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ORIGINAL ARTICLE

Effect of Task Oriented Training on Hand Function in Stroke

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ABSTRACT
To study the effect of task-oriented training on hand function in stroke. The current study aimed to determine the effects of task-oriented training on hand function in stroke patients. 60 Subjects were allocated in 2 groups. The experimental group will receive task-oriented training along with conventional treatment. The control group will be given the conventional treatment. The participants carried out task-oriented training for 40 min per day for 5 weeks. Dynamometer, evaluations of strength and hand function were conducted. Box and block test and ABILHAND scale was used to measure changes in hand function over the course of five weeks. Their hand function was evaluated before and after the training., We investigated how task-oriented training improved hand function and daily living skills in stroke patients. Significant increase was found in BBT and hand-held dynamometer and ABILHAND questionnaire, score which shows that there is improvement in hand function with significant p value <0. 0001.The task-oriented training had a significant impact on improving hand function and daily living activities. According to the findings of this study, task-oriented training improved hand function and daily living activities in stroke patients. Task-oriented training has recently come to the forefront. The importance of, TOT is a more comprehensive approach to neurorehabilitation for recovery. Task-oriented training is recommended to improve hand function.
Keywords: *stroke, task oriented training, hand function, grip, strength.*

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INTRODUCTION

A stroke is a sudden neurological incident caused by a decrease in blood supply to the brain. Stroke is defined as "rapidly developing clinical signs of focal (or global) disturbance of cerebral function lasting 24 hours or longer or leading to death with no apparent cause other than vascular origin," according to the WHO [1]. Stroke is a disease that causes sensory, motor, cognitive, and speech impairments as a result of cerebral blood vessel disease. Studies found that permanent motor dysfunction in the upper limbs is more severe than in the lower limbs after a stroke [2]. Disabilities in upper limb function, including hand function, limit daily living activities. Thus, improving upper limb function and activities of daily living is an important goal of stroke rehabilitation [2]. The majority of stroke patients (80%) have a hand deficit and have difficulty performing manual tasks relevant to daily living independently. However, due to the complexity of manual tasks, developing a task-oriented training programme for hand rehabilitation is a significant challenge [3]. According to research, changes in hand grip strength in patients with a brain stroke are related to motor function. It is difficult to complete daily tasks when hand functions are impaired, which are required for performing fine movements (such as dressing, eating, and writing). Activities of daily living (ADL) are affected by muscle weakness, making tasks like writing or grasping a glass of water challenging or impossible [4]. Hands and arms are used in a wide variety of workplace tasks as well as for communication. The recovery of hand functions necessary for independently performing ADLs in stroke patients may be regarded as critical as the recovery of walking. Typically, the highest recovery rate is observed within three months of a stroke, and progress between three and six months is gradual. This suggests that providing hand treatment during the acute stage improves hand functions in stroke patients, emphasizing the importance of early treatment [5]. Despite improvements in

motor function with traditional motor therapies, functional gains are more difficult to recognise in everyday life; thus, strategies that relate to real-world environments are promising for more effective functional transfer. Task-oriented training (TOT) is one of these treatment strategies that can be implemented in early rehabilitation. It entails the active training of motor tasks performed within a clear functional context, which includes complex whole-limb or pre-task movements of the whole limb or a limb segment. TOT, according to the literature, causes neuroplastic changes and is important for improving motor and functional recovery [6]. Task-oriented training (TOT) is a simple and practical approach that allows you to exercise with real-life objects, such as functional movements for daily activities, in order to increase endurance and intensity of practise. Including TOT in the rehabilitation programme may benefit ADLs and overall well-being [7].There is a lack of research on stroke patients' hand function and how their daily activities change. although task-specific training is more likely to be utilised than non-task-specific training. The important role of TOT for hand function is not prioritised as it should be. This study provides an overview of the importance and benefits of early treatment. Therefore, the purpose of this study is to assess the effectiveness of task-oriented training by examining how it affects patients' hand function. As a result, providing rehabilitation treatment as soon as possible after a stroke is critical. The goal of this study is to see if task-oriented training improves hand function in stroke patients.

