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Comparative Study: Bobath Approach Versus Conventional Therapy In Improving Upper Limb And Trunk Functioning Among Post-Stroke Patients

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ABSTRACT: The purpose of this study was to evaluate the "Effectiveness of Bobath Approach versus Conventional therapy to improve upper limb and trunk functioning in post-stroke patients." For this randomized controlled study, a total of 36 patients (18 in each group) who suffered from ischemic stroke were recruited from The Body Lab Physiotherapy and Multispeciality Clinic and Vidya Jeewan Physiotherapy Centre, New Delhi between duration December 2023 and April 2024. A simple randomization method was used to assign participants to the Group A – Bobath approach with conventional therapy (n=18) and Group B - Conventional therapy (n=18). Patients in both groups received 20 supervised treatment sessions (5 times per week for four weeks). The Fugl-Meyer Assessment (FMA) scale and Motor Activity Log Scale were used to assess upper extremity functioning and quality of movement of the affected part at baseline and after 4 weeks. Statistical analysis of the data revealed that while comparing both the groups, significant improvement was seen in all outcome measures. However, Group A showed more significant improvement with a p-value of 0.05 when compared to Group B in improving upper limb and trunk functioning in post-stroke patients. In conclusion, the Bobath approach is more effective in improving upper extremity and trunk functioning when compared to conventional therapy.

KEYWORDS: Stroke, FMA, MAL, Bobath, Trunk

1. INTRODUCTION

Stroke is one of the most commonly occurring diseases which leads to impairment and inability of the affected arm resulting in functional restrictions and limitation of activities of daily life. [1,2] It markedly increases mortality and morbidity in both developed and developing worlds.

As stated by WHO, stroke is defined as the rapid development of clinical signs and symptoms of a focal neurological disturbance lasting more than 24 hours or leading to death with no apparent cause other than that of vascular origin.[3]

Among the worldwide occurrence of strokes, approximately 87% constitute ischemic infarctions, 10% hemorrhagic strokes and the rest 3% are subarachnoid hemorrhagic strokes. [4] The

prevalence of stroke in India ranged from 44.29 to 559/100,000 persons during the past decades. The incidence ranged from 105 to 152/100,000 persons per year.[5]

According to Momosaki et al., about 80% of stroke survivors exhibit motor impairments related to the upper limb.[5] It results in upper limb disability which has a significant impact on the functional and social independence of the patients. However, Conventional rehabilitation has shown upper extremity recovery to some extent, but it did not result in functional recovery. Recovery of upper extremity function requires stroke rehabilitation along with other recent therapies. The advanced interventions include modified constraint-induced movement therapy, trunk restraint therapy, and Robotic therapy.

75% of strokes occur in the region supplied by the middle cerebral artery. Due to this, the upper limb function will be affected in many patients. Recruitment and complex integration of muscle activity from shoulder to fingers are required for the functional recovery of the arm which includes grasping and holding objects [7].

Before the introduction of neurophysiological approaches to rehabilitation, patients with central nervous system damage were re-educated using both a compensatory and an orthopedic approach consisting of stretching, bracing, and strengthening the affected side and teaching the patient to rely more heavily on the unaffected side to become as independent as possible. Concomitant with advances in motor control and neurosciences of the last decades went the development of new innovative interventions for neurologically impaired patients. One of these approaches is the Bobath Concept, which was last published by Bertha and Karl Bobath in 1990. Bobath explained movement dysfunction in hemiplegia from a neurophysiological perspective stating that the patient must be active while the therapist assists the patient to move using key points of control and reflex-inhibiting patterns. Since 1984, the Bobaths conceded that reflexes were not primitive responses, but essential reactions to support movement; as a consequence, the missing components of the normal developmental sequence were no longer facilitated during Bobath therapy in either adults or children.3 It is thus unfortunate that the Bobath Concept is still referred to as Neuro-Developmental Treatment (NDT) in the American literature because it was originally based on facilitating the missing components of the normal developmental sequence in children with cerebral palsy. More than 50 years later, this treatment approach that is based on their revolutionary ideas has become the most popular approach for the treatment of neurologically impaired patients in the Western world.[8]

Bobath therapy considers the integration of postural control and stability and selective movement or mobility and the influence of sensory information on the interactions between them.

In Bobath therapy, therapists influence sensory information by therapeutic handling called ‘facilitation’ (Vaughan-Graham et al 2020). Facilitation provides afferent information that is believed to maintain, restore, or update the body schema to optimize postural and movement control (International Bobath Instructors Training Association 2019). The rationale is not consistent with current evidence. In stroke rehabilitation guidelines based on high-level evidence, active task practice (ie, the person practicing the task with therapist assistance applied only as required) is strongly recommended for improving stroke survivors’ activity outcomes.

