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Effect of Trunk Muscles Stabilization Exercises and General Exercises on Pain in Recurrent Non Specific Low Back Ache

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Abstract

To study the effect of trunk muscles stabilization exercises and general exercises on pain on recurrent non specific low back ache. A total number of 80 patients with recurrent non specific low back pain are allocated randomly into 1 of 2 groups; control group received general exercise only (n=40) and experimental group received specific stabilization (n=40). Both groups received 6 weeks exercise intervention with 30-40 min per session, thrice per week and written advice. A VAS scale was used to measure pain. Outcomes were measured before and after intervention. Outcome measures for both groups showed significance in reducing disability The calculated t-values for the VAS showed a significant variation at p=0.00. It showed that there is fulfilled improvement in post test VAS values when compared to pre-test VAS values in both the groups. The mean improvement in the group II that received core strengthening is higher when compared to the group I that received conventional exercise program. The calculated p value showed a significance of difference in improvement at p=0.015, which indicates that experimental group has higher gains in improvement in VAS than the Control group. This shows that mean improvement in the group II that received core strengthening is higher when compared to the group I that received conventional exercise program. This study concludes that specific stabilization exercise is beneficial in reducing pain and improved function in chronic non specific low back pain.

Keywords: Exercise, low back pain, stabilization, muscle, pain, disability.

Introduction

Technological and organizational changes in the industrial countries during last few decades have markedly increased the number of jobs performed in Monotonous and constrained postures. Chronic low back disability appears to be increasing faster than any other form of incapacity[1]. Deep trunk muscles eg. transversus abdominis and multifidus responsible for maintaining the stability of the spine[2]. Strengthening of these muscle and their restoration should be effective in the management of persistent low back pain LBP. Therapeutic workouts for superficial and the deep muscles seem to be effective in the treatment of chronic low back pain CLBP[3]. Trunk muscles exercises activate the abdominal and paraspinal muscles as a whole and at a relatively high contraction leve[l,4]. Many randomized controlled trials RCTS have been conducted to gather information regarding the usefulness of classic trunk exercises[5,6], but now the attention has increased on retraining of the local stabilizing muscles of the spine[7,8]. No randomized control trial has been done that stabilization training is beneficial in a sample of patients with sub acute or chronic nonspecific low back pain using pain and disability as outcome. Two relevent randomized control trial have been conducted in specific subgroup of patients with low back pain[7,8]. A more recent study that compared stabilization exercise against other general back extensor exercise regiments in patients with nonspecific chronic low back pain demonstrated positive results for multifidus muscle crosssectional area increase in favor of one of the general exercise approach[9]. A study found that a General exercise program can be improved in reducing pain in short term than specific stabilization and general exercises in subjects with recurrent nonspecific low back pain[10]. Though conventional back care exercises and stabilization exercises are proved to be effective in chronic mechanical low back pain patients, no literature comparing the effectiveness on each other were found which necessitated the present study to compare the outcome of conventional and stabilization exercises in chronic non specific low back pain.

Methodology

A total number of 80 subjects, with nonspecific low back pain, were recruited from the physiotherapy department of Sir Ganga Ram Hospital, New Delhi, India. All the subjects to the physical department were referred from orthopaedic outpatient after proper detailed assessment by an orthopaedician.

Inclusion criteria were: i. Patients who had a history of recurrent LBP (repeated episodes of pain in past year collectively lasting less than 6 months), ii. Patients who have nonspecific nature of pain, iii. Patients who are willing to participate in the exercise program and willing to travel independently to the hospital from

the home[10], iv. Age of subject is 30-50yr, v. Both genders are included.

Exclusion criteria were: i. Patients with previous spinal surgery, ii. Patients who have signs and symptoms of gross spinal instability radiological diagnosis of spondylolysis or spondylolisthesis, iii. Patients with serious spinal pathology[11]. iv. Patients with cardio–pulmonary diseases, v. Patients with tumor, infection and fracture in spine, vi. Patients with rheumatic and inflammatory condition, vii. Patients with disc disease, viii. Lumbar canal stenosis, ix. Bowel and bladder dysfunction.

