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Effect of Task Oriented Training with Conventional Therapy and Conventional Therapy Alone in Hemiparesis: A Comparative Study

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Abstract

Background: Independency for basic self handling is the primary want of every human. Impaired upper extremity functional movements due to stroke followed by hemiparesis leads to poor participation in daily living activities.

Objective: To determine and compare the effectiveness of Task Oriented Training (TOT) with Conventional Exercise Program (CEP) and Conventional Exercise Program alone in hemiparetic post stroke patients for improving functional performance.

Method: 24 subjects with post stroke hemiparesis were assigned into two groups (12 in each group). The outcome measure was Fugl- Meyer assessment scale (FMA) and Wolf motor function assessment scale (WMFA). Group A subjects were treated with conventional therapy only while group B subjects were treated with Task Oriented training. The intervention was provided to both the groups for 5 times a week for a total duration of 8 weeks.

Results: The results demonstrated significant improvement in functional ability for subjects of group B in comparison to group A ($p<0.05$) whereas sensorimotor function doesn't significantly improved with Combination treatment (CEP+ TOT).

Conclusion: The results shows that CEP along with TOT are effective in decreasing dependency in self care activities by increasing functional ability of patients. Therefore, Task oriented training with conventional exercise program can be practiced in physiotherapy for management of hemiparesis.

Keywords: Conventional therapy; FMA; Functional ability; Hemiparesis; Stroke; Task Oriented Training; WMFA.

Introduction

Hemiplegia is complete paralysis of half of the body and hemiparesis or unilateral paresis is, in its less severe form, loss of motor skills of one entire half of body. CVA (also known as Stroke) results from cerebrovascular insult and characterised by immediate loss of neurological function which is followed by hemiplegia in acute stage and hemiparesis in sub-acute and chronic stages.

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Post stroke patients sustained several impairments such as motor, sensory, communication, respiratory, reflex activity, emotional disorders, and functional limitations.[1] As a result, the survivor faces poor Health related quality of Life, low life participation and long-term disabilities.

One of the major functional difficulties after stroke is impaired upper extremity function and only 5% of affected population recoup the full functioning of hemiparetic arm.[2] This will affect the performance of daily living activities and lessen the sufferer's healthy life years and functional wellbeing. The approximated accommodated proportion of prevalence in India is 84-262/100,000 in rustic and 334-424/100,000 in civic areas.[3]

Rehabilitation for post stroke patients continues to be highly variable in terms of programs and duration. Stroke rehabilitation should begin immediately after the patient is declared medically stable. The plan of care must include short term and long-term treatment goals. The specific patient's neurological condition needs different appropriate intervention in order to decrease disability and promoting functional independence. This intervention may be CIMT (constraint induced movement therapy), mirror therapy, motor imaginary training, PNF (proprioceptive neuromuscular facilitation), Neurodevelopmental technique (bobath), Electrical stimulation, TOT (task-oriented training), biofeedback, etc for improving function of paretic arm.

Task oriented training is a therapeutic approach which is intended to acquire a skill by doing a specific given challenging task in repetitive manner. This strategy is based on proposition of motor learning, motor control and neuroplasticity. Unlike general repetitive training which is a bottom-up[4] approach the task-oriented intervention is a top-down[5] approach and it must include goals that involves active participation, meaningful tasks, and purposeful movements in order to upgrade daily life operating abilities.

Numerous approaches are used to improve function of post stroke hemiparetic limb, still due to some practical issues like lack of interest, financial burden, time consuming, lack of understanding of treatment etc., significant improvement is not attained but TOT in contrast have no such issues as it is interesting, low cost, time efficient and easily understandable.

Previous studies have reported much evidence in support of effectiveness of conventional exercise program to enhance positive response in management of post stroke patients. This study purposed to examine the effectiveness of combined task-oriented training and conventional exercise program on upper extremity functional performance in post stroke patients as this intervention is still in confliction.

Methodology

The study was an experimental comparative study of 8 weeks with each session of 1 hour. It was conducted at shri ram hospital, New Delhi and Singh physiotherapy clinic, New Delhi. Ethical clearance was given by institutional ethical committee, Jaipur physiotherapy college, Rajasthan. Simple random sample of 24 post stroke subjects with stable medical condition, age ranging from 40-60 years, both genders, had post stroke period from 1 month up to 1 year, fugl-meyer assessment score between 19-50 were included in the study. Patients with any other neurological disease, poor cognition, any musculoskeletal deformity, recent fracture, shoulder subluxation, visual deficit, and uncontrolled hypertension were excluded from the study.

