



Comparison of Trunk Muscle Stabilization Exercise with General Exercise for non Specific Recurrent Low back Pain

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Abstract

To compare the efficacy of trunk muscle stabilization exercises and general exercises versus general exercises only on subjects with non specific recurrent low back pain in relieving pain and improving function. A total number of 50 patients with recurrent non specific low back pain are allocated randomly into 1 of 2 groups; experimental group received specific stabilization and general exercise (n=25), and control group received general exercise only (n=25). Both groups received 8 weeks exercise intervention with 45-60 min per session, twice per week and written advice. A Visual analog scale and Oswestry low back disability questionnaire were used to measure pain and disability. Outcomes were measured immediately before and after intervention. Outcome measures for both groups showed significance in reducing pain but experimental group showed better significance over control group in 8 weeks treatment session. This study concludes that combined specific stabilization and general 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

Musculoskeletal disorders with back pain accounts for more than half of the cases, causing chronic incapacity in industrialized world. Furthermore, chronic low back disability appears to be increasing faster than any other form of incapacity¹. Low back pain (LBP) is one of the main causes of disability, and despite its high prevalence, the source of pain is not established in the majority of cases and the term "nonspecific low back pain" is used². One factor that has been proposed as important in the genesis and persistence of nonspecific LBP is stability and control of the spine². Studies of individuals with LBP have identified impairments in the motor control of the deep trunk muscles eg, transversus abdominis and multifidus responsible for maintaining the stability of the spine². Therefore, theoretically, an intervention that aims to correct the changes occurring in the deep trunk muscles and that targets the restoration of control and coordination of these muscles should be effective in the management of persistent LBP.

Kinesiotherapeutic protocols addressing both the superficial and the deep muscles seem to be effective in the treatment of CLBP³. Classic trunk exercises performed in physical therapy activate the abdominal and paraspinal muscles as a whole and at a relatively high contraction level⁴. Although there are several randomized controlled trials RCTS on the usefulness of classic trunk exercises^{5,6}, increasing attention recently has been paid to the preferential retraining of the local stabilizing muscles of the spine^{7,8}. Specific stabilizing exercises targeting the multifidus and transversus abdominis muscles have been shown to

decrease pain and disability in chronic low back pain³. No randomized control trial has 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 relevant randomized control trial have been conducted in specific subgroup of patients with low back pain^{7,8}. But, in these trial, the specific effect of the trunk stabilization exercise regiment was not compare to general back and abdominal exercise. A more recent study that compared stabilization exercise against 2 other general back extensor exercise regiments in patients with nonspecific chronic low back pain demonstrated positive results for multifidus muscle cross-sectional area increase in favor of one of the general exercise approach⁹. A study found that a General exercise program can be improved in reducing disability in short term than specific stabilization and general exercises in subjects with recurrent nonspecific low back pain¹⁰. This finding contradicts the theory that general exercise was not effective for restoration of multifidus muscle size but no pain and disability were reported. Therefore, the effectiveness of stabilization exercise in patients with nonspecific low back pain is not yet fully established. It can be concluded that stabilization training for all patients with nonspecific low back pain have been useful in reducing pain dysfunction.

Therefore this study is aimed to investigate whether stabilization exercises are a useful supplement to general trunk exercises in patients with recurrent nonspecific low back pain.

Material and Methods

A total number of 50 subjects, with nonspecific low back pain, were recruited from the physiotherapy department of G.S.L General Hospital, Rajahmundry, and Swatantra hospital, Rajahmundry, Andhra Pradesh, India. All the subjects to the physical department were referred from orthopedic outpatient after proper detailed assessment by an orthopaedician. A total 100 subjects and performed 70 subjects clinical evaluation by their physician including radiograph images. 20 subjects are dropped out and therefore sample consisted of 50 subjects with nonspecific CLBP. Inclusion criteria were: Patients who had a history of recurrent LBP (repeated episodes of pain in past year collectively lasting less than 6 months), Patients who have nonspecific nature of pain, Patients who are willing to participate in the exercise program and willing to travel independently to the hospital from the home¹⁰. Mean age of subject is 30-50yr and both gender are included. Exclusion criteria were: patients with previous spinal surgery, Patients who have signs and symptoms of gross spinal instability radiological diagnosis of spondylolysis or spondylolisthesis, Patients who had red flags suggesting serious spinal pathology¹¹. 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 G.S.L. General Hospital who was unaware of their group. By using random sampling method, the subjects with non specific low back pain were assigned to 1 of 2 treatment groups. Group-I received specific trunk muscle stabilization exercise combined with general exercise and group-II received general low back exercise only flexion and extension exercise. Pain and functional disability were assessed by the visual analogical scale VAS and Oswestry disability questionnaires, were considered most appropriate and yield reliable and valid data. Suitable patients were asked to complete a number of questionnaires of the VAS and Oswestry low back pain disability questionnaire that were repeated immediately and after 8 weeks.