MATERIAL AND METHODS

Patients with stroke who were receiving rehabilitation therapy at the Krishna Institute of Physiotherapy participated in this study. Out of total 60 stroke survivors, 40 were males and 20 were females. In the current study, 5 weeks programme, which was offered 5 times a week samples were included according to 1)Diagnosis of ischaemic or haemorrhagic stroke.2)Mental State Examination score of >25. 3)Participants will be in the subacute phase (less than 6 months).4) Both male and female included.5) Age group: 30 – 60 years. 6) Patient able to perform at least minimal hand grasp (brunnstrome stage between 2-5). And excluded according to :1) upper extremity musculoskeletal disorders. 2)Any deformity to upper extremity.3) Patients with psychological problems.4) Inability to provide informed consent (pacemaker, metal in the head, personal history of seizures, and taking medications known to lower the seizure threshold), other neurological disorders or major medical incapacity. Subjects were allocated to 2 groups by simple random lottery method. The group A control group will receive, standard treatment, (with the same quantity, frequency and treatment time as the intervention group). The group B experimental group will receive task oriented training in addition to standard treatment, (five times per week, over five weeks, 40 min per session). The final assessments will be made. The study protocol is prepared. Outcome measures used:**1. Box and block test:**The Box and Block Test is a simpler measure of gross manual dexterity; it counts the number of blocks that can be transported from one compartment of a box to another compartment in 1 minute [9]. The number of wooden blocks (2.5 x 2.5 x 2.5 cm) that can be moved from one compartment of a box to another in one minute is counted [9]. A greater improvement in precise hand movement is shown by a higher number of blocks moved. We shall use the Box and Block Test (BBT) using 0-150 cubes/min to evaluate the affected arm's dexterity. The manual dexterity of hand function was assessed using the box and block test, which entails moving as many little blocks as you can between compartments of a box in 60 seconds. The BBT test has high intrareader reliability (r =.99 on the left and r = 1.00 on the right) [10].**2. Handhelddynamometer:** The handheld dynamometer is regarded as a practical standard instrument for assessing strength. Furthermore, it provides valid and reliable measures of strength in people who have had a subacute or chronic stroke [11]. A HHD was used to measure the strength of the hands. It has been demonstrated that the HHD is a reliable technique for determining strength in those who have brain damage [2]. **3. ABILHAND Questionnaire:** The ABILHAND questionnaire is self-reported and assesses patients' perceived difficulty with daily activities requiring bilateral UE. It includes 23 daily activities that assess bimanual ability and are graded on a three-point scale (0 = impossible, 1 = difficult, 2 = easy). Its psychometric properties have been validated in stroke patients [12]. As a result, a version was created specifically for stroke patients that included only bimanual items, as well as two alternate unimanual' activities that required skilled use of the affected hand.

Statistical analysis

Instat was used to analyze the data. 60 samples were used in the current study. A repeated measures analysis of variance with a between-subjects factor was used to compare the pre- and post-test data for the two groups. A paired t test was used to compare the differences between the two groups before and after the intervention. Independent t tests were used to compare the two groups' pre- and post-test

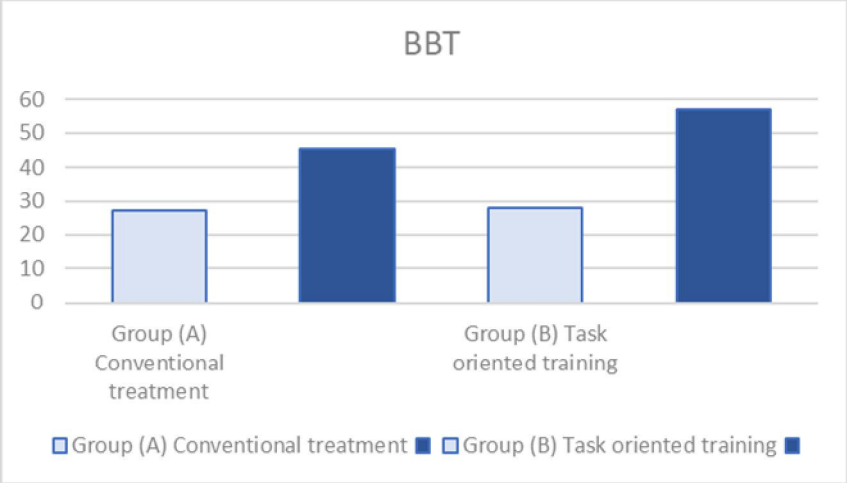
scores, as well as the difference over time. A statistically significant difference was defined as a p value less than 0.05.

