ORIGINAL RESEARCH PAPER

VOLUME-6 | ISSUE-5 | MAY - 2017 | ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

EFFECT OF MOTOR IMAGERY ON EXTREMITY MUSCLE TONE AND FUNCTIONAL TASK PERFORMANCE AMONG STROKE PATIENTS

Physiotherapy

NAMITA JAWALE MASTERS OF PHYSIOTHERAPY NEURO DEPT, DR.D.Y.PATIL COLLEGE OF PHYSIOTHERAPY, DR. D.Y. PATIL VIDYAPEETH PUNE, INDIA

PREETI GAZBARE ASSISTANT PROFESSOR, DR.D.Y.PATIL COLLEGE OF PHYSIOTHERAPY, DR. D.Y. PATIL VIDYAPEETH PUNE, INDIA

TUSHAR PALEKAR PRINCIPAL, DR.D.Y.PATIL COLLEGE OF PHYSIOTHERAPY, DR. D.Y. PATIL VIDYAPEETH PUNE, INDIA

ABSTRACT

Stroke is a rapidly developing clinical signs of focal disturbance of cerebral function, with symptoms lasting 24 hours or longer with no apparent cause other than of vascular origin'. Upper limb hemiparesis is widely reported along with affection of ADL and QOL. In Mental practice clients repeatedly "rehearse" a motor act in working memory, without producing any overt motor output. 30 stroke patients with MMSE Score >24, Brunnstrom Stage 2-4(hand), MIQ Score above 4 were selected and group of 15 each was formed. Group A received Motor Imagery training while other received Conventional physiotherapy 3 times/3 weeks. Assessment was done by using Chedoke Arm and Hand Activity Inventory and Modified Ashworth's Scale. Results shows p value of 0.912 i.e no statistical significance was found between the groups. Thus Motor Imagery can be used as adjunct to conventional physiotherapy for enhancing functional performance in stroke patients.

KEYWORDS:

Stroke, Motor Imagery, CAHAI.

INTRODUCTION

Stroke is the most common neurological disorder leading to chronic disability.It is a 'rapidly developing clinical signs of focal (global) disturbance of cerebral function, with symptoms lasting 24 hours or longer, or leading to death, with no apparent cause other than of vascular origin'[1]. Upper limb hemiparesis is widely reported in the literature as one of the primary impairments following stroke [2]. While many patients recover ambulatory function after dense hemiplegia, restoration of arm motor skills is often incomplete [2]. It has been reported that paretic arm remains without function in between 30% to 66% [3] of hemiplegic stroke patients.

Any functional post stroke intervention should attempt to enrich and optimize neural stimulation in order to promote brain plasticity. Mental practice also calledvisuo-motor imagery or Motor rehearsal, is a training technique in which the clients repeatedly "rehearse" a motor act in working memory, without producing any overt motor output [4]. It involves motor planning and an internal simulation of motor activity [5].

METHODS

Permission was granted from the ethical committee.30 subjects were selected based on inclusion criteria of MMSE Score > 24, Brunnstrom Stage 2 to 4 (For hand), Movement Imagery Questionnaire Score above 4. Upper limb musculoskeletal injuries, neurological disorder other than stroke, visual impairments were excluded. Patients were divided into two groups of 15 each. Treatment procedure was explained & a written consent was taken from them. Group A received Conventional physiotherapy in the form oftone management, mobility training,PNF patterns, trunk control, Balance-Coordination training and Gait training. Group B i.e. experimental group received Motor Imagery Training which include waving hand, counting money, cleaning table, wringing clothes, typing on key board, putting and opening Velcro straps along with conventional physiotherapy.Pre and post treatment assessment was done by using Chedoke Arm and Hand Activity Inventory(CAHAI) [6] and Modified Ashworth's Scale (MAS). Treatment was given for 70 min, 3 days per week for 3 week.

DATA ANALYSIS AND INTERPRETATION

Statistical analysis was done usingPaired t Test and Wilcoxons Signed Rank Test for score within the group &unpaired t Test and Mann Whitney U Test for comparing between groups, by using SPSS.

