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**EFFECT OF ACTIVITY BASED DUAL TASK TRAINING ON COGNITIVE
FUNCTION, HAND DEXTERITY AND QUALITY OF LIFE IN STROKE
PATIENTS**

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ABSTRACT

Reason behind the study: Stroke is a chronic cerebrovascular disease in which a blood vessel supplying the brain is ruptured or blocked, leading to brain damage, which mainly affects the patients cognitive function, hand function and Quality of life, Dual task training is performed for the people whose cognitive or physical function are not smooth such as stroke patients, when two activities are performed simultaneously to effectively carry out complex tasks, such as an increase in cerebral blood flow, then single task training.

The main findings: The study is aimed to find out the Effects of Activity Based Dual Task Training on Cognitive Function, Hand function and Quality of life in Stroke patients. The study showed that the dual

task training activities was effective on improving hand dexterity, cognitive function and quality of life in stroke patients.

Conclusion: From the study, It was concluded that the activity based dual task training were effective on improving Hand dexterity, Cognitive function, and Quality of life.

Keywords: Stroke, Dual task training, Cognitive function, Hand dexterity, Quality of life

INTRODUCTION:

Stroke is a cerebrovascular disease in which a blood vessel supplying the brain is ruptured or blocked, leading to brain damage [1]. It is the second leading cause of death worldwide, affecting 13.7 million people and causing 5.5 million deaths annually. Ischemic strokes account for 87% of cases, with their prevalence rising due to improved survival rates and advancements in treatment [2]. Stroke-related motor dysfunction severely impacts independence in activities of daily living, with 25% to 74% of stroke survivors requiring assistance or becoming completely dependent on others [3].³ Occupational therapy is a client-centred profession that focuses on addressing specific physical, cognitive, or emotional impairments through meaningful activities to reduce limitations after stroke [4]. They work to improve motor control and hand function in stroke-affected patients, helping them regain the ability to perform personal tasks [5]. Quality of life in stroke patients is notably worse than that of the general population, particularly during the first year after a stroke, with severity of stroke, cognitive function, and motor impairments

such as hand, upper, and lower extremity function, as well as depression, being key factors [6].

Dual-task training is often used for stroke patients whose cognitive or physical functions are impaired. In this training, patients are trained to handle complex tasks better by performing two exercises simultaneously. This method can increase cerebral blood flow more than single exercises [7]. Dual-task training involves cognitive tasks and physical tasks such as calculating numbers while doing functional task or two or more simultaneously, such as moving objects and holding balls [8]. Many studies have reported that a dual task affects gait or interactions between cognitive tasks and gait or balance. However, most studies have focused on the effect of a cognitive task on gait or locomotion [9] no studies are available on the interactions between hand dexterity, cognitive function, and quality of life in stroke patients.

MATERIALS AND METHODS:

Using a Quasi-experimental study design, the subjects were included in the study based on the Screening criteria of with Mini-mental

status scores 21 and above and stages 4 and 5 in Brunnstrom hand recovery stages and age group of 40-65 years. Exclusion criteria included with joints or extremity deformities and other neurological conditions. Pre and post test scores were obtained based on the scores of Box and block test for their hand dexterity skills and Trail Making Test-B was used to assess the Cognitive level of the clients in the visual speed, cognitive functions and executive functions and WHOQOL-BREF for their Quality of life of the clients.

RESULTS:

The patients were divided into 15 for control group and 15 for experimental group. The experimental group underwent dual task training and the control underwent conventional occupational therapy. Hence the Statistical Analysis Showed Significant Changes in Post-Test of Control Group and Experimental Group P Value for Box and Block Test P Value Is 0.002, Trail Making Test P Value Is 0.046 And, Who Quality of Life Brief P Values Are Physical 0.001*, Psychological 0.00*, Social 0.036* And Environmental 0.00* After Giving Dual Task Training on Stroke Patients.

