Original Article

Effectiveness of spinal stabilization exercises with and without stretching of Latissimus dorsi Muscle in chronic mechanical low back pain

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Objective: To compare the effects of spinal stabilization exercises with and without stretching of latissimus dorsi muscle in chronic mechanical low back pain.

Methodology: This Randomized controlled trial of chronic mechanical low back patients at Shifa international hospital Islamabad was conducted during September 2018 to February 2019. Using convenient sampling technique the data were collected from 40 subjects following the inclusion criteria of 20 to 60 years having chronic low back pain from 7-12 weeks . Subjects were randomized in two groups. Control Group received spinal stabilization while the experimental group received the spinal stabilization exercises with stretching of latissimus dorsi stretch. The outcome tools were NPRS and Oswerty Disability Index.

Results: Within group comparison of NPRS after week 4 of treatment Median + P-value of Control group was 1(1.75) + 0.00 while in experimental group 1(1) + 0.00. Median + P-value, for ODI in Control group was 1(1) + 0.00 while in experimental group was 0(1) + 0.00 at 4th week. For between group comparison, baseline Median (IQR) + U-stats of control group at initial week was 6(0) + 180.5 and of experimental group was 6(2) + 180.5 whereas P-value was 0.54 respectively. After 4 weeks of intervention it was 1(1) + 145 and 0(1) + 145 respectively, p-value was 0.112.

Conclusion: Spinal stabilization exercises are effective for management of chronic Low back pain. There was significant improvement in functional index and reduction in pain with use of the spinal stabilization combination with Latissimus dorsi stretch. (Rawal Med J 202;45:857-862).

Keywords: Spinal stabilization, latissimus dorsi, low back pain.

INTRODUCTION

Chronic mechanical low back pain (LBP) is characterized by pain in lower back and activity limitation lasting for at least 7-12 weeks. Any kind of back pain which causing unusual strain and stress on the muscles of back is called as mechanical pain1 .[1] When LBP occurs for seven to twelve weeks or more it becomes chronic and this can be disabling.[2] CLBP has poor prognosis.[4,5] The general prevalence of LBP in females students is 43.3 % and housewives is 20%.[6]

CLBP treatment include non-invasive, without drugs pain treatment, non-invasive with medications of pain management and invasive pain management with surgery/injection.[7] LBP has been called like nemesis of medicine and albatross of industry.[8] It can cause non-structural scoliosis.[9] The lumbo pelvic exercise specific to stabilization has good impact on pain reduction and prevent chronicity as well.[10] This study was aimed to assess effectiveness of spinal stabilization exercises with Latissimus dorsi stretch and to find out which mode of treatment is better in improving the activities of daily livings in subjects with chronic mechanical low back pain.

METHODOLOGY

This Randomized control trial was done after approval from advanced study and research committee Shifa International Hospital, Islamabad. Convenient sampling technique was used. The subjects were allocated to group A (control group) and group B (experimental group). The study included male and female from 20 to 60 years of age, CLBP in subjects with pain at least 3 on (NPRS) lasting from last 7-12 weeks. Those subjects with injury or fracture, disc pathology involvement,

radiating pain and spinal cord injury were excluded. In control group spinal stabilization exercises (bridging, plank, tummy tuck in) were used. In experimental group, spinal stabilization exercise was combined with stretching of latissimus dorsi muscle. The intervention time period for each individual was four weeks and data were collected at baseline, after 1st week, 2nd week, 3rd week and 4th week. The frequency of spinal stabilization exercises and stretching of latissimus dorsi was applied three times in a week up-to four weeks. The duration of each session was 30-40 minutes. Duration of latissimus dorsi muscle stretch was 20-30 second with at least 10-20 repetitions in each session. Spinal stabilization exercises were performed 5-15 times in each session depending on the endurance of patient.

Statistical Analysis: Statistical analysis was performed using SPSS version 21. For cross sectional comparison, Mann Whitney U-test was applied, while for within the group longitudinal comparison Friedman and Wilcoxon test was used.