RESULTS

Data was statistically analyzed using paired and unpaired t test. For group A post intervention BBT test was (45.3 ± 4.36), hand held dynamometer for grasp (12.31 ± 6.5), grip (18.5 ± 10.6), pinch (8.6 ± 4.88) and ABILHAND questionnaire (28.04 ± 5.3) which was extremely significant. For group B post intervention BBT test was (56.9 ±2.35), hand held dynamometer for grasp (12.70 ± 6.60), grip (22.7 ± 11.4), pinch (11.50 ± 6.33) and ABILHAND questionnaire (32.04 ± 4.2) which was extremely significant. Between the group comparison of BBT for group A (45.3 ± 4.36) and group B (56.9 ±2.35) with p < 0.0001, and handheld dynamometer for grasp for group A (12.31 ± 6.5) for group B (12.70 ± 6.60), grip for group A (18.5 ± 10.6) for group B (22.7 ± 11.4), pinch for group A (8.6 ± 4.88) and for group B (11.50 ± 6.33) with significant p value (p value < 0.05) and ABILHAND questionnaire for group A (28.04 ± 5.3) and for group B (32.04 ± 4.2) with significant p value.

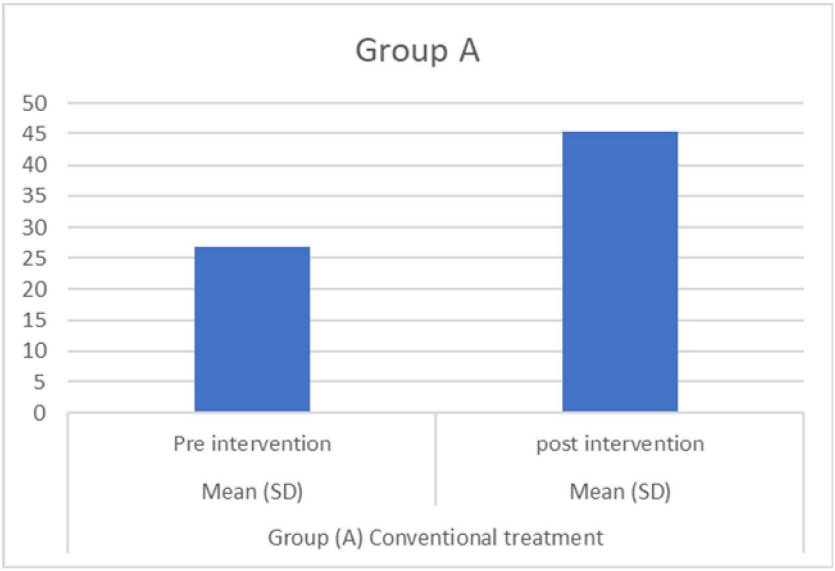
Table 1- BBT

	Group (A) Conventional treatment		Group (B) Task oriented training	
Test	Mean (SD) Pre intervention	Mean (SD) post intervention	Mean(SD) Pre intervention	Mean(SD) Post intervention
BBT	27± 2.38	45.3 ± 4.36	28.1 ± 2.49	56.9 ±2.35



