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Effectiveness of task oriented exercise therapy and cognitive exercise therapy on upper limb function and quality of life in chronic stroke patients

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Abstract
Aim: Effectiveness of task oriented exercise therapy and cognitive exercise therapy on upper limb function and quality of life in chronic stroke patients. Methodology: All the subjects will be explained about the purpose and the procedures of the study & written informed consent will be obtained from all participants. Result: Significant Results were obtained. Conclusion: This Application of cognitive exercise therapy was found to effect functional recovery in stroke patients.

Keywords: task, upper limb, stroke, QOL

Introduction

Stroke is classically characterized as a neurological deficit attributed to an acute focal injury of the central nervous system (CNS) by a vascular cause, including cerebral infarction, intracerebral hemorrhage (ICH), and subarachnoid hemorrhage (SAH), and is a major cause of disability and death worldwide [1]. The current World Health Organization definition of stroke (introduced in 1970 and still used) is - rapidly developing clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin [2].

Incidence provides another measure of the importance of these lesions. In studies using serial MRI scans, the incidence of silent infarcts was ≈3% annually among elderly participants in 2 observational cohorts [3, 4]. Incidence was lower in a third, smaller cohort [5]. Incidence, unlike prevalence, was similar for men and women, providing evidence to support the hypothesis that women with silent infarcts survive longer than men. Incidence also increased with age, prior brain infarction, and hypertension [6]. There are diverse therapeutic approaches for stroke patients' functional recovery, but research on the effectiveness of cognitive exercise treatment approaches is still lacking. Accordingly, this study intended to compare a task-oriented exercise treatment Group and a cognitive exercise treatment group to examine how such treatment methods affected the paretic side upper extremity's functional recovery and patients quality of life.

Stroke is frequent in adults and is the second leading cause of death in the world and the first cause of functional incapacity for activities of daily living. According to the World Health Organization, 15 million people present with stroke annually, and of these five million die as a result of the event and a large part of the survivors present physical and/or mental sequelae.

Discrete changes are manifested by 37% of the patients after stroke, 16% present moderate incapacity, 32% present intense or severe changes in functional capacity, and others depend on a wheelchair or are confined to bed. The sequelae generate economic, social and family impacts, while 15% of the patients present no deficit in functional capacity [7, 8, 9].

The patients with physical and/or mental sequelae require dynamic continuous, progressive and educational rehabilitation, to attain functional restoration, family, community and social reintegration, as well as to maintain the level of recuperation and quality of life [10].

Subjects and Methods

The study involved 40 chronic stroke patients, who meet with inclusion and exclusion criteria. 10 subjects were non-cooperated and irregular because of their personal reasons were then excluded from this study. Neurological assessment was done for all 30 cases.

The upper limb function were examined with Fugl Meyer Assessment upper extremity (FMA-UL), daily living activity were examined by MAL (Motor activity log) and quality of life of stroke patients assessed by stroke impact scale (SIS) and data were recorded. Those who were diagnosed with hemiplegia resulting from a stroke and whose onset of a stroke was six months or longer, the patient whose arm and hand functions were in the fourth stage or higher in Brunnstrom's recovery stages; those who had endurance to continue treatment for 30 min or longer. The subjects voluntarily consented to participate prior to this study. All 30 cases were randomly allocated into two groups A and B by selecting a card on which odd and even numbers were written to allocate them either Group A (n=15) or Group B (n=15).

Group A (n=15) conducted task oriented exercise such as range of motion exercise of the shoulder joints and task-oriented exercise treatment training, which involved moving the distal area after stabilizing them proximal area, such as receiving manual therapy, moving and piling cups, putting up and down a pegboard, moving a small ball, leafing through a book, threading beads, putting in rings, putting coins in a coin bank, and writing letters. Group B (n=15) conducted cognitive tasks using spatial and tactile senses. They conducted spatial tasks using tabulate, which required identification using

sensory modes centered on distance direction, form, and kinesthetic senses.

