

Does lumbar mobilization help stroke patients to improve functional outcomes?

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Abstract

Stroke survivors often face functional deficits and gait impairments. The current study aimed to observe effects of lumbar mobilization on gait of stroke patients. Quasi-interventional study was conducted on 30 stroke survivors. Sample included either gender with onset of stroke (>03-months), patients with other pathologies were excluded. Gait was assessed using gait dynamic index, timed up and go test; 5-times sit to stand and 10-meter walk test. Three sessions of lumbar mobilization were given to all patients and the data were analyzed on Spss-20. Participants had a mean age of 50 ± 10.66 years. Among stroke survivors 20(66.7%) had haemorrhagic stroke while 10(33.3%) stroke survivors had ischaemic stroke. After 03 days of intervention significant improvement was recorded in timed up and go test score ($p < 0.001$) 5-times sit to stand ($p < 0.001$) and 10-meter walk test ($p < 0.001$). Dynamic balance and walking also improved as reported by gait dynamic index ($p < 0.001$). The Current study suggested lumbar-mobilization to be effective in improving gait in stroke survivors.

Keywords: Gait, Lumbar mobilization, Stroke.

Introduction

Trunk is the vital part of body and its control is essential for optimal performance. Keeping body upright, adjusting weight shifts and selective movement of trunk muscle with center of mass controlled in with base of support during postural changes either static or dynamic is defined as trunk control.¹⁻³ Likhiet al in their recent study found that functional independence is highly correlated with level of trunk impairment in stroke survivors.⁴

Stroke leaves an individual with numerous limitations including sensory-motor impairment of the trunk thus affecting functional performance.² Stroke alters

individual's trunk muscle strength and position sense² having significant influence on balance in patients. In addition specific movements at lower and upper trunk are compromised in chronic stroke³ Karthikbabu et al in their review reported that trunk exercises improve functional and balance performances in hemiplegic stroke survivors.⁵

Evidence regarding stability of trunk influencing specific functional activities is still insufficient and requires further investigations.⁶ Likewise no evidence was found whether spinal mobilization is effective for improving trunk problems in stroke patients although it's quite evident that spinal mobilization is effective in managing most mobile lumbar area of the trunk.⁷

Stroke survivors face functional deficits and gait problems. The Current study aimed to observe effects of lumbar-mobilization on gait of stroke patients. The purpose of this study is to observe the effects of lumbar mobilization on gait in stroke patients.

Methods and Results

A Quasi- Interventional study was conducted on 30 stroke survivors from March 2016 to December 2016 at Riphah Rehabilitation and Research Centre, Pakistan Railway General Hospital, Rawalpindi. Sample size was calculated using epi-tool. Assumed population standard deviation was 2.75 with 0.95 confidence level and desired precision 1. The sample included male and female stroke patients with onset of stroke more than 03 months. Patients with other pathologies that effect gait like osteoarthritis, Parkinsons, Alzheimers, Rheumatoid arthritis or balance deficits prior to stroke attack or any stroke survivor having history of trauma were excluded from sample. Patients falling in the criteria were informed and written consent was taken. Blind assessment was made on the patients at baseline and after each session of treatment. Standardized assessment tools were used to collect data; these included Gait Dynamic Index, Timed Up and Go Test, 5 Times Sit to Stand Test and 10 Meter Walk Test. Data were subjected to statistical analysis using SPSS 20.

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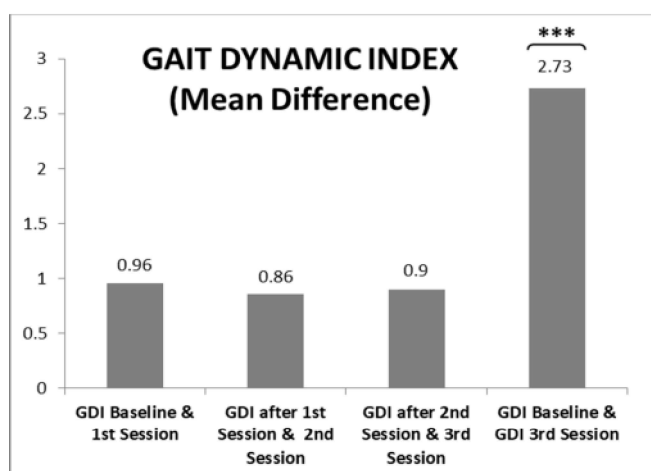


Figure: Mean Difference for Gait Dynamic Index (*** p value less than 0.001).

Table: Friedman Test FOR TUG, 10 Meter Walk Test and 5 Times Sit To Stand.