Table 1: Mean Difference of CAHAIin Control and Experimental Group

	MEAN- PRE	MEAN-POST	MEAN DIFF	P value of mean difference
CONTROL	25.93±4.89	27.87±4.62	1.94	p= 0.912
EXPERIMENTAL	26.60±4.89	29.80±4.79	3.2	

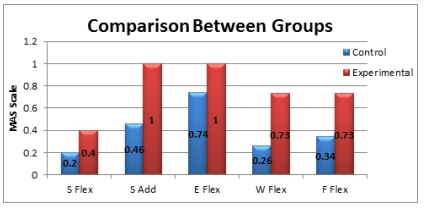
Interpretation: This shows there is no statistical significant difference in the mean value of CAHAI in both Control & Experimental group with p= 0.912. This suggests that Control &Experimental are equally effective in improving upper limb function in stroke patients.

Table 2: Mean and Mean Difference of MASin Control and Experimental Group

Grp	Shoulder flexors			Shoulder adductors			Elbow Flexors			Wrist flexors			Finger flexors		
	Pre	Post	df	Pre	Post	df	Pre	Post	df	Pre	Post	df	Pre	Post	df
A	0.67±0.97	0.47±0.74	0.2	1.33±0.90	0.87±0.74	0.46	1.67±0.48	0.93±0.70	0.74	0.73±0.79	0.74±0.64	0.26	01.0±7±0.73	0.73±0.59	0.34
B	0.53±0.91	0.13±0.35	0.4	1.33±0.9	0.33±0.48	1	1.33±0.90	0.33±0.48	1	1±0.65	0.27±0.45	0.73	1±0.65	0.27±0.45	0.73

Interpretation: This shows there is significant improvement in the mean value of MAS post training with p<0.001 suggesting both groups are effective in improving muscle tone in stroke

Graph 1:Comparison of Mean Difference of MAS in Control and Experimental Group



Interpretation: This shows there is no statistical significant difference in the mean value of MAS in both Control and Experimental group except Shoulder Adductors(p value 0.042)This suggests that Control and Experimental are equally effective in improving upper limb muscle tone.

RESULTS

In this study, 30 stroke patients were included 15 each. Group A i.e. only Conventional&B i.e. Motor Imagery. Statistical analysis was done using SPSS Software.

To compare the pre values of CAHAIand MAS between the groups Mann-Whitney U test was used whose p value was >005 which is not statistically significant which means that both the groups are comparable.

Table 1,2 and graph 1 shows statistical significance in CAHAI and MAS score within group A and B with p value <0.001. This shows that Conventional and Imagery training are effective in improving upper limb function in Stroke patients.

table 1,2 and Graph 1 shows Comparison between control and experimental group, wereno statistical significance was seen with p= 0.912. thus suggest Conventional and Imagery training was equally effective in improving upper limb function in Stroke patients.

DISCUSSION

The present study compared the effect of Motor Imagery on Upper extremity Muscle tone and functional task performance among stroke patients. The Group A was given Conventional Physiotherapy treatment while the Group B was given Motor Imagery along with conventional therapy, for three times/ week for a period of 3 weeks ie. 9sessions. The upper limb function and tone of the patients was assessed before and after 3 weeks of treatment with Chedoke Arm and Hand Activity Inventory (CAHAI) and Modified Ashworth's Scale (MAS), which showed significant improvement in Upper limb function in both the groups.

Motor imagery is a mental exercise that uses an internal stimulus to induce motor sensations from a psychological representation of action without the intent to perform that action[7]. It is known to induce activation in brain areas and muscles similar to those involved in actual task performance.Some authors[8] have divided Motor imagery into internal and external imagery, which refers to imagery of ones's own movement and of another person's movement, respectively. In external imagery, a person views himself from the perspective of an external observer; internal imagery, on the other hand, requires an approximation of the real life phenomenology such that the person actually imagines being inside his or her body and experiencing those sensations that might be expected in the actual situations[8].

William James postulated that increments in synaptic efficacy occur during learning when firing of one neuron repeatedly produces firing in another neuron to which it is connected. There is new growth in a healthy neuron adjacent to destroyed neural tissue known as Collateral Sprouting. Sprouting increases synaptic effectiveness. These widespread synaptic changes may be actually responsible for recovery.

Liu and associates[9] in a year 2004 investigated the relearning of functional tasks, such as household work such as cooking and shopping using MI. After 15 practice sessions, significant gains were achieved in household and community tasks, gains that interestingly transferred to 5 unpracticed activities[10].

Cramer and colleagues[11]in year 2006 found activation of cortical networks in congruence with imagery of specific movements, which suggested to them that brain motor system function can be modulated independently of voluntary motor control and peripheral feedback. They concluded that motor imagery training might have values as an adjunct to restorative interventions targeting post- SCI deficits.