Result

Table 1: Comparison of Age of Subjects between Group A and Group B at the Time of Selection for Study

Variable	Scatter for age (year)	95% CI of the Mean		t-statistic	p-value (LOS)
	Mean ± SD	LB	UB		
Group A	57.07±6.11	53.68	60.45	0.74	p>0.05
Group B	58.73±6.23	55.28	62.18		
Mean Difference	*1.66 year*				

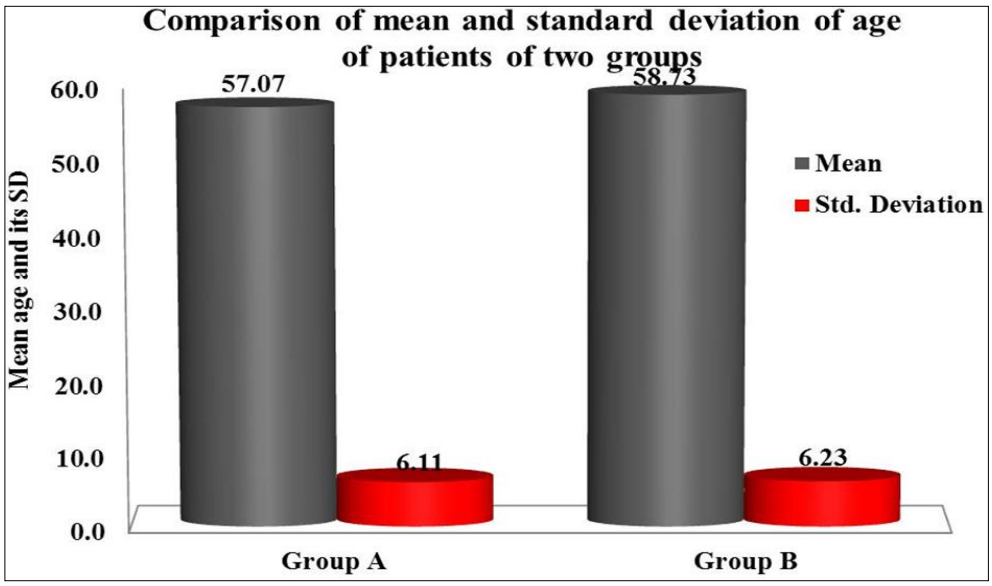

Fig 1: Mean and standard deviation of age of selected chronic stroke patients of Group A and Group B.

Table 2: Scoring Of FMA, MAL and SIS between Pre and Post Intervention Stages among Patients of GROUP A

Parameter (Group A)	Sampling Stage	Scatter of Score	Mean Diff	t-statistic	LOS
		Mean ± SD			
Fugl-Meyer Assessment (FMA)	Pre-intervention	28.47±5.13	30.13 point	17.03	p<0.001 #
	Post-intervention	58.60±6.40			
Motor Activity Log (MAL)	Pre-intervention	1.03±0.64	63.10 point	43.08	p<0.001 #
	Post-intervention	64.13±5.86			
Stroke Impact Scale (SIS)	Pre-intervention	91.00±21.73	158.13 point	8.06	p<0.001 #
	Post- intervention	249.13±69.53			

Table 3: Scores of FMA, MAL and SIS between Pre and Post Intervention Stages among Patients of Group B

Parameter (Group B)	Sampling Stage	Scatter of Score	Mean Diff	t-statistic	LOS
		Mean ± SD			
Fugl-Meyer Assessment	Pre-intervention	29.40±9.24	37.47 point	17.22	p<0.001 #
	Post-intervention	66.87±8.31			
Motor Activity Log	Pre-intervention	0.67±0.56	70.26 point	24.72	p<0.001 #
	Post-intervention	70.93±11.08			
Stroke Impact Scale	Pre-intervention	89.67±19.86	207.33 point	17.42	p<0.001 #
	Post-intervention	297.00±54.83			