Table 1: Statistical Analysis of Pre-Test and Post-Test in Experimental Group OF BBT

	Mean	SD	N	z value	p value
Expoerimental Box and Block Test Pre-test	22.4667	1.50555	15	-3.47	0.001*
Experimental Box and Block Test Post-test	26.4	2.06328	15		

* Significant at 5% alpha level

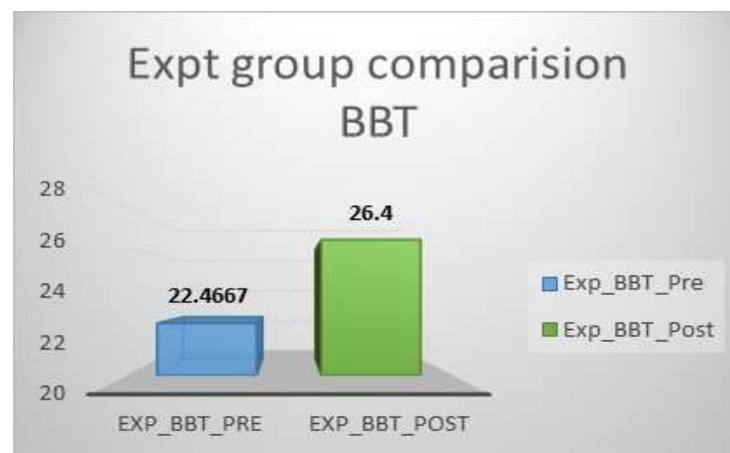


Figure 1: Comparison Between Pre-Test And Post- Test of The Experimental of BBT

Since the p value of 0.001 is lesser than 0.05, alternate hypothesis is accepted. Hence, there is statistically significant difference between pre- test and post test scores in the

Experimental Group of the BBT. This suggests that the intervention received by the experimental group had significant improvement. The statistics analysis of

comparison between of pretest and post-test in experimental group of BBT have been explained in **Table 1 and Figure 1**.

Table 2: Statistical Analysis of Per-Test and Post-Test In Experimental Group of TMT-B

	Mean	SD	N	z value	p value
Experimental Trail Making Test Pre-test	145.4	30.90723	15	-3.412	0.001*
Experimental Trail Test Post-test	125.7333	33.55053	15		

* Significant at 5% alpha level

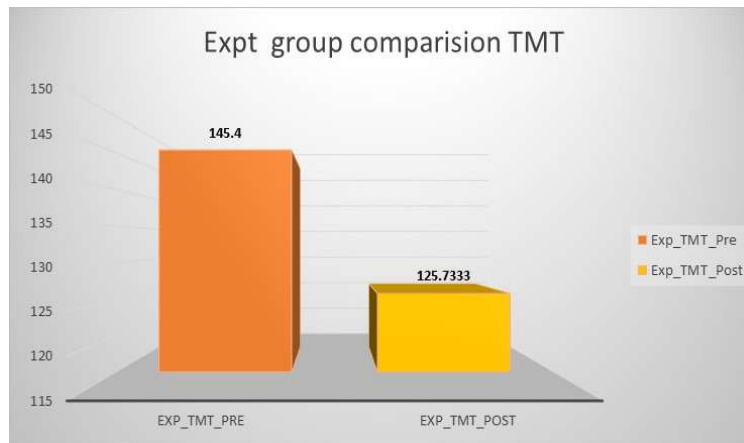


Figure 2: Comparison Between Pre-Test and Post- Test of The Experimental Of TMT-B

Since the p value of 0.001 is lesser than 0.05, alternate hypothesis is accepted. Hence, there is statistically significant difference between pre- test and post test scores in the Experimental Group of the Trail Making Test. This suggests that the intervention received by

the experimental group had significant improvement. The statistical analysis of pre-test and post-test in experimental group of TMT-B have been explained in the **Table 2 and Figure 2**.