Variables	Mean±Std. Deviation	p-value
5 STSTS Baseline	21.19±8.98	< 0.001
5 STSTS after 1st Session	1.95±8.32	
5 STSTS after 2nd Session	18.20±7.35	
5 STSTS after 3rd Session	16.95±7.29	
10 MWT Baseline	13.88±8.39	<0.001
10 MWT after 1st Session	13.25±8.25	
10 MWT after 2nd Session	12.48±7.68	
10 MWT after 3rd Session	11.57±7.32	
TUG Baseline	23.60±13.01	<0.001
TUG after 1st Session	22.55±13.45	
TUG after 2nd Session	20.68±12.29	
TUG after 3rd Session	19.44±11.48	

Test applied for analysis of tools were selected using test of normality (ShapiroWilk test- $p > 0.05$). Repeated measure ANOVA was applied for Gait dynamic index and showed significant p value $p < 0.001$. Friedman test was applied for remaining tools.

Treatment included 3 sessions of lumbar mobilization in addition to normal task oriented training given for 03 days a week. Each session of lumbar mobilization was 2Hz Central Posteroanterior Maitland mobilization at L1-L5 (120 oscillations per minute) for 3 minutes.^{8,9} Data was obtained at baseline and then after three sessions.

Sample had 66.7% male participants & 33.3 % female stroke patients. Analysis showed that average age of participants was 50.00 ± 10.66 year. Out of total sample 12 patients (40%) had right hemiplegia and 18(60%) patients had left hemiplegia. 10 (33.3%) patients had stroke due to infarction and 20(66.7%) had haemorrhagic stroke. Those who were medically diagnosed with MCA

lesion were 18 (60%), with PCA were 8 (26.7%) and with ACA were only 4 (13.3%).

Results for gait dynamic index are shown in figure. Post measurements of outcome tools including TUG, 10 Meter Walk Test and 5 Times Sit to Stand was reported using Friedman Test and shown in Table.

Discussion

This study evaluated acute effects of the application of mobilization technique and has an advantage over other modes of treatment as the result is immediate. It was observed that there was a significant improvement in mobility and balance in stroke patients. The GDI scores showed improvement after 03 sessions of lumbar mobilization. The findings of present study confirm the results of a past study conducted by Christopher M. Powers¹⁰ and others to evaluate the lumbar spine during posterior to anterior mobilization. Their findings showed that posterior to anterior spinal mobilization caused extension at vertebrae and they further conducted this study again using MRI. The results of both of their studies showed that posterior to anterior spinal mobilization consistently caused extension at the tested segment.¹⁰ Lumbar extension is a major parameter of gait. The restricted ranges at lumbar level caused poor ambulation and balance. The study by Steel J. and others suggested that lumbar extensor deconditioning or disability may result in gait variability.¹¹

Results of 10MWT showed significance impact of treatment after 03 consecutive sessions. Pope and his colleagues conducted an RCT on different therapeutic treatments on back pain. They gave 3 weeks treatment protocol to every patient. One group received spinal manipulation, second received transcutaneous Muscle Stimulation and the third received massage and corset. After 3 weeks of treatment it was noted that spinal manipulation showed greatest improvement in flexion while others showed improvement in extension. This proved that spinal manipulation in movements is quite effective.¹²

Measurement of 5times sit to stand showed skewed data. Yet knowing this fact the result of this study showed improvement after 03 sessions of lumbar mobilization. Previously a study conducted by Joel G. Picker to examine the neurophysiologic effects of spinal manipulation showed that there is an impact of spinal manipulation on primary afferent nerves from paraspinal tissues , the

motor control system and pain processing. The results of this study proved that spinal manipulation has an impact on pain and by reducing pain the restricted movement can be improved in stroke survivors.¹³

Joint mobilization was used initially for the treatment of spastic children in 1980's. This method aimed to better the alignment and balance of the patients. The current study showed a significant improvement in mobility level through TUG after 03 sessions of lumbar mobilization. Tsirakis V and his colleagues¹⁴ conducted a study to examine the effects of modified spinal mobilization with leg movement technique on sympathetic outflow to the lower limbs. They applied unilateral postero-anterior mobilization technique, at 2Hz on the left L4/5 lumbar zygapophyseal joint. The results of their study showed significant side specific peripheral at SNS changes in the lower limbs.¹⁴

Results of this study suggest that mobilization is helpful in improving gait and also improves mobility as seen by timed up and go test and 10 meter walk test.

Conclusion and Recommendations

In accordance with the above results the study suggests that lumbar mobilization is effective in improving gait in stroke patients. Lumbar mobilization should be added in routine rehab to improve the mobility level. Further studies should be conducted with larger samples and comparison group to get detailed outcomes of Spinal mobilization.

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