RESULTS

For ODI (Pain intensity) variable Median (IQR) + P-value of control group at initial week was 3(1) + 0.005 and of experimental group were 3(1) + 0.005. After week 4 of treatment Median + P-value of Control group was 1(1.75) + 0.00 while in experimental group Median (IQR) + P-value was 1(1) + 0.00. Within the group comparison, ODI all the sections of it shows that comparison of time point measurements taken from baseline to 4th week taken measurements , P-value was below 0.05 ,showing significant difference in the results of both groups in week wise comparison. (Table 1).

Table 1. Within group changes NPRS and ODI.

		SSE+LDS (n=20)			SSE (n=20)		
		Median(IQR)	*Z-score*	*p-value*	**Median(IQR)**	*Z-score*	*p-value*
Numeric pain rating scale(NPRS)	0 week	6(2)	-4.099	0.000[a]	6(0)	-4.123	0.000[a]
	1st week	5(1)	-4.072	0.000[b]	5(1)	-4.123	0.000[b]
	2nd week	3(1.75)	-4.099	0.000[c]	4(1)	-3.976	0.000[c]
	3rd week	2(1)	-4.099	0.000[d]	2.5(1)	-4.053	0.000[d]
	4th week	.0(1)	-4.003	0.000[e]	1(1)	-3.978	0.000[e]
ODI Pain intensity	0 week	3(1)	-2.828	0.005 [a]	3(1)	-2.828	0.005 [a]
	1st week	3(0)	-3.873	0.000 [b]	3(0)	-2.828	0.005 [b]
	2nd week	2(0)	-3.873	0.000 [c]	3(1)	-3.819	0.000 [c]
	3rd week	1(1)	-4.146	0.000[d]	2(1)	-3.771	0.000 [d]
	4th week	1(1)	-4.130	0.000[e]	1(1.75)	-4.038	0.000[e]
Personal care	0 week	3(0)	-1.732	0.083[a]	3(0)	-1.732	0.083 [a]
	1st week	3(0)	-4.123	0.000[b]	3(0)	-3.606	0.000 [b]
	2nd week	2(0)	-2.828	0.005[c]	2(1)	-2.828	0.005 [c]
	3rd week	2(1)	-3.162	0.002[d]	2(0)	-3.000	0.003 [d]
	4th week	1(0)	-4.177	0.000[e]	1(1)	-4.028	0.000[e]
Lifting	0 week	3(0)	-2.646	0.008[a]	3(0)	-1.000	0.317 [a]
	1st week	3(0.75)	-3.162	0.002[b]	3(0)	-3.742	0.000 [b]
	2nd week	2(0.75)	-3.606	0.000[c]	2(0.75)	-2.646	0.008 [c]
	3rd week	2(1)	-3.000	0.003[d]	2(0)	-3.317	0.001 [d]
	4th week	1(0)	-4.233	0.000[e]	1(1)	-4.099	0.000[e]
Walking	0 week	3(0)	-2.449	0.014[a]	3(0)	-1.414	0.157 [a]
	1st week	3(0)	--3.606	0.000[b]	3(0)	-3.464	0.001 [b]
	2nd week	2(0)	-2.646	0.008[c]	2(1)	-2.828	0.005 [c]
	3rd week	2(0)	-3.464	0.001[d]	2(0)	-3.464	0.001 [d]
	4th week	1(0)	-4.300	0.000[e]	1(1)	-4.099	0.000[e]

