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EFFECT OF MENTAL IMAGERY ON LOWER LIMB FUNCTION IN SUBACUTE STAGE OF STROKE PATIENT; A RANDOMIZED CONTROLLED TRIAL

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Abstract:

Objectives: *To find out the role of mental imagery [visual] in sub-acute stage of stroke patient specifically considering function of lower limb.*

Material and Methods: *An Experimental Randomized Controlled Trial was done. A total of 80 patients were taken by non-probability consecutive sampling technique and then randomly divided into 2 groups. One group was given just conservative treatment i.e, strengthening and balancing training and the other was given conservative treatment along with visual imagery. Later independent sample t test and paired sample t test were used. The duration of the study was 2 months from July to August 2018.*

Results: *Results regarding within group comparison in mental imagery group showed that there was mean difference of 4.88±1.71 with significant difference having p-value 0.00, while those of for conservative group, mean, standard deviation and p-value were 3.96±1.48 and 0.090 respectively. Results regarding within group comparison of time up and go test for mental imagery group showed that there was mean difference of 4.44±1.35 with significant difference having p-value 0.000, while those of for conservative group, mean, standard deviation and p-value were 3.12±0.971 and 0.070 respectively.*

Conclusion: *It was concluded that patients receiving conservative treatment along with visual imagery showed much better results than patients having conservative treatment alone.*

Keywords: *Stroke, Mental imagery, Lower limb.*

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INTRODUCTION:

Cerebrovascular accidents [CVA] disease often refers to a group of disorders that include cerebrovascular events and leads to deficient blood supply to the brain. It can be transient Ischemic Attacks [TIA] or stroke. Stroke, which is most common type of cerebrovascular accidents [CVA], may be defined as a sudden neurological deficit occurring due to vascular reasons which may lead to weakness, loss of sensations or other symptoms. For CVA the symptoms should be sudden lasting for more than 24hrs.[1]

Mental imagery is a visual feedback that is given to the patients through videos so that the neural circuits are built. This not only helps in active stage but research has shown it also plays an important role when patient can't use his limb.[2]

Mental Practice requires conscious participation of certain brain regions that are often unconsciously activated during exercise preparation. However, motion imagination does not depend on exercise skills, but rather depends entirely on the processing of the central organization.[3] Taking this into account, frequent use of mental practice may help to organize central motor commands. Based on the "neural network" theory, it is emphasized that the previous study of certain motor behavior established that during the mental practice, the neural network involved in the exercise gesture was rehearsed.[4]

Thus, by coordinating the movement patterns responsible for that particular exercise, the performance of the exercise gestures can be improved. It is based on the theory that "neural networks" remain intact, despite physical damage, suggesting that patients after stroke can benefit from mental practice activation of partial damage "neural networks". These findings are consistent with previous studies of mental practice, despite the lack of neuroimaging data to reinforce this view.[5]

Studies have shown that after completing the course, the subjects showed improvement in both trained and untrained tasks. Patient feedback also shows that it can enhance day-to-day functions. The clinical assessment showed that the subject's attention and sequential processing increased. Mental images appear to be effective in enhancing the task of re-learning of subjects after brain injury. The skills acquired under the treatment system can be retained and then summarized as other tasks. The therapeutic effect may be mediated by improved attention and planning and executive functions related to rehearsal.[6]

In a study, 13 patients with stable upper arm movement disorder improved the score after assessed on the Fegyl-Meyer sensory motor disorder assessment and action study arm following exercise.[7] It is noteworthy that patients who practice arms with occupational therapy are more likely to have a combination of occupational therapy than mental imagery.[8] Similarly, five months ago, patients with vascular disease with a symptomatic treatment of physical therapy and a comprehensive report of myocardial infarction reported a reduction in injury and improved arm function.[8]

Current study was ensured the importance of mental imagery rather than continuing the treatment blindly without showing the patient visually what is going to be done with him and what are the strategies which are going to be incorporated.

The hypothesis of the study was, effect of mental imagery on lower limb function in sub-acute stage of stroke patients is significant.

MATERIAL AND METHODS:

A randomized controlled trial was done. A total of 80 stroke patients, ages 40-65 years, both genders male and female with intact cognition having more than 25 scores on Mini-Mental State Exam [MMSE] and having at least 3+/5 Manual Muscle Testing Grading System [MMT] in lower limb were taken from National Hospital Defence and Aadil Hospital Defence Lahore for the purpose of this study. The duration of the study was 2 months from July to August 2018.

