

The Effectiveness of Segmental Stabilization Exercise with Conventional Therapy and Only Conventional Therapy for Chronic Low Back Pain Patients

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Abstract

Aim: To identify whether segmental stabilization exercise with conventional therapy program or only conventional therapy program is more effective for the treatment of chronic low back pain patients.

Methodology: It was Randomized control Trial (RCT). 30 patients with chronic low back pain were randomly assigned into two groups from outdoor musculo-skeletal unit, CRP. Among them 15 patients were assigned into experimental group received segmental stabilization exercises with conventional therapy and another 15 into control group received only conventional therapy. Total treatment sessions were twelve comprising of 3 sessions per week for 4 weeks. Double blinding procedure was used during data collection.

Results: The main findings of this study are in case of pain intensity in different functional position in experimental group all variables come highly significant but in control group all the variables come significant except hurt when walking and change work place come non-significant. So, we concluded that segmental stabilization exercise with conventional therapy is effective reducing pain in different functional position. In case of muscle strength group comparison of flexor and extensor muscle strength come significant improvement in both experimental and control group but in experimental group come highly significant changes. In case of ODI, both experimental and control group come significant improvement but in experimental group come highly significant. The result of the study found that segmental stabilization exercise with conventional therapy is more effective than only conventional therapy.

Conclusion: This research showed that segmental stabilization exercises combined with conventional therapy was more effective than only conventional therapy for patients with chronic low back pain.

Keywords: Chronic Low Back Pain; Segmental Stabilization Exercise; Conventional Therapy

Abbreviations

ASIPP: American Society of Interventional Pain Physicians; BHPI: Bangladesh Health Professions Institute; CLBP: Chronic Low Back Pain; CRP: Centre for the Rehabilitation of the Paralysed; LBP: Low Back Pain; PSEQ: Pain Self-Efficacy Questionnaire; ODI: Oswestry Disability Index; RMDQ: Roland-Morris Disability Questionnaire; VAS: Visual Analogue Scale

Introduction

LBP has been referred as a 20th century disaster [1] and now days it become a universal problem. Chronic low back pain (CLBP) is one of the major public health problems with high economic and social costs, loss of job and disability in the worldwide [2]. Low Back Pain (LBP) affects the area between the lower rib case and gluteal folds and often radiates to the thighs [3]. There are various number of treatment techniques ranging from spinal manipulations, mobilization, advice, general exercises and specifically tailored exercises [4]. Positive effect of exercise therapy on pain and functionality in patients with CLBP had been proven by clinical practice and numerous studies. Recently, there has been a focus on exercises that aim to maintain improve lumbar spine stability. Several groups of muscles particularly targeted the transverses abdominis and lumbar multifidus, but also other paraspinal, abdominal, diaphragmatic, and pelvic muscles that are associated in CLBP [5].

Aim of the Study

The aim of this study was to identify whether segmental stabilization exercise with conventional therapy program or only conventional therapy program is more effective for the treatment of chronic low back pain patients.

Materials and Methods

It was Randomized controlled Trial (RCT). This study conducted in musculoskeletal Physiotherapy unit of the CRP, Savar, Dhaka. Because these patient CRP from all over the Bangladesh from all economic groups for comprehensive rehabilitation, so we may assume that this study will reflect the entire population. Approximately 10 months (August 2017 to June 2018) were required for completion of the study.