			SSE+LDS (n=20)			SSE (n=20)		
				Z-score	p-value	Median(IQR)	Z-score	p-value
Sitting	0 week		3(0)	-3.000	0.003 [a]	3(0)	-1.000	0.317 [a]
	1st week		3(1)	-3.000	0.003 [b]	3(0)	-4.000	0.000 [b]
	2nd week		2(0)	-3.317	0.001 [c]	2(0)	-2.236	0.025 [c]
	3rd week		2(1)	-3.000	0.003 [d]	2(0)	-3.606	0.000 [d]
	4th week		1(0)	-4.089	0.000[e]	1(0.75)	-4.134	0.000[e]
Standing	0 week		3(0)	-3.162	0.002 [a]	3(0)	-1.000	0.317 [a]
	1st week		3(1)	-3.317	0.001 [b]	3(0)	-3.873	0.000 [b]
	2nd week		2(0)	-3.464	0.001 [c]	2(0.75)	-2.887	0.004 [c]
	3rd week		1(1)	-2.236	0.025 [d]	2(0.75)	-3.000	0.003 [d]
	4th week		1(0)	-4.177	0.000[e]	1(1)	-4.134	0.000[e]
Sleeping	0 week		2(0)	-2.646	0.008 [a]	2(1)	-2.449	0.014 [a]
	1st week		2(0)	-3.606	0.000 [b]	2(0)	-2.828	0.005 [b]
	2nd week		1(0)	-1.414	0.157 [c]	2(1)	-2.646	0.008 [c]
	3rd week		1(0)	-1.414	0.157 [d]	1(1)	-2.000	0.046 [d]
	4th week		1(0)	-4.179	0.000[e]	1(0)	-4.134	0.000[e]
Sex life	0 week		0.00(1)	0.000	1.000[a]	0.0(0.75)	-0.000	1.000 [a]
	1st week		0.00(1)	-2.000	0.046[b]	0.0(0.75)	-1.000	0.317 [b]
	2nd week		0.0(0.0)	-1.732	0.083[c]	0.0(0.0)	-2.000	0.046 [c]
	3rd week		0.0(0.0)	0.000	1.000[d]	0.0(0.0)	-0.000	1.000 [d]
	4th week		0.0(0.0)	-2.646	0.008[e]	0.0(0.0)	-2.236	0.025[e]
Social life	0 week		2(0)	-2.449	0.014[a]	2(1)	-2.236	0.025 [a]
	1st week		2(0)	-2.646	0.008[b]	2(0)	-2.449	0.014 [b]
	2nd week		1(1)	-2.646	0.008 [c]	2(1)	-2.828	0.005 [c]
	3rd week		1(0)	-1.000	0.317 [d]	1(1)	-1.414	0.157 [d]
	4th week		1(0)	-4.185	0.000[e]	1(0.75)	-4.379	0.000[e]
Travelling	0 week		2(0)	-2.828	0.005 [a]	2(0)	-1.633	0.102 [a]
	1st week		2(1)	-3.162	0.002 [b]	2(0)	-3.000	0.003 [b]
	2nd week		1(0.75)	-1.732	0.083 [c]	1.5(1)	-2.000	0.046 [c]
	3rd week		1(0)	-2.000	0.046 [d]	1(1)	-1.732	0.083 [d]
	4th week		1(0)	-4.134	0.000[e]	1(0)	-4.264	0.000[e]

Table 2. Between group comparison for NPRS.

		SSE+LDS(n=20)	SSE(n=20)	U-stats	p-value
		Median(IQR)	Median(IQR)		
Numeric pain rating scale	0 week	6(2)	6(0)	180.50	0.54
	1st week	5(1)	5(1)	132.50	0.051
	2nd week	3(1.75)	4(1)	82	0.001
	3rd week	2(1)	2.5(1)	135	0.063
	4th week	.0(1)	1(1)	145	0.112
ODI Pain intensity	0 week	3(1)	3(1)	190	0.747
	1st week	3(0)	3(0)	190	0.554
	2nd week	2(0)	3(1)	120	0.011
	3rd week	1(1)	2(1)	155	0.169
	4th week	.1(1)	1(1.75)	145	0.103