Table 3: Statistical Analysis of Pretest and Post-Test in Experimental Group of WHOQOL-BREF:

Group		Mean	SD	N	Z value	p value
Experiment al group	Physical Pretest	42.5927	6.67217	15	-3.41	0.001*
	Physical Post test	54.7553	6.70357	15		
	Psychological Pre test	42.326	8.05182	15	-3.411	0.001*
	Psychological Post test	54.7953	9.17155	15		
	Social Pre test	36.108	8.71992	15	0	1.00
	Social Post test	36.664	9.34285	15		
	Enviromental Pretest	43.956	6.62485	15	-3.426	0.001*
	Environmental Post test	51.4413	8.08753	15		

* Significant at 5% alpha level

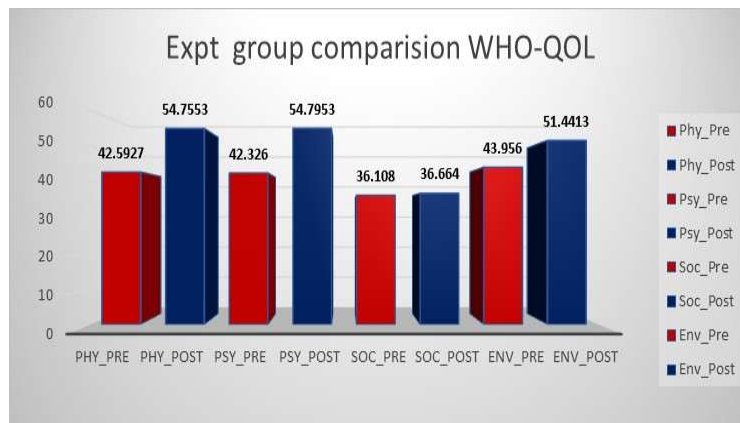


Figure 3: Comparison Between of Pre-Test And Post-Test in Experimental Group of WHOQOL-BREF

Since the P values (Physical, Psychological, and Environment) is lesser than 0.05, alternate hypothesis is accepted hence, there is statistically significant difference between pre-test and post test scores in the experimental group of the WHOQOL-BREF. The suggests that the intervention received by the experimental group had significant improvement.

Since the P value (social) is greater than 0.05, Alternate hypothesis is rejected. Hence, there is no significant difference between pre-test and post –test scores in the experimental group of the WHOQOL-BREF. The statistical analysis of pre-test and post-test in experimental group of WHOQOL-BREF have been explained in the **Table 3 and Figure 3**.

Table 4: Statistical Analysis of Post-Test In Control and Experimental Group of Box and Block Test

	Mean	SD	N	z value	p value
Control Box and Block Test Post-test	24.3333	1.34519	15	-2.986	0.002*
Experimental Box and Block Test Post test	26.4	2.06328	15		

*Significant at 5% alpha level

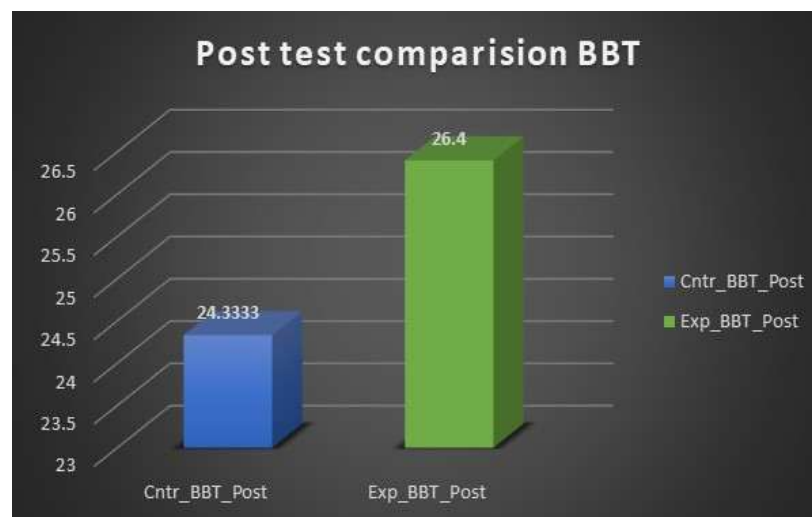


Figure 4: Comparison Between Post-Test of the Control and Experimental of BBT

Since the p value of 0.002 is lesser than 0.05, alternate hypothesis is accepted. Hence, there is statistically significant difference in post test scores between Experimental and Control Group of the BBT. This suggests that the intervention received by the experimental

group had more improvement when compared to the control group. The statistical analysis of post-test in control and experimental group of BBT is explained in the **Table 4 and Figure 4.**