2. METHODOLOGY

The study design is an assessor-blinded randomized controlled trial. The subject population belongs to persons with affected upper limb functional performance after ischemic stroke. The intervention is for 4 weeks. The sampling is Convenience Sampling. A total of seventy stroke patients were taken; out of that, a sample of 40 subjects who were willing was recruited to participate in the study after obtaining the consent form and the patients who met the inclusion criteria. These 36 subjects were randomized into three groups by Convenience Sampling. Group A – Bobath approach with conventional therapy (N=18). Group B - Conventional therapy. (N=18). For outcome measures, the Motor activity log scale is used to measure the amount of use and quality of movement of the affected arm in daily living activities, The Fugl Meyer assessment upper extremity is used to measure the motor function in the affected arm.

The inclusion criteria are sudden onset of an ischemic Cerebrovascular accident of < 3 months duration diagnosed by a neurologist, Ability to actively extend at least 10°at the metacarpophalangeal & interphalangeal joints, and 20° at the wrist, Middle Cerebral Artery stroke subjects. And History of not more than one stroke. The exclusion criteria are patient with any comorbidity or disability other than stroke that precludes upper-extremity training, any uncontrolled health condition for which exercise is contraindicated, and excessive spasticity, defined as a grade of 3 or higher on the modified Ashworth scale. 40 stroke subjects were taken according to Convenience sampling, subjects who met the inclusion criteria were randomly allocated into three groups with twenty subjects in each group. All patients diagnosed by a neurologist as having had a stroke were invited to participate in the study. The diagnoses were made based on the patient's history and signs and confirmed by computed tomography (CT) or magnetic resonance imaging (MRI).

Assessment

After the initial assessment, patients were divided randomly into two groups using a random numbers table. Blocks were numbered, and then a random number generator program was used to select numbers that established the sequence in which blocks were allocated to the study or the control group. There were 12 patients in thestudy group and 10 in the control group.

Interventions

First, the demographic and clinical data for both groups were recorded. Individual training programs were then created for the patients in the study group. For this purpose, the functional limitations of each patient were identified, and multiple hypotheses regarding the potential trunk-associated causes underlying each limitation were developed. By analyzing the various deficiencies, the most important factor responsible for each impairment was detected. Verification tests for each hypothesis were performed on the trunk muscles that were mainly responsible for the functional limitations, and a specific intervention plan for the particular impairment was identified and implemented. After this, the hypothesis was verified by observing any recent functional recovery, or, where this could not be confirmed, a new hypothesis was developed.

3. RESULTS:

Statistical analysis was done using the statistical software SPSS software Version 20.0 and MS

Excel - 2007. Descriptive statistical data was presented in the form of mean ± standard deviations, Percentage is graphically represented. To observe the impact of the treatment before and after the treatment in the groups, the analysis is carried out by using Paired T-Tests, and Oneway ANOVA.

For all statistical analyses, a P-value < 0.05 was considered statistically significant. To compare between groups, the Paired t-test for paired sample observations has been utilized. It is observed that the post values of Group A have a significant difference than Group B. The results of this study were analyzed in terms of improved upper limb functional performance on the Motor activity log scale and Fugl Meyer assessment.

On observing the means of post parameters of the Bobath approach, Conventional Therapy, and control groups, a Paired T-test was done and the P-value is 0.00 also in the one-way ANOVA analysis, the mean difference is significant at 0.05 level.

It shows that there is a significant difference between the groups in the motor activity log and the Fugl Meyer assessment. Overall results of this study were analyzed which shows more significant improvement in the Bobath approach group when compared to control groups in improving upper limb and trunk functional recovery in post-stroke patients.

TABLE -1: ANALYSIS OF THE EFFECTIVENESS OF THE TREATMENT AMONG THE 2 GROUPS.

OUTCOME MEASURES	GROUPS	N	MEAN± STANDARD DEVIATION	STANDARD ERROR	95% CONFIDENCE INTERVAL FOR MEAN		P-VALUE
					LOWER BOUND	UPPER BOUND	
MAL PRE: AOU	A	18	1.8761±0.08354	0.01969	1.8346	2.0177	0.05*
	B	18	1.7461±0.04474	0.01055	1.7239	1.7684	
	Total	54	1.8178±0.08767	0.01193	1.7938	1.8417	
MAL POST: AOU	A	18	2.1244±0.066	0.01556	2.0916	2.1573	0.05*
	B	18	1.8689±0.06388	0.01506	1.8371	2.0007	
	Total	54	2.0557±0.08941	0.01217	2.0313	2.0801	
MAL PRE: QOM	A	18	1.8117±0.07702	0.01815	1.7734	1.85	0.05*
	B	18	1.7644±0.05125	0.01208	1.739	1.7899	