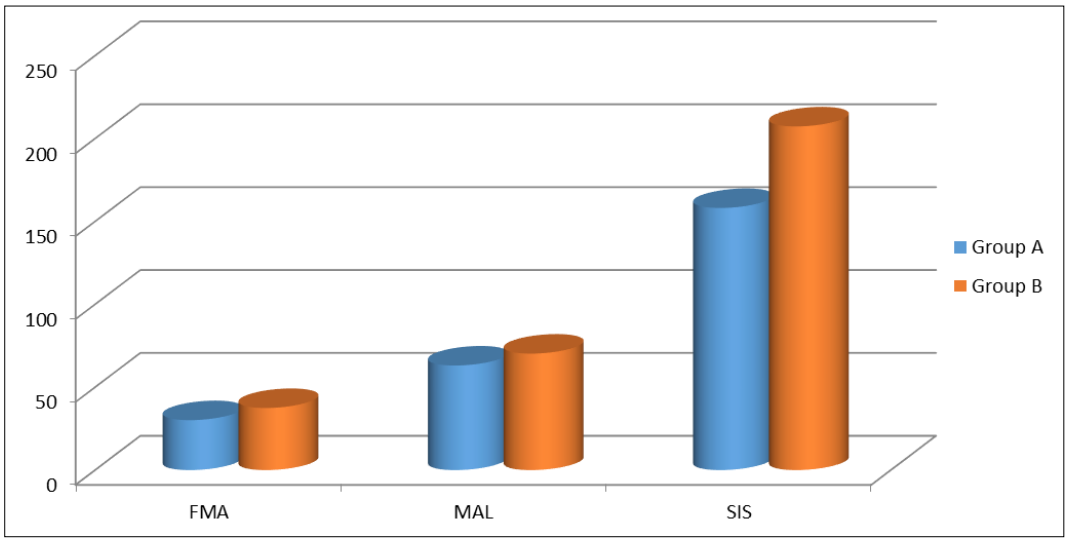

Fig 2: Comparison of Mean difference of Group A and Group B.

Table 4: Comparison of Fugl-Meyer Assessment Scoring Between Patients of Group A and Group B at Pre and Post Intervention Stages

Sampling Stage	Group	Score on FMA Mean ± SD	Mean Diff	t-value	LOS
Pre intervention	Group A	28.47±5.13	0.93 Points	0.34	p>0.05
	Group B	29.40±9.24			
Post intervention	Group A	58.60±6.40	8.27 Points	3.05	p<0.005 #
	Group B	66.87±8.31			

