my study for their wholehearted participation and co-operation without whom the study would not have been possible.

References

1. Susan B O Sullivan. Thomas J Schmitz, Physical Rehabilitation; 5th edition Ch: 18 Strokes, p. 706, 728-760.
2. Management of patients with stroke Rehabilitation, preventives and Management of complication, and change players. A national clinical guide line. Available from http://www.sign.ac.uk/pdf/sign118.pdf
3. Banerjee TK, Shamala .KS. Epidemiology of stroke In India. Neurology Asia, 2006; 11: 1- 4.
4. Jeanine A Verbunt, et al. Mental practice based rehabilitation training to improve arm function and daily activity

performance in stroke patients: A randomized clinical trial. BMC Neurology, 2008; 8: 7.
5. Pamela W. Duncun, et al. Adherence to part acute rehabilitation guide lines is Associated with functional recovery in stroke. Stroke, 2002; 33; 167–178.
6. Stephen J. Page, Peter Lexxcine, et al. Mental practice in chrolic Stroke Result of a randomized, placebo-controlled trail. Stroke, 2007; 38: 1293-1297.
7. DK Sommerfeld. Spasticity after stroke: Its occurrence and association with motor impairments and active limitations. Stroke, 2004; 35: 134-139.
8. Johanna H., et al. Forced use of the upper extremity in chronic stroke patients: Results from a single Blind randomized clinical trial. Stroke, 1999; 30: 2369-2375.
9. Gerald V Smith, et al. Task oriented exercise improves hamstring stroke & spastic reflexes in Chronic stroke patients. Stroke, 1999; 30: 2112-2118.
10. B Bernspang, K Asplund, S Eriksson, et al. Motor and perceptual impairment in acute stroke patients: Effects on self care ability. Stroke, 1987; 18: 1081-1086.
11. Andra Zimmermann. Efficacy of motor imagery in post stroke rehabilitation: A system review. Schlallatter Journal of neuro engineering and rehabilitation, 2008; 5: 8.
12. Paola Cicinelli, et al. Imagery – induced cortical excitability changes I stroke: A Tran's cranical maqnetli stimalatic study. Cerebral lateh, 2006; 16: 247-253.
13. M Ietswaart, et al. Recovery of hand function through mental practice, A study protocol. BMC neurology, 2006; 6: 39.
14. Judy Llles, Eri Racine. Imaging or Imagining? A neuro ethics challenge informed by genetics. Am J Bioeth., 2005; 5(2): 5-18.
15. Audney Bwen Kale, et al. Reasons for variability in the reported rate of occurrence of unilateral spatial neglect after stroke. Stroke, 1999; 30: 1196-1202.
16. Lang CE, Wagner JM, Dromerick AW, Edwards D F. measurement of upper extrimity functions early after stroke: Properties of the action research arm test. Arch Phy Med Rehab., 2006; 87: 1605-10.
17. Thomas Platz, Cosina Pimlzowaski, et al. Reliability and validity of arm function assessment with standard dized guidelines for the Fugel-Meyer test, Action research arm test and box and test: A multicentre study. Clinical rehabilitation, 2005; 19: 404.
18. Julle Sanford, Julle Noreiand. Reliability of the Fugl-meyer assessment for testing motor performance in patients following stroke. Physical Therapy, 1993; 73(7): 36-43.
19. N. Nakhostin Ansari, et al. Add media iranica A comparative study on the inter-rater reliability of the Asworth scales in assessment of spastically.Acta Medica Iranica, 2006; 44(4): 246-250.
20. Atomer Nutlu, Ause Liveneliogical, et al. Reliability of Asworth and modified Asworth scales in children with spastic cerebral pulsy. BMC, 2008; 9: 44.
21. Hsieh CL, et al. Inter rater reliability and validity of the action research arm test in strelace patients. Age ageing, 1998; 27: 107-113.