	Total	54	1.7476±0.09105	0.01239	1.7227	1.7724	
MAL POST QOM	A	18	2.0417±0.06627	0.01562	2.0087	2.0746	0.05*
	B	18	1.7822±0.06656	0.01569	1.7491	1.8153	
	Total	54	1.8737±0.09215	0.01254	1.8486	1.8989	
FMA PRE TESTS	A	18	38.51±3.09	0.728	37.07	40.15	0.05*
	B	18	33.78±2.734	0.545	32.42	35.14	
	Total	54	35.75±3.434	0.467	34.81	36.79	
FMA POST TESTS	A	18	50.57±3.841	0.829	48.71	52.53	0.05*
	B	18	43.78±2.734	0.545	42.42	45.14	
	Total	54	46.7±4.276	0.582	45.54	47.77	

MAL=MOTOR ACTIVITY LOG, AOU=AMOUNT OF USE, QOM=QUALITY OF LIFE, FMA=FUGL MEYER ASSESSMENT *0.00= Highly significant

ONE-WAY ANOVA ANALYSIS

TABLE 2: ANALYSIS OF PRE AND POST-INTERVENTION OF UPPER LIMB FUNCTION IN THE BOBATH APPROACH.

GROUP A	OUTCOME MEASURES	N	MEAN± STANDARD DEVIATION	STANDARD ERROR MEAN	P-VALUE
PAIR 1	MAL PRE: AOU	18	1.8761±0.08354	0.01969	0.05*
	MAL POST: AOU	18	2.1244±0.066	0.01556	
PAIR 2	MAL PRE: QOM	18	1.8117±0.07702	0.01815	0.05*
	MAL POST: QOM	18	2.0417±0.06627	0.01562	

PAIR 3	**FMA PRETEST**	**18**	**38.51±3.09**	**0.728**	**0.05***
	FMA POSTTEST	**18**	**50.57±3.841**	**0.829**	

MAL=MOTOR ACTIVITY LOG, AOU=AMOUNT OF USE, QOM=QUALITY OF LIFE,FMA=FUGL MEYER ASSESSMENT

***0.00= Highly significant**

Improvement of upper limb function of Group A was recognized by an increase in MAL and FMA scores. For this MAL and FMA were noted on the first day and last day (after 4 weeks) of treatment for all subjects. However, the difference between the 2 scores was considered for analysis of the difference between the pre and post-test values.

PRETEST AND POSTTEST MEAN VALUES OF MAL: AOU AND QOM IN THE BOBATH APPROACH GROUP.

The average baseline MAL score in group A was AOU=1.876, QOM=1.811, which was increased to AOU=2.124, QOM=2.041 on the last day (after 4 weeks) of the treatment.

There was a highly significant difference between the MAL score in the subjects in MCIMT with the TR group ($p<0.00$).

The average baseline FMA score in group A was 38.51, which was increased to 50.57 on the last day (after 4 weeks) of the treatment.

There was a highly significant difference between the FMA score in the subjects in MCIMT with the TR group ($p<0.00$).

TABLE 3: ANALYSIS OF PRE AND POST-INTERVENTION OF UPPER LIMB FUNCTION IN CONVENTIONAL THERAPY.

GROUP C	OUTCOME MEASURES	N	MEAN± STANDARD DEVIATION	STANDARD ERROR MEAN	P-VALUE
PAIR 1	MAL PRE:AOU	18	1.7461±0.04474	0.01055	0.05*
	MAL POST: AOU	18	1.8689±0.06388	0.01506	
PAIR 2	MAL PRE: QOM	18	1.7644±0.05125	0.01208	0.05*
	MAL POST: QOM	18	1.7822±0.06656	0.01569	
PAIR 3	FMA PRETEST	18	33.78±2.734	0.545	0.05*
	FMA POSTTEST	18	43.78±2.734	0.545	

MAL=MOTOR ACTIVITY LOG, AOU=AMOUNT OF USE, QOM=QUALITY OF LIFE,FMA=FUGL MEYER ASSESSMENT

***0.00= Highly significant**

The improvement of upper limb function of Group B was recognized by an increase in MAL and FMA scores. For this MAL and FMA were noted on the first day and last day(after 4 weeks) of treatment for all subjects. However, the difference between the 2 scores was considered for analysis of the difference between the pre and post-test values.

The average baseline MAL score in Group B was AOU=1.746, QOM=1.764, which was increased

to AOU=1.868, QOM=1.782 on the last day(after 4 weeks) of the treatment.

There was a highly significant difference between the MAL scores of the subjects in the MCIMT group (p<0.00).