		SSE+LDS(n=20) Median(IQR)	SSE(n=20) Median(IQR)	U-stats	p-value
Personal Care	1st week	3(0)	3(0)	190	0.553
	2nd week	2(0)	2(1)	153	0.080
	3rd week	2(1)	2(0)	150	0.062
	4th week	1(0)	1(1)	140	0.041
Lifting	0 week	3(0)	3(0)	180	0.152
	1st week	3(0.75)	3(0)	160	0.080
	2nd week	2(0.75)	2(0.75)	200	1.00
	3rd week	2(1)	2(0)	140	0.031
	4th week	1(0)	1(1)	160	0.149
Walking	0 week	3(0)	3(0)	190	0.553
	1st week	3(0)	3(0)	170	0.157
	2nd week	2(0)	2(1)	160	0.149
	3rd week	2(0)	2(0)	172	0.251
	4th week	1(0)	1(1)	170	0.294
Sitting	0 week	3(0)	3(0)	190	0.31
	1st week	3(1)	3(0)	130	0.009
	2nd week	2(0)	2(0)	200	1.00
	3rd week	2(1)	2(0)	140	0.031
	4th week	1(0)	1(0.75)	182.5	0.530
Standing	0 week	3(0)	3(0)	190	0.553
	1st week	3(1)	3(0)	120	0.002
	2nd week	2(0)	2(0.75)	162	0.144
	3rd week	1(1)	2(0.75)	140	0.056
	4th week	1(0)	1(1)	180	0.471
Sleeping	0 week	2(0)	2(1)	160	0.149
	1st week	2(0)	2(0)	154	0.060
	2nd week	1(0)	2(1)	100	0.001
	3rd week	1(0)	1(1)	150	0.040
	4th week	1(0)	1(0)	171	0.086
Sex life	0 week	0.00(1)	0.0(0.75)	180	0.496
	1st week	0.00(1)	0.0(0.75)	180	0.496
	2nd week	0.0(0.0)	0.0(0.0)	190	0.681
	3rd week	0.0(0.0)	0.0(0.0)	200	1.00
	4th week	0.0(0.0)	0.0(0.0)	200	1.00
Social life	0 week	2(0)	2(1)	160	0.118
	1st week	2(0)	2(0)	152	0.024
	2nd week	1(1)	2(1)	145.5	0.090
	3rd week	1(0)	1(1)	150	0.062
	4th week	1(0)	1(0.75)	162.5	0.144
Travelling	0 week	2(0)	2(0)	198.5	0.953
	1st week	2(1)	2(0)	165	0.210
	2nd week	1(0.75)	1.5(1)	150	0.107
	3rd week	1 (0)	1(1)	160	0.118
	4th week	1(0)	1(0)	153	0.027

For NPRS variable that baseline Median (IQR) + U-stats of control group at initial week was 6(0) + 180.5 and of experimental group were 6(2) + 180.5 whereas P-value was 0.54 respectively. After 4 weeks the Median + U-stats of Control group was 1(1) + 145, while in experimental group Median (IQR) + U-stats was 0(1) + 145 whereas P-value was 0.112 respectively (Table 2).

DISCUSSION

Our study results showed that breathing exercise is effective in trunk stability for LBP. Lumber stabilization and lumber strengthening in dynamic pattern for lengthening of lumber extensors, aimed for decreasing pain and disability[14] and exercise for 8 weeks, twice a week improved with reduction in VAS scores Oswerty disability cores were improved significantly in stabilization group.[15] The results of our experimental group had less difference in means of control compared to experimental group after 3 and 4 weeks scores. The p-values in both the groups is 0.00 which shows there is significant difference in both groups but the difference is in the extent of difference.

There was more improvement in the experimental group than in control group. Another study aimed at management of CLBP using core stability exercise with and without neck extension in subjects of age 25-50 years. The experimental group proved to have significant improvement compared to the control group with VAS and Functional disability after total of 12 session for 4 weeks.[16]

The use of technique that facilitate the lumbar spine can effectively work in recruitment of fibers like bridging and keeling, it was dictated in a study by analysis of global muscles activity measured by electromyography after the said exercises.[17] The data were collected from single setting and sample size was small, that is a limitation. Hence, more detailed study is required to find out more refined results.Treatment duration should be increased to get better result.

CONCLUSION

Spinal stabilization exercises are effective for management of chronic Low back pain. There was significant improvement in functional index and reduction in pain with use of the spinal stabilization combination with Latissimus dorsi stretch.

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