Impact of Positioning on Functional Outcomes among Post Stroke Spastic Patients

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Abstract— Aim: The aim of this study is to check the impact of positioning on post stroke spastic patients. Stroke is the state of sudden loss of consciousness, sensation, and voluntary motion either caused by rupture or obstruction. Annually stroke causes over 5.5 million deaths among which two thirds occur in the developing world. According to Pakistan stroke society estimated annual incidence of stroke is 250/100,000, translating to 350,000 new cases every year. A study was conducted on adult Pushtoon residents in Karachi, Pakistan showed 4.8% prevalence of stroke which was alike in males and females. Positioning is an accurate placement of the patient's body part in order to promote physiological wellbeing. Positioning in stroke patients is used to assist the recovery of movement by maintaining the correct alignment of joint and muscles. Methodology: 25 subjects meeting the inclusion criteria were enrolled from Rabia Moon Trust (Institute of Neuro-Science and Rehabilitation) for the study.Pre and post treatment parameter was taken by Modified Ashworth Scale. Functional Independence Measure (FIM) was used to check the functional outcomes. All the patients received twelve positioning treatment sessions.Results: The results showed that the pre mean of Total Motor Scale (TMS) was 70.28 and S.D 5.86. The post mean of TMS was 95.72, S.D 5.18. Pre mean of Social Cognition Scale (SCS) was 31.04, S.D 1.12 and post mean of SCS was 32.52, S.D 1.05.(p<0.05). Conclusion: after twelve sessions of positioning treatment. The effects of Positioning treatment in total motor subscale n total social cognition worked effectively and were significant

Keywords—Stroke, Spasticity, Positioning, Functional Independence Measure, Modified Ashworth scale, Functional outcomes, Motor subscale, Social cognition subscale.

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1 INTRODUCTION

The term Stroke which is also known as cerebrovascular accident (CVA) or cerebrovascular insult (CVI) which is because of poor blood flow to the brain resulting in cell death. World Health Organization (WHO) defined stroke as a "neurological deficit of cerebrovascular cause persists beyond 24 hours or interrupted by death within 24 hours.[1] It is sudden disabling attack or loss of consciousness caused by an interruption in the flow of blood to the brain, especially through thrombosis.[2] It is the state of sudden loss of consciousness, sensation, and voluntary motion either caused by rupture or obstruction.[3]

The incidence of CVD in Scotland has been decreased over the last decade. The number of new cases of CVD in Scotland were 328.9 per 100,000 population in 2004/05 as compared to 257.4 per 100,000 in 2013/14 which is a decrease of 21.8%. Incidence rates for CVD are consistently greater in males than females.[1]

For most people with stroke, physical therapy (PT), occupational therapy (OT) and speech-language pathology (SLP) are the cornerstones of the rehabilitation process.[1]

Spasticity is the state of hypertonicity with exaggeration of the tendon reflexes mediated by loss a loss of inhibitory control of the upper neurons.[4] Spasticity occurs when the part of brain controlling voluntary movements is damaged, either by rupture or any obstruction of the blood vessels. Symptoms of spasticity are abnormal posture, exaggerated deep tendon reflex, repetitive jerky motions(clonus), and scissoring.[5]

Spasticity related to stroke is treated by early mobilizations, combined with lengthening of spastic muscles and sustained stretching through various positions.[6] Post stroke spasticity causes significant changes in patient's functional status. It effects the quality of life and its difficult to evaluate and treat spasticity. According to the author the use of biomechanical, electro physiologic, imaging techniques as well as clinical measures plays an important role in treating spasticity. Moreover, counseling of the patient and their family members also aids in recovery and improved functional outcomes.[7]

Modified Ashworth scale is the tool for grading spasticity. It includes 0 to 5 grades according to muscle tone.[8]

Positioning is an accurate placement of the patient's body part in order to promote physiological well-being.[9] Positioning in stroke patients is used to assist the recovery of movement by maintaining the correct alignment of joint and muscles. It helps to promote physical recovery and prevent from further complications. A survey was conducted by H.J Chattervon, V.M Pomeroy and J.Gratton to identify the current physiotherapy practice for positioning patients in first week of stroke concluded that positioning is an important part of physiotherapy practice and requires further evaluation.[10]

Functional independence measure (FIM) is the measurement tool for functional outcomes. This measurement tool is used for stroke patients. It comprises of eighteen items grouped into two subscales motor and cognition.[11]

A study was done by Louise Ada and Elizabeth Goddard to determine the effect of thirty minutes positioning of the ef-

fected shoulder in flexion and external rotation to prevent contracture after stroke showed significant improvements and reduction in development of contracture.[12] E.K Carr and F.D Kenney concluded the influence of posture on recovery from stroke. A consensus was developed on recommended positions for stroke patients i.e protraction of affected shoulder, spine straight, fingers extended and avoiding external rotation of hip.[13]