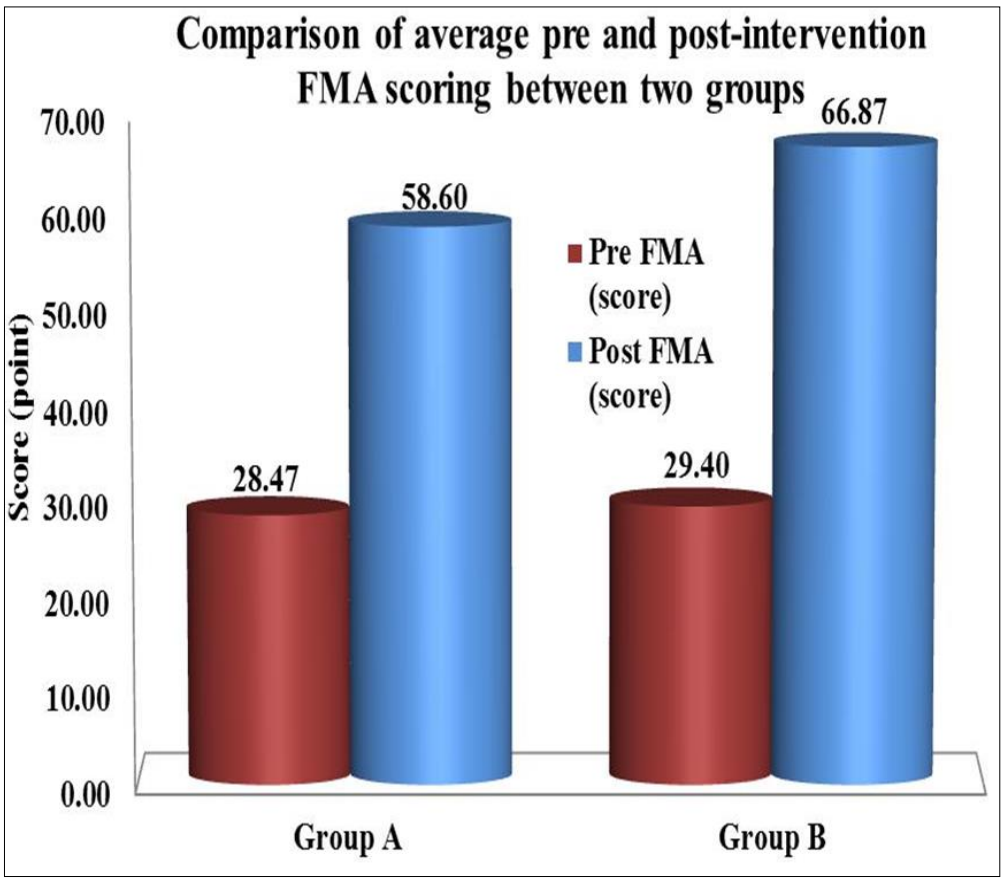

Fig 3: Comparison of pre-and post-intervention Fugl-Meyer assessment of patient with chronic stroke patients of Group A and Group B

Table 5: Comparison of Motor Activity Log Scoring Between Patients of Group A and Group B at Pre and Post Intervention Stages

Sampling Stage	Group	Score on MAL Mean ± SD	Mean Diff	t-value	LOS
Pre intervention	Group A	1.03±0.64	0.36 points	1.68	p>0.05
	Group B	0.67±0.56			
Post intervention	Group A	64.13±5.86	6.80 points	2.10	p<0.05
	Group B	70.93±11.08			

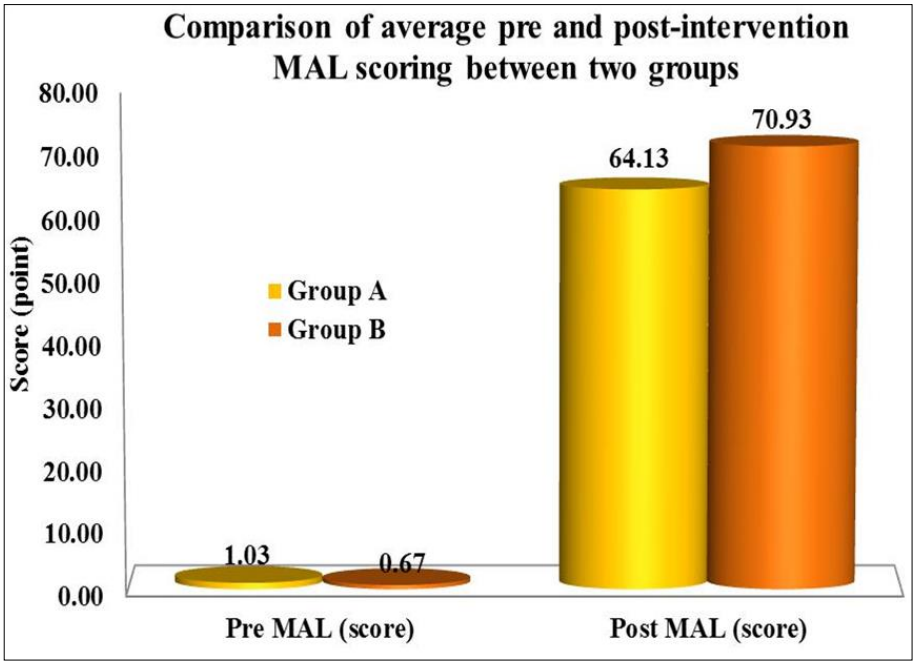

Fig 4: Showing the comparison of pre-and post-intervention motor activity log of patient with chronic stroke patients of Group A and Group B

Table 6: Comparison of Stroke Impact Scale Scoring Between Patients of Group A and Group B at Pre and Post Intervention Stages

Sampling Stage	Group	Score on SIS Mean ± SD	Mean Diff	t-value	LOS
Pre intervention	Group A	91.00±21.73	1.33 points	0.18	p>0.05
	Group B	89.67±19.86			
Post intervention	Group A	249.13±69.53	47.87 points	2.09	p<0.05
	Group B	297.00±54.83			

