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RESEARCH ARTICLE

TO COMPARE THE EFFECT OF SCAPULAR STABILITY EXERCISE VERSUS SCAPULAR PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION ON FUNCTION OF PARETIC UPPER EXTREMITY OF STROKE PATIENTS

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ABSTRACT

Background: Major concern facing individual with upper extremity paresis after stroke is recovery of upper extremity movement and function. Hemi paresis leads to compromise normal biomechanics and stability of shoulder complex by loss of motor control and development of abnormal pattern. There are many therapeutic approach used to restore motion and maintain scapular stability. **Objective:** To compare the effect of scapular stability exercise versus scapular PNF on function of paretic upper extremity in stroke patients. **Method:** 30 patients who fulfilled the criteria were selected and divided into two groups of 15 each. Group A Scapular PNF and Group B Blackburn exercise. Intervention given for 4 weeks and pre and post scoring done by Fugl Meyer Assessment and Manual Function Test. **Result:** Wilcoxon Signed Rank Test and Mann Whitney U Test were used to analyze data for statistical significant among groups. Result shows a statistically significant difference in both groups and group B is more significant than group A. **Conclusion:** This study concluded that scapular stability exercises are more effective in improving paretic upper extremity function in stroke patients.

INTRODUCTION

Stroke is defined by the World Health Organization as a clinical syndrome consisting of rapidly developing clinical signs of focal (or global in case of coma) disturbance of cerebral function lasting more than 24 hours or leading to death with no apparent cause other than a vascular origin (Aho, 1980). Cerebral vascular anatomy is important to understand the symptoms, diagnosis and management of stroke. The middle cerebral artery (MCA) is the second of the two main branches of the internal carotid artery and supplies the entire lateral aspect of the cerebral hemisphere and sub cortical structures and it is the most common site of occlusion and Clinical manifestation of MCA stroke are contra lateral spastic hemi paresis, sensory loss of face, UE, and LE, with the face and UE more involved than LE (Susan, 2014). The greatest mobility of glenohumeral joint is at the expense of its stability. The normal biomechanics and stability of shoulder complex is compromise by loss of motor control and development of abnormal patterns due to beginning of hemiplegia (Tatiana, 2006).

Hemi paretic patients had altered scapular and shoulder movement patterns which hamper the performance of ROM of shoulder joint (Dustin, 2011). Abnormal biomechanics of shoulder joint will alter the stabilization of scapula due to that Glenohumeral joint and scapula cannot function independently (Paine, 2013). Neurological and functional recovery is very active, task oriented and intensive during sub-acute phase of stroke so during this phase rehabilitation is crucial (Blache, 2017). Scapular stabilizing exercise will help to improve shoulder ROM, firing rate, and synchrony at level of motor neuron by neural adaptation (Awad, 2015). PNF improve motor response and neuromuscular control by facilitation, inhibition, strengthening and relaxation of muscle group (Joshi, 2018). The Manual Function Test (MFT) is a performance-based assessment for upper limb in patient with hemi paresis. The MFT is designed to assess arm motions, grasp and pinch, and arm and hand activities. It reliable and valid tool to assess paretic upper extremities of patients with stroke (Song, 2013). The Fugl Meyer upper extremity scale is a highly recommended and widely used stroke specific measure to assess the upper limb function in motor improvement in patients with hemi paresis (Barbara, 2016).

HYPOTHESIS

Alternate Hypothesis: There is significant difference between scapular stability exercise VS scapular PNF on paretic upper extremity function in stroke patients.

Null Hypothesis: There is no significant difference between scapular stability exercise VS scapular PNF on paretic upper extremity function in stroke patients.

MATERIALS AND METHODS

- **Study Design:** Comparative Study
- **Study Setting:** Various physiotherapy clinics of Rajkot city
- **Sampling Technique:** Convenient Sampling
- **Study Population:** Hemi paretic patients having MCA stroke
- **Study Sample:** 30 patients
- **Study duration:** 6 months

Inclusion Criteria

- Sub-acute(3-6 months) hemi paretic patients having MCA stroke
- Patients with brunstrom level ≥ 4 Both male and female.
- Age group between 30-60 years.7

Exclusion Criteria

- Patients having perceptual dysfunction
- Neurological conditions other than stroke
- Musculo skeletal injuries as fractures, dislocation, joint instability or any soft tissue injuries on affected side or non-affected side.
- Uncooperative patients.
- Unconscious patient.

Procedure

The proposal is approved by ethical committee, School of Physiotherapy, RK University (ECR/259/INDT/GJ/2016) and CTRI (Clinical trial registry – India) CTRI/2018/10/015890.Total 30 patients were taken from various physiotherapy clinics of Rajkot by convenient sampling. All the patients were explained about procedure involved in the study before the enrolment in the study. Institutionally approved written consent was obtained from the patients before the study who fulfilled both the criteria. On the first visit a complete physical assessment was done and Patients who randomly divided into 2 groups. Group A Scapular PNF (n=15) Group B Blackburn exercises (n=15) To evaluate shoulder function before and after intervention, outcome measures used in the study were Fugl Meyer Assessment and Manual Function Test.