Table 5: Statistical Analysis of Post-Test in Control and Experimental Group of Trail Making Test-B:

	Mean	SD	N	Z value	P value
Control Trail Making Test Post test	147.3333	31.96352	15	0.046*	1.99
Experimental Trail Making Test Post test	125.7333	33.55053	15		

*Significant at 5% alpha level

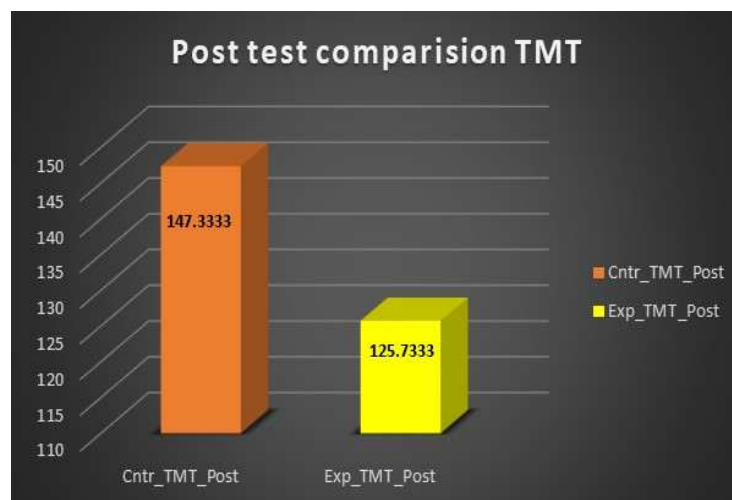


Figure 5: Comparison Between Post-Test of the Control and Experimental of TMT-B

Since the p value of 0.046 is lesser than 0.05, alternate hypothesis is accepted. Hence, there is statistically significant difference in post test scores between Experimental and Control Group of the TMT. This suggests that the intervention received by the experimental

group had more improvement when compared to the control group. The statistical analysis of Post-test in control and experimental group of TMT-B have been explained in the **Table 5 and Figure 5.**

Table 6: Statistical Analysis of Post-Test in Control and Experimental Group of WHOQOL-BREF

WHO-QOL Brief		Mean	SD	N	Z value	p value
	Control Physical Post test	45.2327	7.59693	15	-3.11	0.001*
	Experimental Physical Post test	54.7553	6.70357	15		
	Control Psychological Post test	39.3327	9.76044	15	-3.421	0.00*
	Experimental Psychological Post test	54.7953	9.17155	15		
	Control Social Post test	28.8787	9.38977	15	-2.094	0.036*
	Experimental social Post test	36.664	9.34285	15		
	Control Environment Post test	38.478	6.75109	15	-3.65	0.00*
	Experimental Environment Post test	51.4413	8.08753	15		

*Significant at 5% alpha level

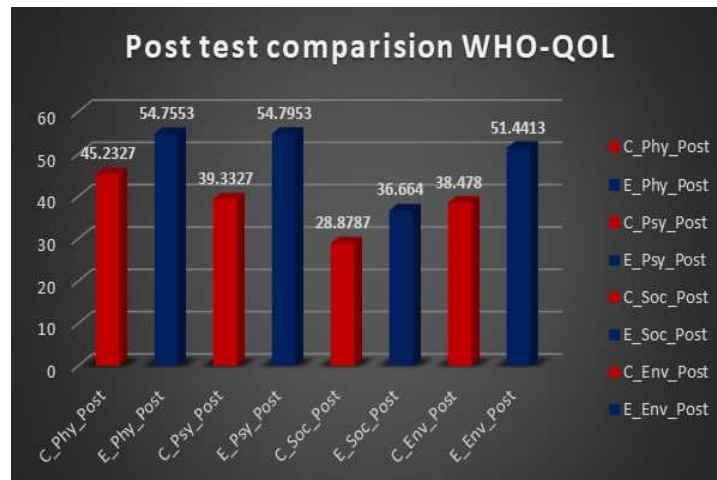


Figure 6: Comparison Between Post-Test of the Control and Experimental of WHOQOL-BREF