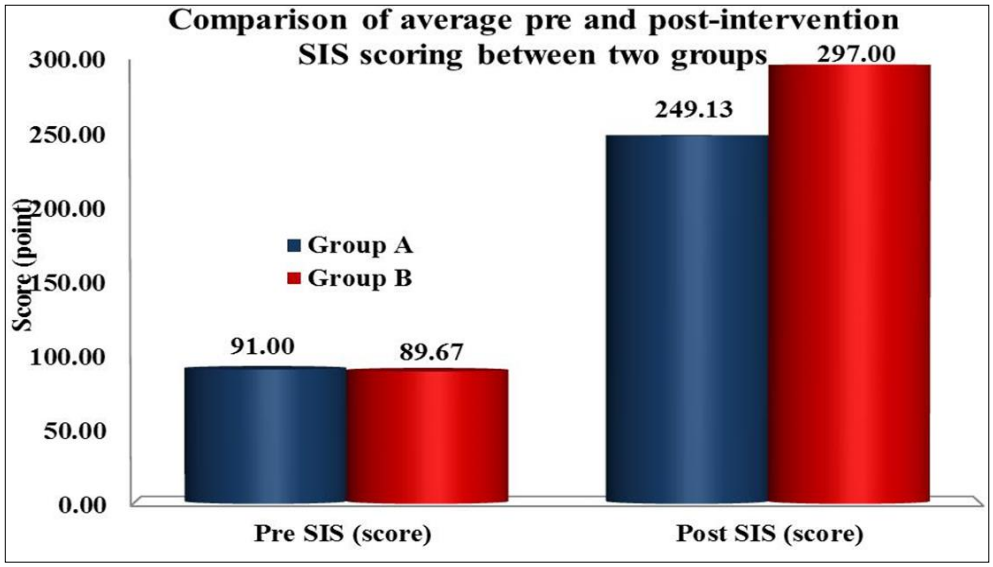

Fig 5: Showing the comparison of pre-and post-intervention Stroke impact scale of patient with chronic stroke patients of Group A and Group B

Discussion

Cognitive exercise therapy is an innovative approach for retraining motor functions of patients with hemiplegia after a stroke noted the purpose of he exercise was an appropriate intervention within the cognitive process of motor learning, such as perception, attention, memory, visual sense, and language. Stimulating the physical and mental functions of a patient together directly affects reorganization of the brain after damage and in the rehabilitation of the brain were damaged cognitive and kinematic aspects should be considered therefore this study applied cognitive exercise treatment to stroke patients, thereby examining its effects on upper limb function recovery and quality of life as well as proposing it as a strategy for treatment.

Sunghee Lee, *et al* states that the FMA performed to measure the effects on upper extremity functions there were statistically significant differences between the two groups and a statistically significant improvement after the experiment in both Group A and Group B. There was great change in Group B which showed that cognitive exercise therapy was effective for improving paretic side upper limb functions.

Seahyun Bae, *et al* states that the MAL performed to measure the activities of daily living there were statistically significant differences between the two groups and a statistically significant improvement after the experiment in both Group A and Group B. There was great change in Group B which showed that cognitive exercise therapy was effective for improving paretic side upper limb functions.

The findings from this study provide important new guidance to clinicians who must choose the best treatment for patients with stroke.

The result of this study shows that cognitive exercise therapy is more effective then task oriented exercise therapy. To improve function of upper extremity in stable patients.

Conclusion

Application of cognitive exercise therapy was found to effect functional recovery in stroke patients. Future research should focus on application of cognitive exercise therapy in diverse populations, and assess its clinical utilization.

The FMA, representing changes in upper limb functions, the MAL, representing changes in daily living activities, and the SIS, representing changes to quality of life where analysis within the groups and there was a significant improvement in both groups after training compared to before training at the pre intervention ($P<0.05$). In particular an improvement in Group B was considerably greater ($p<0.01$). According to the result of a comparison between the groups there were significant differences among the FMA and SIS results ($p<0.05$). Nonetheless, there was mild statistically significant difference between he groups regarding the MAL ($p>0.05$).

Therefore Experimental hypothesis "There is significance effectiveness of task oriented exercise therapy and cognitive exercise therapy on quality of life on upper limb function in chronic stroke patient." is accepted, rejecting the null hypothesis.

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