The patients were not aware of the theoretical basis of each of the exercise regimes but they were briefed the study objective. All the subjects were interviewed and examined by a clinical physiotherapist of Sir Ganga Ram Hospital who was unaware of their group. By using random sampling method, the subjects with non specific low back pain were assigned to treatment groups. Group I received general low back exercise only flexion and extension exercise and Group II received specific trunk muscle stabilization exercise. Pain was assessed by the VAS Scale, were considered most appropriate and yield reliable and valid data, the patients were reassessed on the basis of pain rating on VAS repeated immediately and after 6 weeks. Interventions were conducted over 6 weeks duration and each class duration of 30-40 min for thrice per week for both groups. For Group I, Simple classic exercises for extensor paraspinals and flexor abdominals muscle groups were administered. If subjects were able to progress each week to a new level, on graded exposure exercise principle, otherwise they remained at the same exercise level. For Group II, exercises were instructed as previous recommendation. The first session was given individually for subjects assigned to this group and lasted 30-45 minute. Initially exercises with low intensity for local stabilizing muscles was initially administered with no movements isometric and in minimally loading positions. The holding time and the number of contractions were increased progressively in these positions up to 10 contractions repetitions x 10 sec duration each 1st and 2nd week. To ensure correct activation of the transverse abdominis muscle was to observe a slight drawing in maneuvers of the lower part of the anterior abdominal wall below the umbilical level consistent with the action of this muscle. Various tactile and pressure cues and auditory cues were given to the patient to enhance the contractions and to get maximum corrective position and outcomes. Too much effort of initial contraction of muscles was discouraged. Integration with dynamic function through incorporation of the stabilizing muscles' co-contraction into light function tasks was advised next 4-6 weeks as soon as the specific pattern of co-activation was achieved in the minimally loading position and the subjects could comfortable performed 10 contraction repetition x 10 sec duration each. A senior clinical physical therapist assessed the outcome measures of this study. All subjects received an information booklet providing the latest scientific facts on low back pain management at the beginning of the program.

Results and Discussion

The outcome of the data was analyzed, mean, standard deviation of the pre test and post test values of the two groups individually. Comparison of mean within the group was done and the difference of mean, standard deviation between the group is also done. Calculation was done according to M.S excel soft ware.

The mean improvements between the two groups of low back pain patients were tested for significance using student t- test. The calculated t-values for the VAS showed a significant variation at p=0.00. It showed that there is fulfilled improvement in post test VAS values when compared to pretest VAS values in both the groups, but the mean improvement in the group II that received core strengthening is higher when compared to the group I that received conventional exercise program. The mean improvements between the two groups of low back pain patients were tested for significance using student t- test. The calculated t-values for the VAS scale was significant at p=0.015.

Table-1
Comparison of pain (VAS) within Control group

Control group	Mean(pre post)	S.D. (pre-post)	t-value	p-value
Pre	6.53	±1.99	18.43	0.00
Post	3.33	±1.75		Highly significant

The pain in the control group has decreased post intervention, as in shown by their means, further analysis on the scores revealed that these changes are statistically highly significant in the control group (t=18.43, p=0.00)

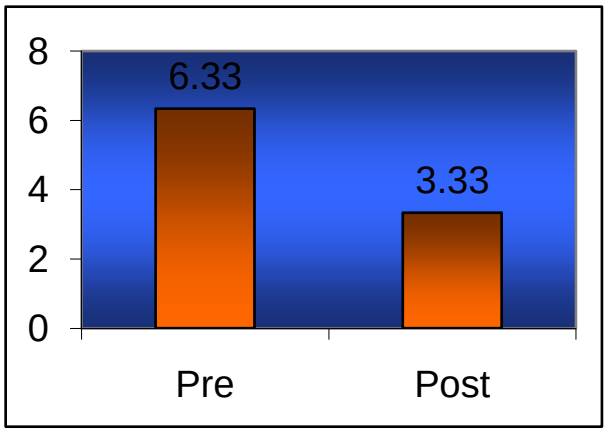

Figure-1
Comparison of pain within Control group

Table-2
Comparison of pain (VAS) within Experimental group

Experimental-group	Mean(pre-post)	S.D(pre-post)	t-value	p-value
Pre	7.07	±2.017	11.18	0.00 Highly significant
Post	2.07	±1.033		

The pain in the experimental group has decreased post intervention, as in shown by their means, Further analysis on the scores revealed that these changes are statistically highly significant in the control group (t=11.18, p=0.00)

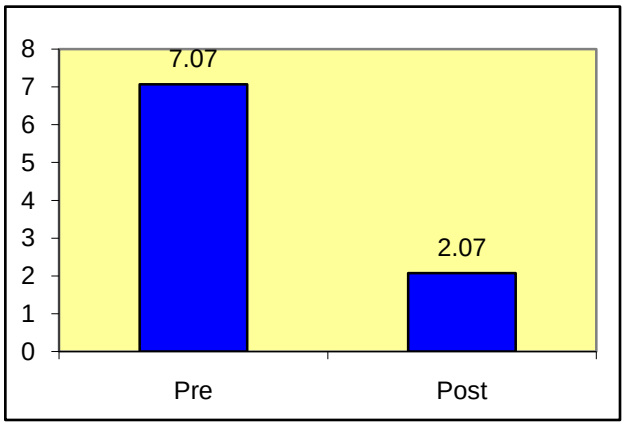

Figure-2
Comparison of pain within experimental group

Comparison of VAS between Group-I and Group–II

Table-3
Experimental Vs control group-Pain (post pre difference)