Since the p values are lesser than 0.05, alternate hypothesis is accepted. Hence, there is statistically significant difference in post test scores between Experimental and Control Group of the WHO-QOL. This suggests that the intervention received by the experimental group had more improvement when compared to the control group. The statistical analysis of control and experimental group of WHOQOL-BREF have been explained in the **Table 6 and Figure 6**.

DISCUSSION:

Table 1 and Figure 1 showed the statistical analysis of pretest and post-test of Box and block test in experimental group. The result indicates that there was a significant improvement in hand dexterity, in the experimental group. Since the p value of 0.001 is lesser than 0.05, alternate hypothesis is accepted. Hence the result was similar to the previous study which was conducted by Ju

Hyung Park, 2017 [10]. The author concluded that, through the results of the research, it was confirmed that the dual task training is effective for the enhancements of the hand function and the balancing ability of the stroke patients.

Table 2 and Figure 2 showed the statistical analysis of pretest and post-test of Trail making test in experimental group. The result indicates that there was a significant improvement in cognitive function. In the experimental group, since the p value of 0.001 is lesser than 0.05, alternate hypothesis is accepted. Hence the result was similar to the previous study which was conducted by Renata Do Nascimento Silva 2021 [11]. The author concluded that, the dual task training was able to promote improvements in the performance of daily life activities.

Table 3 and Figure 3 showed the statistical analysis of pre-test and post-test of

WHOQOL-BREF test in experimental group. Since the p values (Physical, Psychological and Environmental) is lesser than 0.05, alternate hypothesis is accepted. Hence the result was similar to the previous study which was conducted by Hee-Su An [1] the author concluded that, the dual-task training that combined attention and executive function with daily living activities was found to be meaningful.

Table and Figure 4 showed the statistical analysis of post-test of Box and block test in control and experimental group. The result indicates that there was a significant improvement in hand dexterity. Since the p value of 0.002 is lesser than 0.05, alternate hypothesis is accepted. Hence the result was similar to the previous study which was conducted by I-Chen Chen [12]. The control group value is lesser than experimental group.

Table and Figure 5 showed the statistical analysis of post-test of Trail making test-B in control and experimental group. The result indicates that there was a significant improvement in cognitive function. Since the p value of 0.046 is lesser than 0.05, alternate hypothesis is accepted. Hence, this suggests that the intervention received by the experimental group had more improvement when compared to the control group. Jin-Hyuck Park-2021 [13] author concluded that,

the experimental group achieved a significant improvement in the Trail making Test-B compared with the control group.

Table and Figure 6 showed the statistical analysis of post-test of WHOQOL-BREF test in control and experimental group. The result showed a significant improvement in quality of life in stroke patients. Since the p values are lesser than 0.05, alternate hypothesis is accepted. Hee-Su An [1]. The author concluded that, the results for changes in the WHOQOL-BREF Quality of life scale after the intervention for the experimental and the control groups. Statistically significant improvements in the quality of life.

CONCLUSION: The study investigated on the effect on dual task training on cognitive function, hand dexterity and quality of life in stroke patients. The experimental group underwent dual task training, whereas control underwent conventional occupational therapy [single task training]. The result shows that they were significant improvement in the experimental group more than the control group after dual task training. This study proves that the effectiveness of dual task training improves hand dexterity, cognitive function and quality of life in stroke patients.

ETHICAL APPROVAL: This study has been approved by the Institution Scientific Review Board (ISRB) of Saveetha College of

Occupational Therapy with REF No of SCOT/ISRB/ 044/2023

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