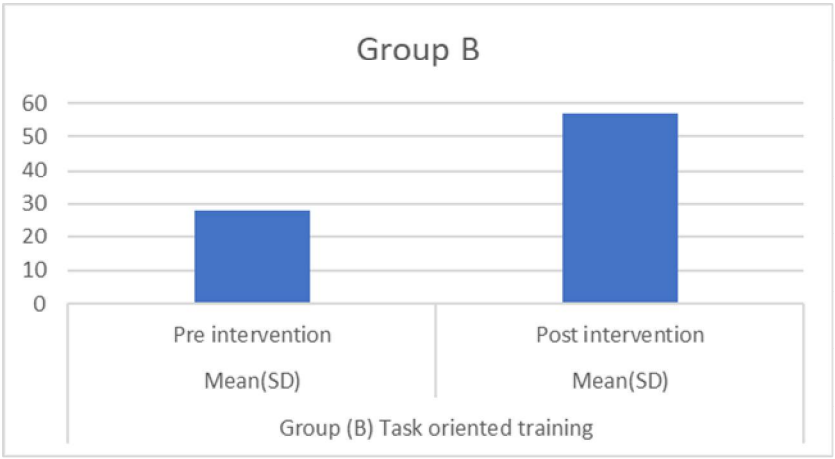
Graph no. 1:(BBT) Between the group comparison

Interpretation: Table 1 displays the results of for both groups. Subjects in both groups increased the number of blocks transferred during the post-intervention assessment. Improvement was seen in both groups of participants using the BBT. Following the training, there was a substantial p (value< 0.0001) improvement in hand function. According based on these outcomes, we conclude that the task-oriented Training significantly improved stroke patients' condition.



Graph 2: Within the group comparison of group A

Interpretation: Graph 2 represents, within the group comparison of pre and post values of BBT, which shows there is improvement after post assessment by 18.3 with extremely significant p value.

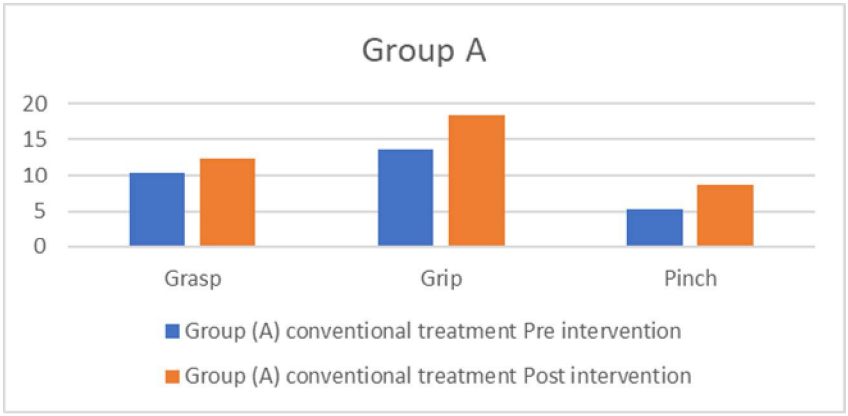


Graph 3: Within the group comparison of group B

Interpretation: Graph 3 represents, within the group comparison of group B , pre and post values of BBT which shows there is improvement after post assessment by 28.8 with extremely significant p value.

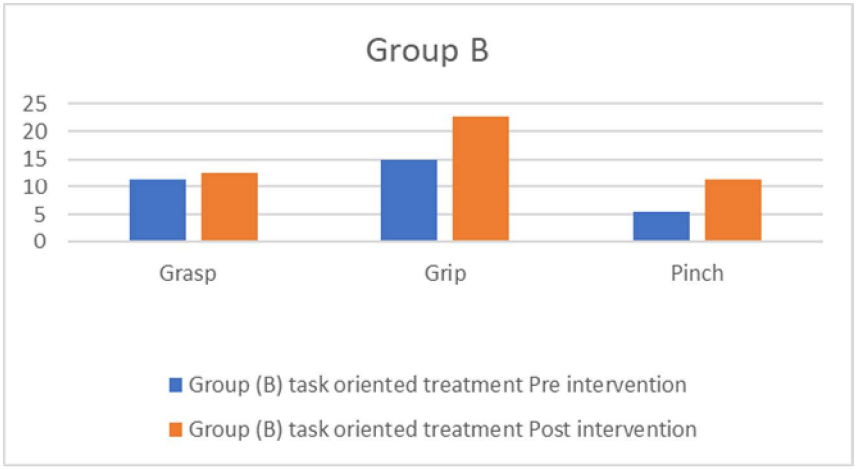
Table no. 2- Handheld dynamometer

	Group (A) conventional treatment		**Group (B) task-oriented treatment**	
	Pre intervention	**Post intervention**	**Pre intervention**	**Post intervention**
Grasp	10.40 ± 6.31	12.31 ± 6.5	11.40 ± 6.41	12.70 ± 6.60
Grip	13.6 ± 6.2	18.5 ± 10.6	14.9 ±5.4	22.7 ± 11.4
Pinch	5.31 ± 2.5	8.6 ± 4.88	5.5 ± 4.6	11.50 ± 6.33