The patients in group A PNF received Scapular PNF plus conventional therapy and group B Scapular stability exercise received Blackburn exercise plus conventional treatment in which patient in prone position and do 6 holds. Both the groups underwent the protocol of 10 repetitions of each exercise once a day, 5days per week up to 4 weeks.

RESULTS

SPSS version 20.0 for windows was used for the statistical analysis. The Wilcoxon Signed Rank Test for intra group analysis and Mann-Whitney U Test for inter group analysis because the outcome measure shows ordinal data. A p-value less than 0.05 were considered statistically significant.

Table 1. Group a intra group analysis

Outcome Measure		Mean	Standard Deviation	Z value	P value
FMA	PRE	25.266	4.727	-3.411	0.001
	POST	42.333	4.966		
MFT	PRE	9.666	2.609	-3.441	0.001
	POST	15.533	3.356		

Interpretation: The mean average for FMA improved from 25.266(pre) to 42.333(post). Similarly for MFT the mean average improved from 9.666(pre) to 15.533(post). As per Wilcoxon signed rank test data reflects that P value is lesser than 0.05which shows significant difference in FMA and MFT in group A (PNF).

Table 2. Group b intra group analysis

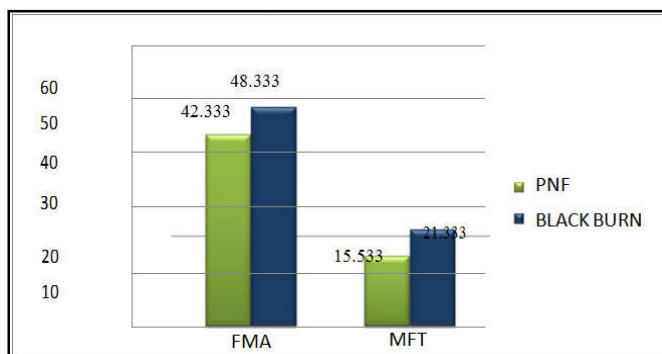
Outcome Measure		Mean	Standard Deviation	Z value	P value
FMA	PRE	30.133	6.631	-3.417	0.001
	POST	48.333	4.7		
MFT	PRE	14.333	3.696	-3.42	0.001
	POST	21.333	3.331		

Interpretation: The mean average for FMA improved from 30.133 (pre) to 48.333 (post). Similarly for MFT the mean average improved from 14.333 (pre) to 21.333 (post). As per Wilcoxon signed rank test data reflects that P value is lesser than 0.05which shows significant difference in FMA and MFT in group B (Blackburn).

Table 3. Inter group analysis

Outcome Measure	POST PNF	POST BB	Mean	Standard deviation	Z value	P value
FMA	42.333	48.333	45.333	5.646	-2.831	0.005
MFT	15.533	21.333	18.433	4.415	-3.712	0.001

Interpretation: The mean average for FMA is 42.333(post) and 48.333(post) respectively for group A and B. similarly for MFT the mean average is 15.533(post) and 21.333(post) respectively for group A and B. As per Mann Whitney U Test data reflects that P value is lesser than 0.05 which shows significant difference between both groups.



Graph 1. Inter group analysis

DISCUSSION

The important finding is a statistically significant improvement in the function of the paretic upper extremity after scapular stability exercise, so the null hypothesis is rejected and alternate hypothesis is accepted which suggest that there is significant difference between scapular stability exercise

versus scapular PNF on paretic upper extremity function in stroke patients. As per the study of D Bhidescapular muscle play crucial role in proper functioning, execution of movement and proper stability of upper extremity. Dynamic scapular muscle strengthening exercise had significant influence to the distal segment, hand by increasing grip strength (Devika, 2018). Andrew sacks studied that Blackburn series consists of 6"holds", helps to increase time under tension and will help those muscles tighten up more quickly and concluded that the best way to strengthen the scapular stabilizer is through Blackburn series. For proper positioning of scapula during overhead motion strengthening of scapular stabilizer was needed (Sacks, 2013). In accordance to Singh AK understand that in stroke with applying resistance to the proximal muscles, giving traction and approximation to the joint and by using stretch reflex at the end of each pattern, we can generate response in weak and paralyzed distal muscles. PNF Exercises improve the functional outcome and hence quality of life irrespective of side of stroke (Singh, 2017). The mechanism behind effectiveness of Blackburn exercises is explained by AAwadas strengthening exercises primarily reeducate the stability, control around scapula, enhance the recruitment, firing rate and synchrony at level of motor neuron by enhancing neural adaptation of the hemiparetic upper limb in patients with stroke (Awad, 2015).

Conclusion

This study concluded that scapular stability exercises are more effective in improving paretic upper extremity function in stroke patients.

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