Procedure

24 subjects after meeting inclusion and exclusion criteria were randomly assigned to two groups. Complete explanations were given to both the groups singly but subjects were unaware of which group they referred. "Group A" included 12 patients. After assessment and calculation of pre intervention score, subjects received Conventional exercise program for 1 hour each day for 5 days in a week for 8 weeks (Total 40 sessions). This intervention focused on increasing range of motion, improving strength and co-ordination of hemiparetic upper limb. The treatment protocol for this group was arm and elbow isometrics in supine lying with hold of 10 seconds for 10 repetitions for 4 weeks and 15 repetitions for next 4 weeks. Arm raises with clasped hands, turns to affected and sound side one by one with clasped

hands, straight push with clasped hands were performed in high sitting position, repeated for 10 repetitions for first 20 sessions and progressed to 15 repetitions in next 20 sessions.

Bridging was performed as patient was lying supine with feet flat on couch, both knees bent and arm straight, palm facing downwards. Patient was asked to lift up the waist and hold the position for 10 seconds for 10 repetitions. Prone on hands was done as the patient was lying on stomach with hands directly under shoulders. Patient was asked to lift the head slowly to face the ceiling and hold the position for 10 seconds for 10 repeats. Stretching exercises for biceps brachii,wrist flexor, finger flexor and pectorals was done to passively by therapist to increase Range of motion. Active assisted sit to stand transfer followed by self assisted sit to stand, then followed by active transfer (sit to stand), Active pumping exercises for wrist by using squeeze ball. Finger to nose and finger to finger exercises were performed to improve coordination.

Group B includes 12 patients, allocated to conventional exercise program of group A in combination with task oriented training. Each patient was assessed for calculation of pre intervention outcomes score. Intervention was given for 5 days in a week for 8 weeks (Total = 40 sessions) for 1 hour per day out of which 10 minutes were given to warm up exercises. This intervention focused on repeating meaningful tasks that were selected according to patient's need or preference. Sitting was the selected position while performing tasks. 2 minutes of rest provided to patient after completion of each task. Every task was demonstrated by therapist before patient performs the same. The task opted were moving pegs, drinking water from glass, combing hair, pouring water from one cup to another, polishing table with towel with elbow in extension, piling up cones, passing loops through curvy pipeline, throwing tennis ball.

Progression of intervention program is done by increasing sets and repetitions. Verbal, visual or proprioceptive feedback was also provided timely to the patient to make sure that the patient had performed task timely and precisely. Re-evaluation of outcome measures was done after 8 weeks.

Statistical Analysis

Comparative Statistical analysis was performed using graphpad prism software. Level of significance with p value <0.05 significant result and < 0.001 proves highly significant result.

The post intervention outcome measures within the same group were compared by using paired t-test' and the measures between control group and experimental group were tested for effectiveness by 'unpaired test'.

Results

Table 1: Baseline Data of Demographic Variables

Demographic Variables	Control Group	Experimental Group
Age	63.25 ± 8.44	64.83 ± 7.01
Side(R/L)	7/5	6/6
Gender(M/F)	8/4	8/4

Table 2: Control Group/ Cep (Intragroup Comparison)

Outcomes	Pre-Intervention	Post-Intervention	Mean Difference	t-value	p-Value	Result
FMA	27.25 ± 4.13	29.66 ± 4.14	2.41 ± 0.66	12.52	<0.001	Highly Significant
WFMA	35.58 ± 4.20	40.66 ± 4.67	5.08 ± 1.31	13.43	<0.001	Highly Significant

Table 3: Experimental Group/Tot (Intragroup Comparison)

Outcomes	Pre-Intervention	Post-Intervention	Mean Difference	t-value	p-Value	Result
FMA	27.08 ± 4.48	31.5 ± 4.29	4.41 ± 1.08	14.12	<0.001	Highly Significant
WFMA	38.25 ± 2.56	49.08 ± 3.17	10.83 ± 2.88	13	<0.001	Highly Significant

Table 4: Inter-Group Comparison

Outcomes	Control Group	Experimental Group	Mean Difference	t- value	p-Value	Result
FMA	29.83 ± 1.07	31.5±1.24	1.667±1.662	1.003	>0.05	Insignificant
WFMA	40.67±1.35	49.08±0.91	8.41±1.632	5.157	<0.05	Significant

Discussion

The present study investigated the effect of combined task oriented training and conventional exercise program versus the effect of conventional exercise program alone. Total 24 patients were included in the study, in that group A (CEP group) had 12 patients, and Group B (TOT group) had 12 patients. Initial baseline data was taken and compare with final data for both the control and experimental group. Baseline data of demographic variables did not show any statistical difference between patient population in two given groups.