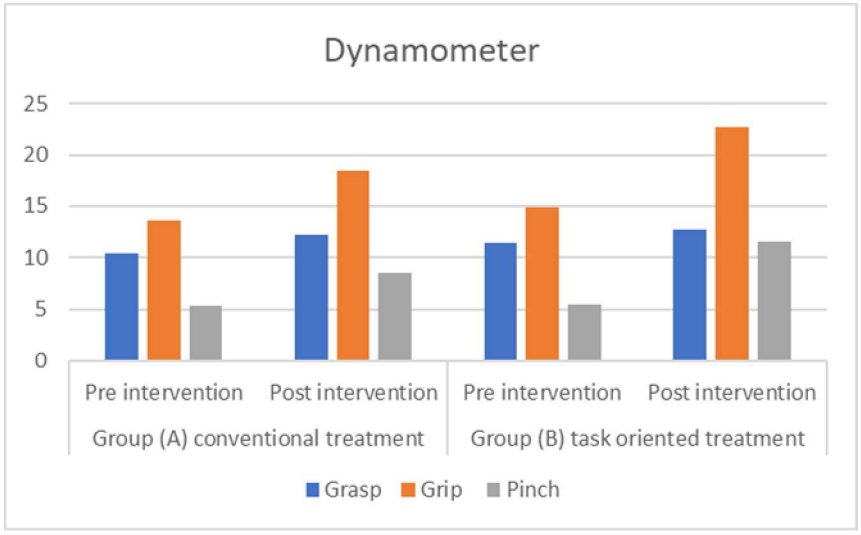
[Graph 4]: Within the group comparison of group A

Interpretation: Graph 4 represents within the group comparison of group A of values of handheld dynamometer which shows there is improvement in grasp, grip, pinch post assessment with extremely significant p value.



[Graph 5]: within the group comparison of group B

Interpretation: Graph 5 represents within the group comparison of group B values of handheld dynamometer which shows there is improvement in grasp, grip, pinch, post assessment with extremely significant p value.



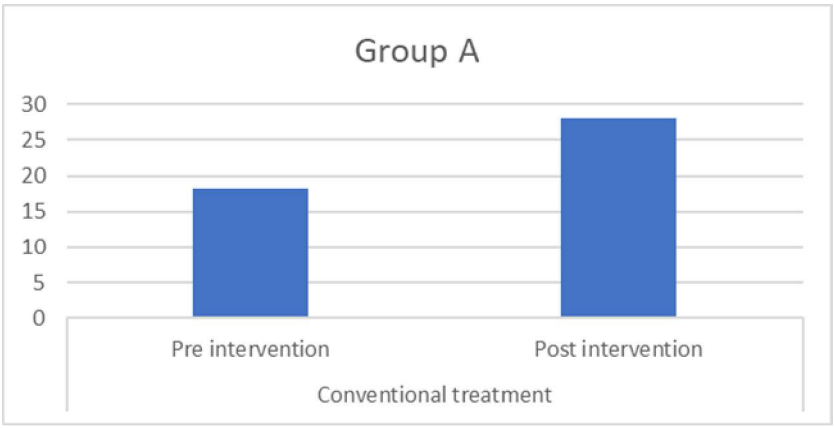
[Graph no. 6] :(dynamometer) Between the group comparison

Interpretation: Table 2 displays the results for both groups. Improvement was seen in both groups of participants using the dynamometer. Following the training, there was a substantial p (value <0.05)

improvement in hand function. According based on these outcomes, we conclude that the task-oriented Training significantly improved stroke patients.