Method of sample selection

Computer generated simple random sampling technique was used of this study. 30 patients with CLBP who met the inclusion criteria selected conveniently from outpatient musculoskeletal unit of physiotherapy department at CRP, Savar, Dhaka. The study was a double blinded (participants and assessor blinding), technique. After completion of sampling technique, the researcher randomly assigned the participants into experimental and control group. The participants were assigned into experimental and control group by using computer generated random number from 1 to 30. The Inclusion criteria were patient suffering from low back pain at least 3 months, male and female both were included, age range from 25 to 60 years, willingness to participant. The exclusion criteria were patients who are suffer from cardiopulmonary diseases, participants who have bowel and bladder dysfunction, serious pathological disease e.g. tumours, tuberculosis and spine infection, the participants who have osteoporosis and rheumatologic disorder, the patients who have history of previous low back surgery were excluded from this study. Total 30 participants were included in this study. The 15 numbers were in Group A named experimental group and rest of 15 were in other group B named control group. To conduct this study, the researcher collected data through using different types of data collection tools named Dallas pain scale by using Visual Analogue Scale (VAS) for pain measurement in different working position and also activities, Manual muscle testing technique by using OXFORD muscle grade scale to assess the muscle strength of lumbar spine, Oswestry Low Back Pain Disability Questionnaire was used for disability measurement. The researcher collect data through a close ended structural questionnaire, face to face interviews and assessing the patient, initial recording, treatment and final recording. Questionnaires used both English and Bengal for easy understanding of the participants.

Intervention

At first collect the list of qualified musculoskeletal physiotherapist from CRP musculoskeletal department then randomization of physiotherapist by computer generated randomization. Total 6 qualified physiotherapists among them 3 male and 3 females. Protocol of conventional physiotherapy was obtained from head of physiotherapy department CRP. The researchers arranged special training about the segmental stabilization exercise protocol with type of exercise, dose and treatment duration. The experimental group receives segmental stabilization exercises with conventional therapy and doses uses for treatment each treatment session near about 30 minutes. Total 4 weeks, 3 sessions per weeks and 12 sessions total and 15 repetition and each exercise hold for 3 to 5 seconds. Control group receive only conventional therapy.

Flow chart

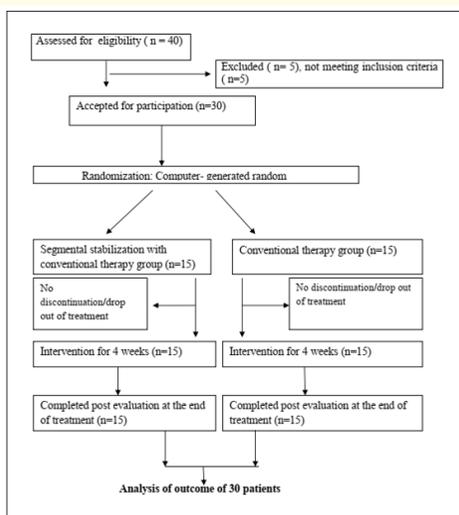


Figure 1: Shows flow chart.

Data analysis

Data was analyzed by using SPSS version 16 to compute the descriptive statistics using pie chart, bar chart, and percentage. Between group analysis of muscle strength and back disability will be calculated by Mann - Whitney U test and Pain (continuous data) by unpaired t test. Within group analysis of muscle strength and back disability will be calculated by Wilcoxon test and pain (continuous data) by paired t test. The researcher has used 5% level of significant to test the hypothesis. Calculated t value and compared with standard t value.

Results

The baseline characteristics of participants in experimental group, the mean age (\pm SD) of the participants was 36.40 (9.73) years and in control group 39.27 (8.81) years. In experimental group male 5 (33.3%) and female 10 (66.7%) and control group male 7 (46.7%) and female 8 (53.3%). In addition, mean weight (\pm SD) in experimental and control group participants was 62.7 (\pm 6.88) kg and 61.8 (8.67) kg and mean height (\pm SD) was 1.58 (\pm .06) cm and 1.79 (\pm 1.00) cm. Mean (\pm SD) BMI of the experimental group was normal 9 (60%), overweight 6 (40%) and control group was normal 8 (26.7%), overweight 4 (13.3%), obesity 3 (10%). Mean (\pm SD) pretest ODI score in experimental group was 44.4 (\pm 9.89) and in control group was 48.6 (21.0).