The average baseline FMA score in group B was 33.78, which was increased to 43.78 on the last day (after 4 weeks) of the treatment.

There was a highly significant difference between the FMA scores of the subjects in the Conventional group (p<0.00).

The study aims to evaluate Group A, with significant improvement observed in both groups. The WMFT has shown significant improvement at the pre-posttest score (p=0.001) and as well at post follow-up test score (0.001). Thus, there is a significant improvement seen in Bobath intervention in improving arm motor function as demonstrated by WMFT scores. The JTHFT has also shown improvement, although writing had improved slightly at pre-post test comparison (p=0.031). Cards turning had moderate improvement at posttest-follow-up comparison (p=0.040). Small common objects improved significantly at pre-post test comparison (p=0.006). The improvement of upper limb function of Group A was recognized by an increase in MAL and FMA scores. For this MAL and FMA were noted on the first day and last day (after 4 weeks) of treatment for all subjects. However, the difference between the 2 scores was considered for analysis of the difference between the pre and post-test values. The average baseline MAL score in group A was AOU=1.876, QOM=1.811, which was increased to AOU=2.124, QOM=2.041 on the last day(after 4 weeks) of the treatment.

There was a highly significant difference between the MAL score in the subjects in MCIMT with the TR group (p<0.00). The average baseline FMA score in group A was 38.51, which was increased to 50.57 on the last day(after 4 weeks) of the treatment. There was a highly significant difference between the FMA score in the subjects in MCIMT with the TR group (p<0.00). The improvement of upper limb function of Group B was recognized by an increase in MAL and FMA scores. For this MAL and FMA were noted on the first day and last day (after 4 weeks) of treatment for all subjects. However, the difference between the 2 scores was considered for analysis of the difference between the pre and post-test values.

The average baseline MAL score in Group B was AOU=1.746, QOM=1.764, which was increased to AOU=1.868, QOM=1.782 on the last day(after 4 weeks) of the treatment. There was a highly significant difference between the MAL scores of the subjects in the MCIMT group (p<0.00).

The average baseline FMA score in group B was 33.78, which was increased to 43.78 on the last day(after 4 weeks) of the treatment. There was a highly significant difference between the FMA scores of the subjects in the Conventional group (p<0.00).

Simulated feeding had a moderate improvement at the pre-port test comparison (p=0.019). Checkers had shown moderate improvement in pre-post test comparison (p=0.030) as well as post-follow-up test comparison (p=0.048). Large light objects also showed moderate improvement in pre-posttest comparison (p=0.017) and as well in post-follow-up test comparison (p=-.040). Large heavy objects significant improvement at pre-posttest comparison (p=0.001). In the evaluation of Group B also, significant improvement is observed in both groups. The WMFT has shown significant

improvement at the pre-posttest score (p=0.001) and as well at the post-follow-up test score (p-0.001). The JTHFT also shows significant improvement in its subcomponents. Writing shows significant improvement at pre-post test comparison and as well as at post-follow-up comparison (p=0.005). Bobath therapy is inferior to task-specific training and not superior to other interventions in improving lower limb activities after stroke, except the PNF technique. Our study adds to the perspective of results of these systematic reviews that there is no evidence related to the superiority of Bobath therapy except to the PNF technique and orthopedic approach as results came out to be similar in terms of improvement.

There is inconclusive evidence for the efficacy of Bobath over other treatment approaches in improving motor activity, gait, spasticity, and daily living activities after stroke. Only three studies demonstrated that the Bobath technique is useful in all outcome variables used in those studies with excellent significant value. [24,32,33] On comparing Bobath with an orthopedic approach on different motor stages, found good improvement in tone control, motor assessment, stroke-related impairment, and balance in Bobath-treated patients.[24] The other two studies had PNF as the comparison approach and showed improvement in both groups, still Bobath treated group had higher and significant gains in balance, posture, gait parameters, and trunk control.[32,33] Though there was no superiority of Bobath over multisensorial treatment and conventional exercise programs. One study found a small difference in favor of Bobath, but clinically insignificant.[27] The other two studies reported improvement in Bobath-treated patients but only in balance and gait velocity. [17,29]

Three studies [15,16,23] stated that Bobath is equally useful to Movement Science-Based Therapy, PNF technique, and Integrated Behavioral Physical Therapy in improving movement abilities and functional independence. The other ten studies reported that Bobath was not effective when compared to other therapeutic techniques.

4. CONCLUSION

The study showed that Group A who received 30 minutes of the Bobath approach shown beneficial improvement than Group B, who underwent Conventional rehabilitation over 4 weeks of treatment. So, this study concluded that the Bobath approach is more effective when compared to Conventional rehabilitation in improving upper limb functional recovery in post-stroke patients.

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