The data was collected by using Berg Balance Scale [BBS] and get up and go test questionnaires to know the functional status of patients beforehand. These tests help to find the static as well as dynamic balance of patients. Non-probability consecutive sampling was done for the data collection.

The following procedure was used for evaluation of the patients: two groups were made by the help of lottery method in which name of all the patients were written on chits and folded then, the 3rd person was called on to choose the chits randomly to be included in control group and experimental group. It made almost 40 patients in experimental group [Group I] who went through mental imagery which included giving patients the visual image of the treatment going to be given to them. Then the patients were asked to rehearse the video shown in their mind as if they are performing the exercises themselves. It included showing them the videos of strengthening

techniques specifically for hip abductors, hip flexors and hip extensors and balance training. The visual imagery and later on mental practice was of 20 min session along with conservative treatment which included the practical application of the visual image that was shown to the patient for 20 min and it now was of duration of 30 min total session hence being of 50 min. The other 40 control group [Group II] just had conservative treatment i.e, strengthening exercises training and balancing exercises training only. Afterwards, the treatment session was begun giving 20 min of mental imagery to Group I followed by conservative treatment of 30 min for 4 days a week for 8 weeks and Control Group II was given standard treatment only for 30 min. Assessments was repeated before treatment and then after treatment and compared.

All collected data was entered in computer program Statistical Package of Social Science [SPSS] version 16 and analyzed through this very software. Distributions of frequency and also standard deviations and means were utilized for expressive reasons. Paired Sample T-test to assess the difference of Mean values, ± Std. deviation and P-value or not in 1st week Berg Balance Scale, Get up and Go test and 8th-week Berg Balance Scale, Get up and Go test within each group. Independent Sample T-test to assess dissimilarity of Mean values, ± Std. deviation and P-value for significant or not in 1st-week Berg Balance Scale, Get up and Go test and 8th-week Berg Balance Scale, Get up and Go test in between groups. The P-value was considered statically significant 0.05.

RESULTS:

Among 80 patients of stroke 25 [31.25%] were male and 55 [68.75%] were female. Mean ages and standard deviation, 40 patients of experimental group I were 51.35±5.16 and 40 patients of control group II were 51.10±5.16 with minimum age 40 years and maximum 65 years.

Table I: Comparison of Pre and Post Intervention of Berg Balance within Groups; N = 80

Group of Patients		N	Mean	St. D	Std. Error	Correlation	Sig.
Mental Imagery Group I	Pre Intervention of the Berg balance [1st week]	40	13.76	2.85	0.57	0.80	.000
	Post Intervention of the Berg balance [8th week]	40	18.64	2.33	0.47		
Conservative Group II	Pre Intervention of the Berg Balance [1st week]	40	13.84	3.26	0.65	0.89	.000
	Post Intervention of the Berg Balance [8th week]	40	17.80	2.94	0.59		
Paired Differences							
		Mean		St. D	Std. Error	df	Sig. [2-tailed]
Mental Imagery Group I	Pre and Post Intervention of the Berg balance	-4.88		1.72	0.34	24	.000
Conservative Group II	Pre and Post Intervention of the Berg balance	-3.96		1.49	0.30	29	.090

Table II: Comparison of Pre and Post Intervention of Time up and Go test within Groups; N = 80

Group of Patients		N	Mean	St. D	Std. Error	Correlation	Sig.
Mental Imagery Group I	Pre Intervention of Time up and go test [1st week]	40	6.28	1.86	0.37	0.68	.000
	Post Intervention of Time up and go test [8th week]	40	1.84	1.28	0.26		
Conservative Group II	Pre Intervention of Time up and go test [1st week]	40	6.68	0.99	0.20	0.78	.090
	Post Intervention of Time up and go test [8th week]	40	3.56	1.26	0.25		
Paired Differences							
		Mean		St. D	Std. Error	df	Sig. [2-tailed]
Mental Imagery Group I	Pre and Post Intervention of Time up and go test	4.44		1.36	0.27	24	.000
Conservative Group II	Pre and Post Intervention of Time up and go test	3.12		0.97	0.19	28	.070