Muscle strength of both control and experimental group

In this study, among the participants, rate of mean muscle strength (flexor and extensor muscle group) of (from pre- test to posttest or final assessment) find out that in experimental group flexor muscle strength is more improve than control group. In case of extensor muscle group there was no change in control and experimental group.

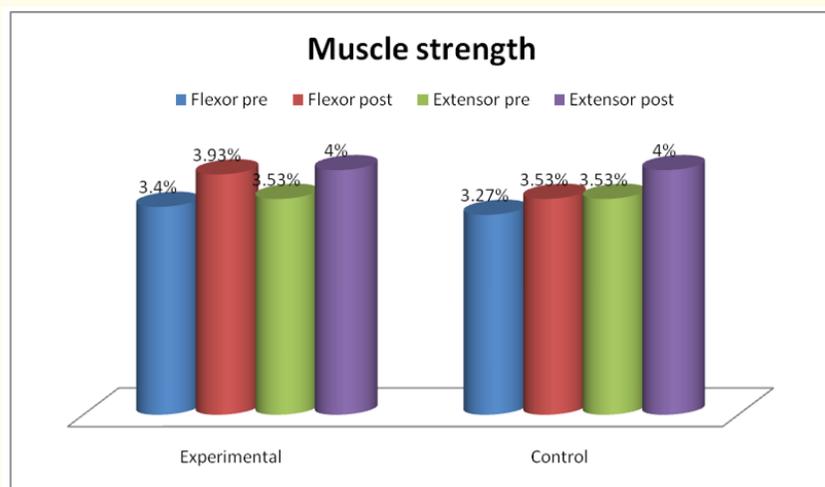


Figure 2: Showing mean muscle strength of both control and experimental group.

Wilcoxon Signed Rank test showed that in case of flexor muscle strength t value was 2.828 And p value 0.005. There is a significant change of flexor muscle strength in within group. In case of extensor muscle strength Z value was -2.828 and p value 0.005. This shows that there is a significant change of extensor muscle strength in within group (See figure 2).

In between group comparison of flexor muscle strength, the experimental group shows a higher mean rank of 18.33, compared to 12.67 for the control group. Mann-Whitney U test score for flexor muscle group is 70. The p value is 0.49 which is greater than 0.05. So, we cannot reject the null hypothesis. That means in between group comparison of flexor muscle strength null hypothesis is accepted and alternative hypothesis rejected. In between group comparison of extensor muscle strength, the experimental group shows a higher mean rank of 15.97, compared to 15.03 for the control group. Mann-Whitney U test score for flexor muscle group is 105. The p value is 0.577 which is greater than 0.05. So, null hypothesis accepted, and alternative hypothesis rejected.

Oswestry disability index (ODI) between and within group

Variable	Mann-Whitney U test	Will Coxon sign-rank test	
	P	Experimental group	Control group
		P	P
Pain intensity	0.000	0.000	0.000
Personal care	0.000	0.000	0.002
Lifting	0.001	0.001	0.008
Walking	0.001	0.001	0.007
Sitting	0.001	0.001	0.005
Standing	0.001	0.001	0.007
Sleeping	0.002	0.001	0.003
Sex life	0.001	0.008	0.014
Social life	0.007	0.001	0.003
Traveling	0.045	0.001	0.003

Table 1: Rank and test statistics of ODI in each variable between and within groups.

This table 1 proved that between groups analysis in each component of ODI showed significant improvement occurred in all variables (p < 0.05). Within experimental group analysis showed that significant improvement occurred in all variables of ODI after application segmental stabilization exercise combined with conventional therapy (p < 0.05). In addition, within control group analysis showed significant improvement in all variables of ODI (p < 0.05). It indicated that segmental stabilization exercise combined with conventional therapy found effective treatment technique for patient with chronic low back pain in terms of minimizing low back disability.