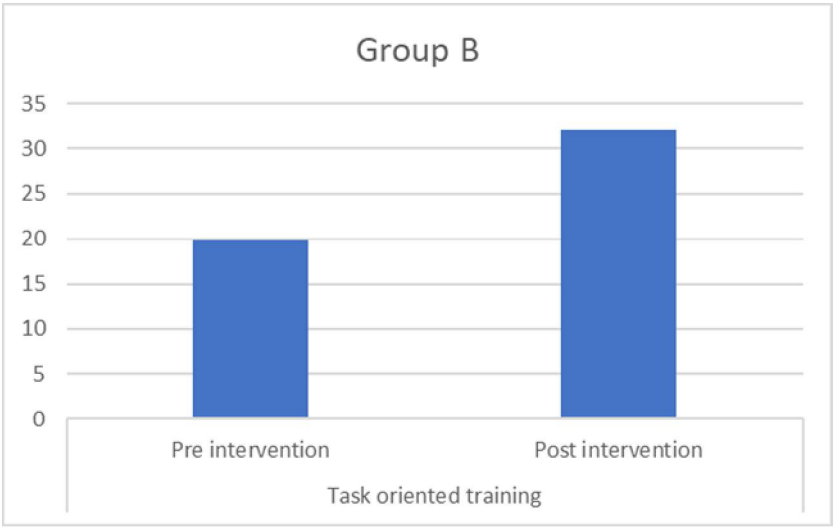
Table no. 3- ABILHAND scale

	Conventional treatment		Task oriented training	
	Pre intervention	Post intervention	Pre intervention	Post intervention
ABILHAND scale	18.13 ± 2.7	28.04 ± 5.3	19.8 ± 3.7	32.04 ± 4.2



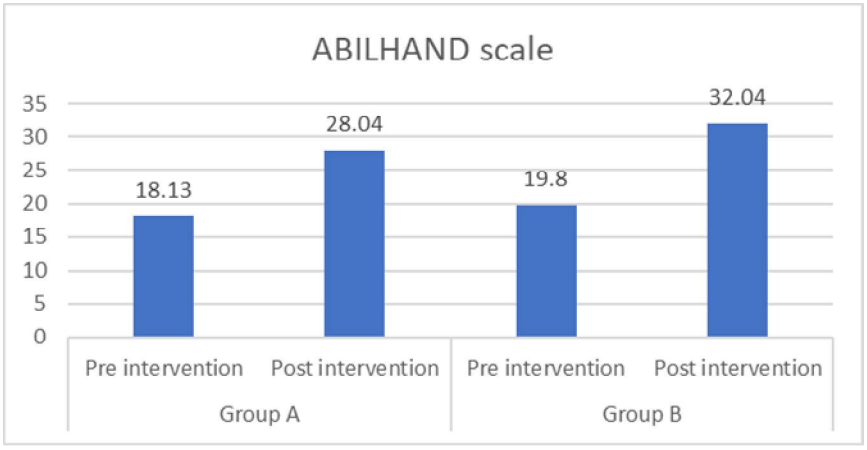
Graph 7: Within the group comparison of group A

Interpretation: Graph 7 shows within the group comparison of pre and post values of ABILHAND questionnaire which shows there is improvement after post assessment by 9.91 in conventional group.



Graph 8- Within the group comparison of group B

Interpretation: Graph 8 shows pre and post assessment of ABILHAND questionnaire which shows improvement in post intervention in task-oriented training.



Graph no 9: (ABILHAND) Between the group comparison

Interpretation: Graph 9 shows comparison between the two groups of ABIL HAND scale which is significantly increased in experimental group. The significant increase was (28.04 ± 5.3) to (32.04 ± 4.2) seen.

DISCUSSION

Task-oriented therapy is reported to have an effect on function recovery in brain stroke patients because the motions are more enjoyable, influence cerebral cortex reorganization, and contribute to brain plasticity, according to Kim J. and Yim J[13]. This study was conducted to find out the effect of task-oriented training on hand function in stroke patients. There are a large number of stroke survivors who have persistent residual hand deficits in stroke recovery, so it is important to be able to identify interventions that are effective within this population. A 5-week programme was offered five times per week in the current study, and Group A was the control group, which received conventional treatment.