Aleman and colleagues [12] in a year 2001 conducted a research on Visual Imagery without visual experience: evidence from congenitally totally blind people, and found that people who are congenitally blind were able to perform tasks that are mediated by visual mental imagery in people who were not blind. The authors maintained that their observations strongly suggest that vision and haptics share common representations.

In patients with Parkinsons disease the ability to apply MI is controversial. [13-16] Only a few studies have looked at the effects of mental practice. Data from one such study showed that patients with PD failed to learn a Graphomotor task using imagery practice, whereas individual with Huntington's disease did show improvement. The authors interpreted these findings as disordered imagery ability resulting from deficits in dopamine inputs to the basal ganglia in patients with PD. [17]

Many Researches have been done showing significant improvement in upper limb function in stroke patients after Mental or Motor Imagery Training. Similar results were found in this study, where Motor Imagery was found to be effective method of improving upper limb function in stroke patients clinically.Also statistically significant improvement was found in CAHAI and MAS score in both the groups.

CONCLUSION

Thus the study concludes that both Conventional and Motor Imagery Training are effective in improving upper limb functional task performance in stroke patients statistically but clinically Motor Imagery Training group showed better results with negligible effect on muscle tone. Therefore Motor Imagery Training can be used as an adjunct to Conventional Physiotherapy

CONFLICT OF INTEREST

There was no conflict of interest found in this study.

REFERENCES

1. Hatano S (1976). Experience from a multicentre stroke register: a preliminary report. Bulletin of the World Health organization; 54(5):541-553.
2. Johnson MJ, Van der Loos HFM, Burgar CG, Shor P, LeiferLJ. Designing a robotic stroke therapy device to motivateuse of the impaired limb. Integration of Assistive Technologyin the Information Age 2001;9:123–32.
3. Heller A, Wade DT, Wood VA, Sunderland A, HewerRL,Ward E. Arm function after stroke: measurement and recovery over the first three months. Journal of Neurology,Neurosurgery and Psychiatry 1987;50:714–9.
4. Gaggoli A, MeneghiniA(2004)Training with computer supported motor imagery in post stroke rehabilitation.Cyberpsychology& Behaviour; 7(3):327-332.
5. Sabate M, Gonzalez B, Rodriguez M (2004). Brain lateralization of motor imagery : motor planning symmetry as a cause of lateralization. Neuropsychologia;42(8):1041-1049.
6. Susan R. Barreca et al, Validity, Reliability of CAHAI, Arch Phys Med RehabilVol 86, August 2005.
7. Warner L, Mc Neill ME. Mental Imagery and its potential for physical therapy. PhysTher. 1988;68:516-521.
8. Callow N, Hardy L. The relationship between the use of kinaesthetic imagery and different visual imagery perspectives. J sports Sci. 2004;22:167-177.
9. Liu KP, Chan CC, Lee TM, Hui-Chan CW. Mental Imagery for promoting relearling for people after stroke: a randomized controlled trial. Arch phys med Rehabil. 2004; 85: 1403-1408.
10. Dijkerman HC, Letswaart M, Johnson M, MacWalter RS. Does motor imagery training improve hand function in chronic stroke patients? A pilot study. ClinRehabil. 2004; 18: 538-549.
11. Cramer SC, Orr EL, Cohen MJ, Lacourse MG. Effects of Motor imagery training after chronic complete spinal cord injury. Brain. 2005; 128: 2941-2950.
12. Aleman A, Van Lee, Mantione M et al. Visual imagery without visual experience; Evidence from congenitally blind people. Neuroreport. 2001;12: 2601-2604.
13. Frak V, Cohen H, Pourcher E. a dissociation between real and simulated movements in Parkinson's disease. Neuroreport 2004; 15:1489-1492.
14. Cunnington R, Egan GF, O'sullivan JD et al. Motor imagery in Parkinson's Disease: a PET study. MovDisord. 2001; 16: 849-857.
15. Filippi MM, Oliveri M, Pasqualetti P et al. Effect of motor imagery on motor cortical output topography in parkinson's disease. Neurology. 2001; 57: 55-61.
16. Thobois S, Dominey P, Fraix V et al. Effect of subthalamic nucleus stimulation on actual and imagined movement in parkinson's disease: A PET study. J Neurol. 2002; 249:1689-1698.
17. Yaguez I, Canavan AG, Lange HW, Homberg V. Motor learning by imagery is differentially affected in parkinson's and huntington's disease. Behav Brain Res. 1999; 102 (1-2):115-127.