SL No.	Variables	Experimental group		df	Control group	
		t	P value		t	P value
Pair-1	Pain intensity	16.584	.000*	14	7.835	0.000*
Pair-2	Pain intensity at Night	14.229	.000*	14	5.232	0.000*
Pair-3	Interfere with Lifestyle	12.156	.000*	14	3.77	0.002
Pair-4	Back stiffness	10.510	.000*	14	9.076	0.000*
Pair-5	Interfere with Walking	8.660	.000*	14	6.555	0.000*
Pair-6	Hurt when walking	8.318	.000*	14	1.312	0.211
Pair- 7	Keep standing still	12.867	.000*	14	4.406	0.001
Pair-8	Keep twisting	9.604	.000*	14	5.307	0.000*
Pair-9	Sit in a upright hard chair	13.602	.000*	14	7.086	0.000*
Pair-10	Sit in a soft arm Chair	14.230	.000*	14	0.011	0.000*
Pair-11	Lying in a bed	7.424	.000*	14	10.486	0.000*
Pair-12	Normal lifestyle	11.566	.000*	14	4.302	0.000*
Pair 13	Interfere with work	14.258	.000*	14	3.097	0.000*
Pair-14	Change workplace	5.102	.000*	14	1.061	0.307

Table 2: Dallas pain questionnaire (Initial and final assessment-Paired t-test).

Note: *: Indicate highly significant value.

Mean disability

In this study, among all the participants, rate of mean disability from pre- test or initial assessment to final or post- test assessment find out that decreased more in experimental group (44.40% to 16.73%) in comparison to the control group (44.13% to 30.93%).

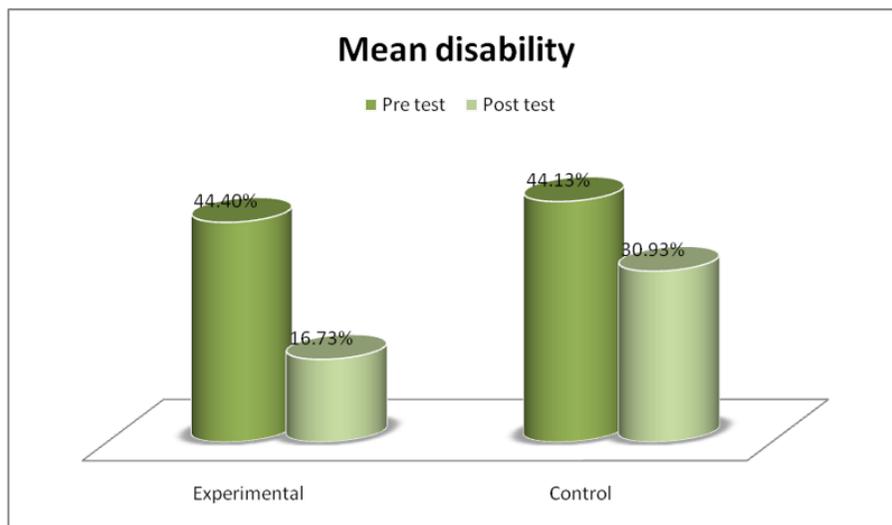


Figure 3: Mean disability.

Discussion

The aim of this study was to find out the effectiveness of segmental stabilization exercise with conventional therapy for chronic low back pain patient. Total participants were 30 in two groups. In baseline characteristics of experimental and control both groups was almost similar. The result found that the mean age of both groups was 37.83 years (36.40 years in experimental group and 39.27 years in control group). The male was 40% and female was 60% in the both groups.