The results of present study indicates improvement in both the group in terms of pre and post FMA and WMFT scoring, whereas, in inter group comparison only WMFT scores showed considerable difference.

For 11 degree of freedom at 5% level of significance, the 't' value of FMA score in control group was 12.52 and p- value was <0.001 which proved highly significant difference. The calculated t-value for WMFA measure in control group was 13.43 and p- value is <0.001 which reported highly significant difference .The 't' value of FMA score in experimental group for 11 degree of freedom and 5% level of significance was 13 and p value is <0.001 which indicates highly significant difference. The calculated 't' value of WMFA score for same degree of freedom and level of significance in experimental group was 13 and p value is <0.001 which indicates highly significant difference.

For 22 degree of freedom, the inter-group comparison result of both the groups reported no significant difference in FMA scoring as the calculated 't' value is 1.003 and p value is 0.326 which is greater than 0.05 while in WMFA scoring, the calculated t-value is 5.157 and p value is <0.05which showed significant difference in control group and experimental group.

Patients in the control group were treated with upper limb strengthening, stretching and coordination exercises for 8 weeks. The mean difference in pre and post FMA was 2.41±0.66 ($p<0.05$), and the mean difference in pre and post WMFT scores was 5.08 ± 1.311 ($p<0.05$) , that concludes significant difference. The results showed that there is statistically significant improvement in all outcome measures seen in group A on intra- group comparison.

The result could be due to improvement in neural activation, and muscle structure and function which in turn leads to gain in strength. Juo-o-kim,2017[6] noted enhancement in balance, gait ability and ADL in hemiplegic post stroke patients after 4 weeks of upper extremity co-ordination exercises. Ehsan ghasemi (2017)[7], reported improvement in functional outcomes such as modified as timed up and go

test and timed 10-meter walk test after functional stretching exercises.

Patients in this group were treated with conventional exercise program along with task-oriented training for 8 weeks. The mean difference in pre and post intervention FMA scores was 4.41 ± 1.08 ($p<0.05$) , and the mean difference in pre and post WMFA scores was 10.83 ± 2.88 ($p<0.05$). The given analysis concludes significant difference in both outcome measures seen in group B on intra comparison.

The critical part of functional recovery is adaptation to environmental changes. In reference to this, instead of single muscle activation pattern[8], patients are helped to learn various ways to solve task. Task oriented training works on the concepts of neural plasticity. This mechanism is believed to be useful for motor learning in intact brain and also for relearning in damaged brain.

According to AA Thant[9], the task-oriented training is more useful than conventional exercise program for improving functional performance of paretic upper extremity in sub acute stroke sufferers. Sneha s. Khandare[10] 2013, have suggested that mirror therapy can be added along with task-specific in treatment of sub-acute stroke patients to improve upper limb function.

Task specific training is considered effective in preventing post stroke secondary complications and also in improving the patient's general health through changes in physical activity levels[11]. Khander almhdawi (2011)[12], reported that task-oriented approach is an effective upper extremity post stroke intervention in improving functional abilities of upper limb. It is commonly known that, drill like training programs and intervention which focused mere repetition to a movement problem are less effective than practice of problem solving training programs.[1]

Limitations

The study was short term and done with smaller sample size with an unequal distribution of males and females in this study. Further studies can concentrate on large number of subjects with equal distribution of male and female and duration of study can be prolonged with more follow ups.

Conclusion

Among post- stroke upper extremity hemiparetic patients, use of task-oriented training with conventional exercises program did not significantly improved sensorimotor function of upper limb as fugl-meyer assessment scale results has shown insignificant difference in inter-group comparison, while functional ability has improved more with the use of combination therapy of task-oriented training and conventional exercises in comparison to conventional exercise program alone as WMFA results has shown significant difference.

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