The repetitive stretching of ankle planter and dorsi flexors helps in reducing spasticity and contracture in stroke patients. Researches suggests that stretching is more effective and safe treatment approach rather than manual range of motion.[14] Researches suggests that botulinium toxin A combined with dynamic splinting helps to reduce tone and maintaining ROM. [15] Roper investigated the orthopedic management of stroke patients including physiotherapy and bracing. A number of patients respond well to physiotherapy and bracing. However, in some patients the results were not achieved. For such patients transcutaneous electrical nerve stimulation (TENS) is an alternative option.[16]

A literature review was done by Discren K et al which concluded that early mobilization after stroke showed a good long term outcome. [17] A case study was presented for ther treatment of post stroke spasticity. It was concluded that during stretching repetitive magnetic stimulation of the effected muscles is a new and effective treatment option inorder to reduce muscle tone.[18] Sheweta Malhotra gave six weeks of treatment to patients having sub-acute stroke. They gave forty five minutes physiotherapy session to control group and thirty minutes TENS on wrist and fingers plus forty five minutes of physiotherapy. She concluded that it decreases pain and increased the functional outcomes.[19] Post stroke spasticity causes significant changes in patient's functional status. It effects the quality of life and it's difficult to evaluate and treat spasticity. According to the author the use of bio mechanical, electrophysiologic, imaging techniques as well as clinical measures plays an important role in treating spasticity. Moreover, counseling of patient and family members also helps on recovery and improve outcomes.[20]

Brain can remodel after stroke by the process of synaptogenesis. Exercise and task oriented exercises plays a major role in promoting synaptogenesis. Constraint induces therapy help in ambulation and motor recovery. According to author the motor recovery strategies are good at movement level but less effective in functional outcomes. It is unclear that the inconsistent evidence for functional outcomes is due to less effective treatment or insensitive outcome measure.[20]

A survey was conducted by H.J Chattervon, V.M Pomeroy and J.Gratton to identify the current physiotherapy practice for positioning patients in first week of stroke concluded that positioning is an important part of physiotherapy practice and requires further evaluation.[21]

METHODOLOGY

It was an experimental study and the sample size was calculated by counting the number of total stroke patients coming at Rabia Moon Institute of Neurosciences, Karachi in last six months and the total figure was divided by 6. The sampling method was convenient non probability sampling technique and the sample was 25 post stroke spastic patients.

All participants who fulfilled Inclusion Criteria were selected from Rabia Moon Institute of Neurosciences , Karachi. Informed consent was taken from parents of each participant

Each group was assessed by FIM and modified Ashworth scale on first and the last session of the total treatment. Four types of positions were applied to the each patient. First position is lying in bed with one pillow placed under the head and the affected arm will be 3supported by a pillow.. Second position is lying on unaffected side for which four pillows will be needed. Each pillow will be applied under the head and trunk, affected arm with shoulder and pelvic girdle forward and affected leg will be relaxed forward. Third position is lying on affected side with three pillows, one pillow will be placed under the head with the affected shoulder blade forward, second on back with affected leg flexed forward and third pillow will be placed under the unaffected side leg. Fourth is the sitting position in which patient will be seated on a back supported chair, the affected arm will be supported on an adjustable base with pillows. Each position will be given for 15 minutes thrice a week. Total number of sessions will be twelve.[21]

Data was analyzed on SPSS Quantitative data paired t test was used to check the improved functional outcomes.

RESULTS

Data was stored and analyzed using SPSS version 16.0, count and percentages are given for Age group and gender into two treatment groups. Total Motor Subscale (TMS) and Social Cognition Subscale (SCS) are used to see the pre and post effect using paired sample t-test. P-value less than 0.05 were considered significant, bar charts also used to display the mean values of parameters and percentages.

Table 1 gives the mean and standard deviation of motor subscale parameters in positioning treatment at pre and post level, it was found that mean score of eating, grooming, bathing, dressing, toileting, bladder management and other parameters significantly got increased at post level, it was observed that mean score of motor got significantly down at post stage as compare to pre stage and score of stairs was also decreased but it was insignificant.

Table 2 gives the comparison of means at pre and post level for the outcomes of Social Cognition Subscale in Positioning treatment group, it was found that, all scores of social cognition subscales significantly increased at post stage with p-value less than 0.05.