Table III: Comparison of Pre Intervention of Berg Balance, Time up and Go test between Groups; N = 80

	Group of patients	N	Mean	St. D	Std. Error	Mean Difference	Sig.
Pre Intervention Reading of the Berg balance	Mental imagery Group I	40	13.76	2.85	0.57	-0.80	.323
	Conservative Group II	40	13.84	3.26	0.65		
Time Up and Go test Pre Intervention Reading	Mental imagery Group I	40	6.28	1.86	0.37	-0.40	.057
	Conservative Group II	40	6.68	0.99	0.20		

Table III: Comparison of Post Intervention of Berg Balance, Time up and Go test between Groups; N = 80

	Group of patients	N	Mean	St. D	Std. Error	Mean Difference	Sig.
Post Intervention Reading of the Berg balance	Mental imagery Group I	40	18.64	2.33	0.47	0.84	.007
	Conservative Group II	40	17.80	2.94	0.59		
Time Up and Go test Post Intervention Reading	Mental imagery Group I	40	1.84	1.28	0.26	-1.72	.005
	Conservative Group II	40	3.56	1.26	0.25		

DISCUSSION:

In this study, total 80 patients were included. 40 patients were included in experimental group I who were given conservative treatment along with visual imagery and 40 patients were included in conservative group II.

Results regarding comparison of means at pre-intervention level of berg balance test between Mental imagery group and conservative treatment group for reading showed that assuming equal variances mean difference was 0.800 having p value 0.323. Comparison of means at post-intervention level of Berg Balance Scale between mental imagery group and conservative for berg balance score showed that assuming equal variances mean difference was 0.840 having p value 0.0073. Comparison of means at pre-intervention level between both groups for Time up and go reading showed that assuming equal variances mean difference was 0.400 having p value 0.057. Comparison of means at post-intervention level

between both group showed that assuming equal variances mean difference was 1.72 having p value 0.005.

Several studies have evaluated the effectiveness of the mental practice of arm rehabilitation. The study found that, when combined with conventional physical therapy, task-oriented training,[9] or exercise-induced exercise therapy, psychiatric practices help improve the function of upper limb damage by developing new exercise regimens These abilities were confirmed by the patients themselves, who reported that they had been able to carry out daily activities that had not yet been completed since their death.[10] The authors also observed that these changes varied over time within 3 months of treatment. Riccio et al. detected positive results in sub-acute patients. Spiritual practice has made progress in strength, gesture quality and performance.[11] These authors emphasize the great potential of this technique in patients who can cause movement because it is neither comfortable nor reusable without any physical stress. Miller et al. is also pointed out that in the case of pinching, individual psychological practice is as effective as repeated physical practice.[12]

Most of the published data is the result of mental functioning improved after upper limb function, but few are also available for lower limb gait training. Verma et al. evaluated the effectiveness of a training program, which included a task-oriented gait recovery circuit combined with a mental image.[13] They found a statistically significant improvement in the majority of the results, and the independent functional gait was earlier than the control group. At least 6 weeks after treatment is still improved.

So the results showed that the group which received conservative treatment along with the mental imagery had better prognosis than the conservative group requiring less efforts on the part of the physical therapist as the patient has developed the neural circuitry of the movement that has to be done. Moreover, it can be said that the treatment that was to be given to the patient was better understood so that he or she contributed actively during whole treatment session. This was also proven by literature review in which majority of the studies is with this consent that mental imagery should be incorporated with the physical therapy session in order to get better results whether it can be in the terms of acute stage of stroke or sub-acute, upper limb or lower limb, improving functional status, balance or gait training. The more work is done on upper limb regarding its effects on functional status of patient in acute and sub-acute stage. The work done regarding lower limb is on effects of gait training.

CONCLUSION:

It can be concluded that at sub-acute stage of CVA patient's mental imagery [visual] of the treatment given plays an important role in developing neural circuits. So, along with any treatment the imagery of it should be given beforehand and then the patient should be asked to rehearse that imagery within his mind as if he is performing it by himself. It not only plays role in neural circuitry but also it increases patients understanding about the treatment he is going to have. Later on in the treatment session he or she can perform that activity in a better way than those patients who were made to do the exercises blindly.

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