- Sustained icing
- Sustained stretching
- weight bearing on the affected upper extremity
- Activities for reaching functional goals
- ROM exercises for the hand (wrist and fingers)

Group B, on the other hand, was an experimental group that received a conventional treatment protocol combined with task-oriented hand training. The programwas tailored for each participant based on their goals, objectives, and level of functional ability. Reaching, grasping, and handling important objects were among the activities. Examples of activities could have included opening jars, stacking objects, grabbing and eating finger foods, handwriting, using a computer mouse, and typing, depending on the person's level of competence. This group of individuals had been conventionally treated for their spasticity. The intervention has been given to them for 5 days. The current study found that after 5 weeks, both Group A (the control group that received conventional treatment) and Group B (the experimental group that received conventional treatment protocol combined with task-oriented training) showed significant improvement, but Group B showed greater improvement in all measured parameters. The task-oriented treatment affected the way that the hands functioned, according to an analysis within the group. On the BBT, participants in the experimental group showed more progress. At the post-intervention evaluation, multiple individuals exhibited clinically significant changes on the BBT (7 blocks). The findings of this study lend support to the notion that people who have had a stroke will perform better and be stronger if they incorporate task-oriented strength training. Within the group comparison of pre- and post-intervention outcome measures, there was significant improvement noted. Between the group comparison of BBT, the mean for group A (45.3± 4.36) and for group B (56.9 ± 2.35), shows that there is more improvement in hand function in group B than group A, with a significant p value of 0.0001. According to Aye Aye Thant, et al., TOT enhances an individual's functional abilities by emphasizing the skilled, repeated performance of a task rather than attempting to correct the impairment level [14]. TOT resulted in faster movement and improved movement quality, both of which were associated with improved functional performance in the hand. This study also discovered that TOT improved task-specific results in functional movement [14]. According to the findings analyzed by Aye Aye Thant in Effects of task-oriented training on upper extremity functional performance in patients with sub-acute stroke: a randomized controlled trial, TOT, a top-down training approach focusing on functional activities, has a

measurable effect not only on paretic UE functional performance but also on motor recovery and stroke survivors' rated quality of hand function [14].

TOT improves a person's functional abilities by emphasizing the skill, repetitive completion of a task rather than attempting to alleviate the level of impairment. TOT accelerated movement and improved movement quality in this study, both of which were related to improved hand functional performance. This study also discovered that TOT improved task-specific outcomes in functional movement. Task-specific training may restore function by using spared brain regions close to the damaged area and/or recruiting additional brain regions [14] .

According to Amanda Michaelsen-Demartino, the type of grasp in the actual environment is affected by motor impairment, and greater motor impairment leads to the performance of less complex tasks [15]. Task-related training has been shown to improve walking performance in people who have had a stroke [16] .

The current study evaluates the impact of task-oriented training on hand function. A hand-held dynamometer was used to measure power grips and grasp. The average of the measurements was computed, revealing a significant (p value 0.05) improvement in hand function.

Table 3 and graph 9 show the group comparison for the ABILHAND questionnaire, which shows there is more improvement in group B than group A.

The findings of this study add to the body of knowledge about the impact of 5 weeks of TOT on hand function in people who have had mild to severe hand impairment. However, the TOT approach used in this study may be appropriate for training the paretic hand of subacute stroke patients with hand involvement. These encouraging results suggest that such training be implemented in the rehabilitation of stroke patients.

CONCLUSION

We have demonstrated that task-oriented training on group of people and were able to conclude improved result than conventional method. The computation of all the three assessments i.e. BBT, handheld dynamometer, ABILHAND questionnaire have shown an increased in p value (p value <0.05) in task-oriented training group. The study was analyze based on statistic data obtained during the training, its presentation in term of graphical view and the intervention. It was concluded that task-oriented training is effective and successive technique to improve hand strength and function in people who have stroke. Hence, from the above assessment it justifies that providing task-oriented training in acute stage, optimizes the hand functions in stroke patients, hence emphasizing the significance of early treatment.

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