The Dallas pain scale was measured for measuring pain and discomfort in different working position like general pain intensity, pain intensity at night, pain interference with lifestyles, back stiffness, interference with walking, hurts when walking, standing still, twisting activity, sitting in a upright hard chair, sitting in a soft arm chair, lying in bed, pain limit normal life style, interfere in work and change of workplace. In within group analysis, experimental group showed that all the variables exhibited highly significant changes, but in control group except hurt when walking and change workplace all the variables come significant. In case of between group analysis, except pain intensity at night all the variables come highly significant ($p < 0.05$) that means segmental stabilizing exercise with conventional therapy was not effective for pain intensity at night (See table 2). In case of back muscle strength, in within group comparison of flexor and extensor group muscle strength in experimental group was significant that means null hypothesis rejected and alternative hypothesis accepted. In between group comparison of flexor and extensor muscle strength there was no significant change and in mean difference of extensor group muscle strength in initial and final in experimental and control group were equal that means null hypothesis accepted and alternative hypothesis rejected. In case of ODI, mean disability of experimental group was higher than control group. Post comparison of ODI among control and experimental group find out that 73.3% was minimal disability in experimental group where in control group 26.7% was severe disability but in experimental group was no severe disability. In within group comparison both groups showed significant

change but in experimental group was highly significant. In between group comparison ODI was significant change. Several studies assessed ODI after application of only segmental stabilization exercise and found improvement of disability [6,7].

In this study, participants in the experimental and control group received 3 sessions per week (total 12 sessions) of treatment study. A study on two exercise programs, segmental stabilization and strengthening of abdominal and trunk muscles on pain, functional disability and activation of the transverse abdominis muscle in individuals with chronic LBP. In these study inclusion criteria matched with the current study and the numbers of treatment sessions were appropriate to prove [8].

On the other hand another study evaluated the efficacy of pain, disability, and thickness of the transverse abdominis and multifidus muscles in the segmental stabilization and McKenzie program and found significant outcome ($p < 0.05$) in between group both experimental and control group but in between group muscle strength was no significant ($P > 0.05$) [9]. In contrast, the present study outcomes on patient general pain intensity was similar with this finding. A study illustrated that clinical and therapeutic effects of core stabilization exercise program over the period of six weeks are more effective in terms of reduction in pain, compared to routine physical therapy exercise for similar duration [10].

The strengthening of the abdominal muscles is essential in recovery of the spinal neutral position because weakening of the abdominal muscles among the trunk muscles of LBP patients is generally prevalent [11]. Imbalance between the abdominal muscles of the trunk and extensor muscles is a major cause of low back pain and reduces stabilization of the lumbar segment [12]. The present study found that there was significant improvement was observed in the lumbar spine muscles in flexor and extensor group of muscles in two groups but between group there is no significant changes ($p > 0.05$) of muscles strength in lumbar spine.

A study reported that stabilization exercise was found to be effective in reducing disability in patients with CLBP [13]. It was also concluded that stabilization exercise is effective in the reduction of pain and improvement of functional disability in patients with chronic low back pain [14]. Authors reported that stabilization or (core stability exercise) have been suggested to reduce symptoms of pain and disability and form an effective treatment in patients with chronic low back pain [15]. In present study also supported that segmental stabilization exercises reduce symptoms of pain and disability and this study use segmental stabilization exercises in sitting, supine lying, and prone lying.

In this study have some limitation such as - Samples were collected only from CRP Savar, it could not represent the wider chronic low back pain population and the study lacks in generalizability of results to wider population. The study was conducted with 30 patients of chronic low back pain which was a very small number of samples in both groups and was not sufficient enough for the study to generalize the wider population of this condition. Authors recommended more study is needed to find out the effectiveness of segmental stabilization exercise with conventional therapy program or only conventional therapy program is more effective for the treatment of chronic low back pain patients.

Conclusion

Chronic LBP has become one of the main causes of disability in the adult population around the world. The treatment procedure of low back pain is costly and need more time to recovery. Segmental stabilization exercise is an effective treatment procedure for chronic low back pain but in our country have not adequate study about this treatment procedure. The findings of this study may help to develop evidence-based practice for chronic low back pain. This study measured the pain intensity in different functional position, muscle strength and disability in case of chronic low back pain. So, we concluded that segmental stabilization exercise with conventional therapy is effective reducing pain in different functional position. In case of muscle strength within group comparison of flexor and extensor muscle strength come significant improvement in both experimental and control group but in experimental group come highly significant changes.

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Conflict of Interest

Author declared that they have no conflict of interest.

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