TABLE 1
Mean Differences of Motor Subscale in Positioning Treatment

Characteristics	Pre		Post		p-value
	Mean	SD	Mean	SD	
Eating	3.48	2.07	4.64	1.83	<0.01*
Grooming	3.28	1.91	4.4	1.91	<0.01*
Bathing	3.32	1.91	4.4	1.91	<0.01*
Dressing (upper body)	3.28	1.95	4.36	1.95	<0.01*
Dressing (lower body)	3.28	1.89	4.4	1.89	<0.01*
Toileting	3.28	2.08	4.52	2.08	<0.01*
Bladder management	3.84	2.24	5.12	2.24	<0.01*
Bowel management	3.84	2.24	5.12	2.24	<0.01*
Transfers bed/chair/wheelchair	3.64	2.1	4.68	2.1	<0.01*
Transfers-toilet	3.52	2.19	5.04	2.19	0.01*
Transfers-bath/shower	3.48	2.19	5.04	2.19	<0.01*
Walk/wheelchair	3.08	2.06	5.04	2.06	0.03*
Motor	63.08	25.42	44.56	25.42	<0.01*
Stairs	4.52	1.88	2.88	1.88	0.53

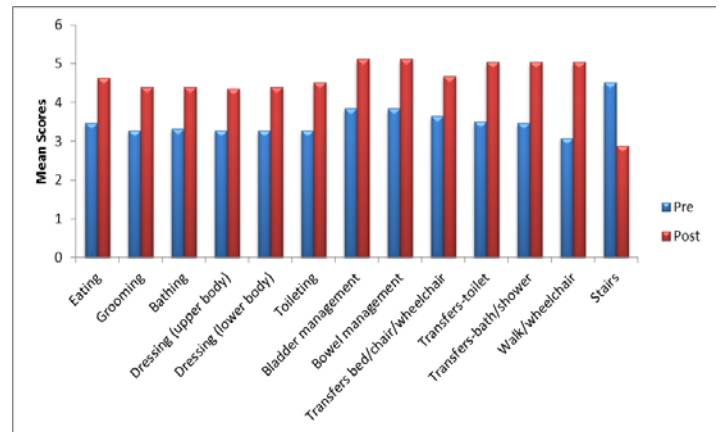*p<0.05 was considered significant using paired sample t-test

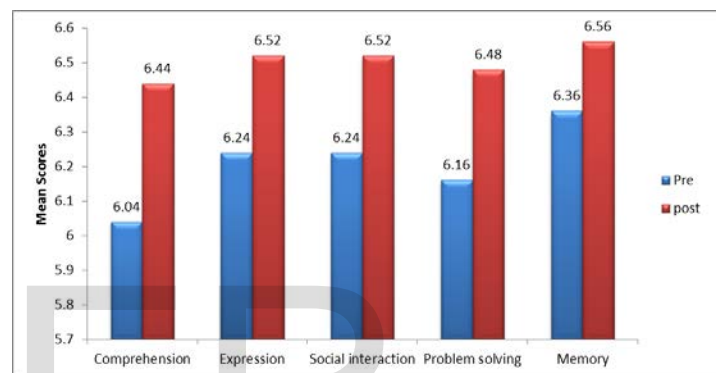Fig. 1. Total Motor Subscale in positioning Treatment

Fig. 1. Social Cognition Subscale in positioning Treatment

TABLE 2
Mean Differences of Social Cognition Subscale in Positioning Treatment Group

Characteristics	Pre		Post		p-value
	Mean	SD	Mean	SD	
Comprehension	6.04	1.04	6.44	1.04	<0.01*
Expression	6.24	1.02	6.52	1.09	<0.01*
Social interaction	6.24	1.09	6.52	1.04	<0.01*
Problem solving	6.16	1.03	6.48	1.02	<0.01*
Memory	6.36	1.05	6.56	1.03	<0.01*

*p<0.05 was considered significant using paired sample t-test

DISCUSSION

Stroke is a disease treated by a wide range of Physical therapy methods. Rehabilitation has a major role in the treatment of stroke. It is diagnosed by physical examination and imaging techniques. The results of my study indicates that the effects of Positioning treatment group in both total motor subscale and total social cognition were significant and worked effectively Chatterton HJ conducted a survey to identify the current physiotherapy practice for positioning after stroke. A postal questionnaire was sent to 674 physiotherapist of England. Specific positions were recommended during the first week following stroke by 98 % of respondents. The most common goals of positioning were normalization of muscle tone (93%), preventing any damage to affected limbs (92%), supporting and stabilizing body segments (91%). Other positions like sitting in an armchair, side lying on affected side and side lying on the affected side were recommended by 98%, 96% and 92% of respondents respectively.[22]

Selles RW conducted a research to check the effect of stretching of Dorsi and Planter flexors of ankle by feedback, controlled programmed stretching device. It was a four weeks treatment i.e three times a week. The outcome measures were joint passive and active ROM and muscle strength etc. The results showed significant improvements.[23]

4 CONCLUSION

The study indicated that positioning technique showed significant results in improving functional outcomes but requires further researches on ground with other techniques

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