Variable	Mean (Post pre difference)	S.D (post pre difference)	t-value	p-value
Control group	3.47	±1.50	2.58	.015 significant
Experimental group	5.00	±1.73		

The pain in the experimental and control group has decreased post intervention, as in shown by their means, though the change in the experimental group was much higher than in the control group. Further analysis on the scores revealed that these changes are statistically significant. (t=2.58, p=0.015)

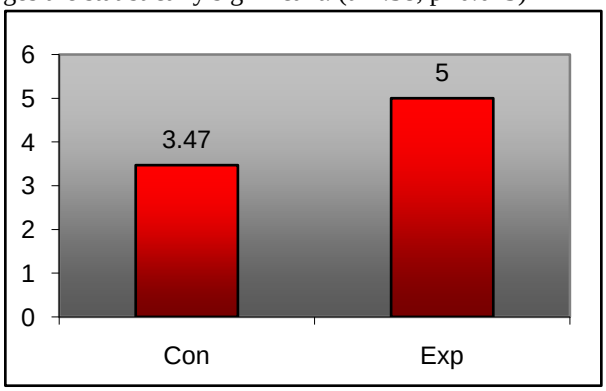

Figure-3
Experimental Vs control group-Pain (post pre difference)

Interpretation: The table-1and 2 showed that there is highly significance difference between pre and post test values of VAS within the groups. The calculated t-values for the VAS showed a significant variation at p=0.00. It showed that there is fulfilled improvement in post test VAS values when compared to pretest VAS values in both the groups

The table-3 showed that there is highly significance difference between pre and post test values of VAS between the two groups. The calculated p value showed a significance of difference in improvement at p=0.015, which indicates that core strengthening group has higher gains in improvement in VAS scale than conventional group**.**

Discussion: Our findings suggest that stabilization exercises reduce subject's pain more effectively immediately after the end of treatment protocol over general exercise protocol with statistical significant. The stabilizing exerxises treatment approach was more effective than other conservative treatment approaches which mainly involved conventional exercise programs..Consistent with these findings, McGill reported that lumbar stability is maintained in vivo by increasing the activity (stiffness) of the lumbar segmental muscles, and highlighted the importance of motor control to coordinate muscle recruitment between large trunk muscles and small intrinsic muscles during functional activities, to ensure stability is maintained.

The trunk muscle stabilization exercise group exercised the TrA and LM muscle[12]. In individual with low back pain, the TrA has decreased anticipatory capacity, meaning that it has reduced segmental protective function[13]. Rodacki et al, suggested that abdominal exercises are associated with low back pain improvement, since during abdominal contraction the pressure on the intervertebral disks was decreased as a consequence of the increased intra abdominal pressure. However, no improvement on TrA capacity were observed[14]. From methodological point of view the frequency and duration of the study were deemed appropriate to produce demonstrable benefits, based on previous studies of similar or less exercise duration[5,13,15,16]. However, the stabilizing function of trunk musculature is especially important around the neutral posture, where the spine exhibits the least stiffness. Increased neutral zone, a region of low stiffness around the neutral spine had been suggested first by Punjabi**[17].** Richardson suggested that the simultaneous isometric contraction exercise for the local deep muscle TrA and LM is most beneficial for re-educating the stabilizing muscle and can incoporated with dynamic functional exercise. Hence, it showed more significant in early phase of treatment than the later phase. In non specific low back pain patients the neutral zone muscles gets more affected than the other muscles of back. Hence, early rehabilitation of these muscles produced good results within short time. This is in support of Punjabi's hypothesis[17] that the stability of the lumbar spine is dependent not solely on the basic morphology of the spine, but also the correct functioning of the neuromuscular system. Therefore, if the basic morphology of the lumbar spine

is compromised, as in the case with symptomatic CLBP, the neuromuscular system may be trained to compensate, to provide dynamic stability to the spine during the demands of daily living.

Conclusion

Both the exercise groups showed statistical significance but stabilization exercise exercise group showed more significant over general exercise group in reducing pain in nonspecific low back pain. Specific stabilization exercise improves TrA and LM muscle activation capacity. So specific stabilization exercise was superior in the improvement of pain and reduce of disability than general exercise group. Limitation of the study were no intermediate and long-term follow up examination. Biopsychosocial factors were not observed in this study.

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