Interventions were conducted over 8 weeks duration and each class duration of 45-60 min for twice per week for both groups. Common components of the 2 programs included a warm-up period stretching exercises and stationary bicycling for 10-15 min. For Group-I, a staged approach was followed, according to previous recommendation appendix. The first session was performed on an individual basis for subjects assigned to this group and lasted 30-45 minute. Briefly low load activating of local stabilizing muscles was initially administered with no movements isometric and in minimally loading positions like 4-point kneeling, supine lying, sitting, standing. Progressively the holding time and the number of contractions were increased in these positions up to 10 contractions repetitions x 10 sec duration each 1st and 2nd week.

The clinical measure used 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. In addition, a bulging action of the multifidus should have been felt under the clinical physical therapist fingers when they were placed on either side of the spinous process of L4 and L5 vertebral levels, directly over the belly of the muscles. 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 3-5 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. Heavier load functional tasks, with exercises similar to those performed by the subjects who performed general exercise only, were progressively introduced in the last 3 weeks of the program. For Group-II, Simple classic exercises activating the extensor Paraspinals and flexor abdominals muscle groups were administrated appendix. As muscle contraction occurring with these exercises it imposes extra loading on the spinal tissue and give benefit to patients. 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. Subjects also were asked to repeat the exercises at home, for a maximum of half an hour 3 times per weeks, from the beginning of the program. 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, using bar-graphical representation, 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. A significance level of, $P < 0.05$ was fixed. Calculation was done according to M.S excel soft ware. Using Wilcoxon signed rank test (paired sample test) for finding the difference in pain and disability before and after the treatment within the groups table. 1 and 2. It showed that there is fulfilled improvement in post test VAS and post test ODQ values when compared to pre test VAS and pretest ODQ values in both the groups. Mann whitney U test was used to find out the significance difference between group-I and group-II table-3. The results showed that there is a significance improvement in pain and reduced disability group-II experimental group when compared to group-I control group.

Interpretation: The table-1 showed that there is highly significance difference between pre and post test values of VAS and ODQ within the group I. The table-2 showed that there is highly significance difference between pre and post test values of VAS and ODQ within the group II.

Table-1
Comparison of pre and post test values of pain and disability within the group-I Wilcoxon signed rank test

GROUP – I		Mean	N	Std. Deviation	P VALUE
VAS	Pretest	5.63	19	0.895	0.000
	Post-test	1.11	19	0.809	
ODQ	Pretest	36.58	19	2.874	0.000
	Post test	10.68	19	2.945	

Table-2
Comparison of pre and post test values of pain and disability within the group -II Wilcoxon signed rank test

GROUP – II		Mean	N	Std. Deviation	P values
VAS	Pretest	5.33	21	0.796	0.000
	Post- test	1.71	21	0.845	
ODQ	Pretest	36.05	21	4.364	0.000
	Post- test	13.14	21	3.772	

Table -3
Comparison between Group -I and Group -II Mann whitney U test

GROUP		N	Mean	Std. Deviation	P VALUE
AGE	Group 1	19	38.05	5.275	0.496
	Group 2	21	39.19	5.115	
VAS Post test	Group1	19	1.11	.809	0.027
	Group 2	21	1.71	.845	
ODQ Post test	Group 1	19	10.68	2.945	0.039
	Group 2	21	13.14	3.772	

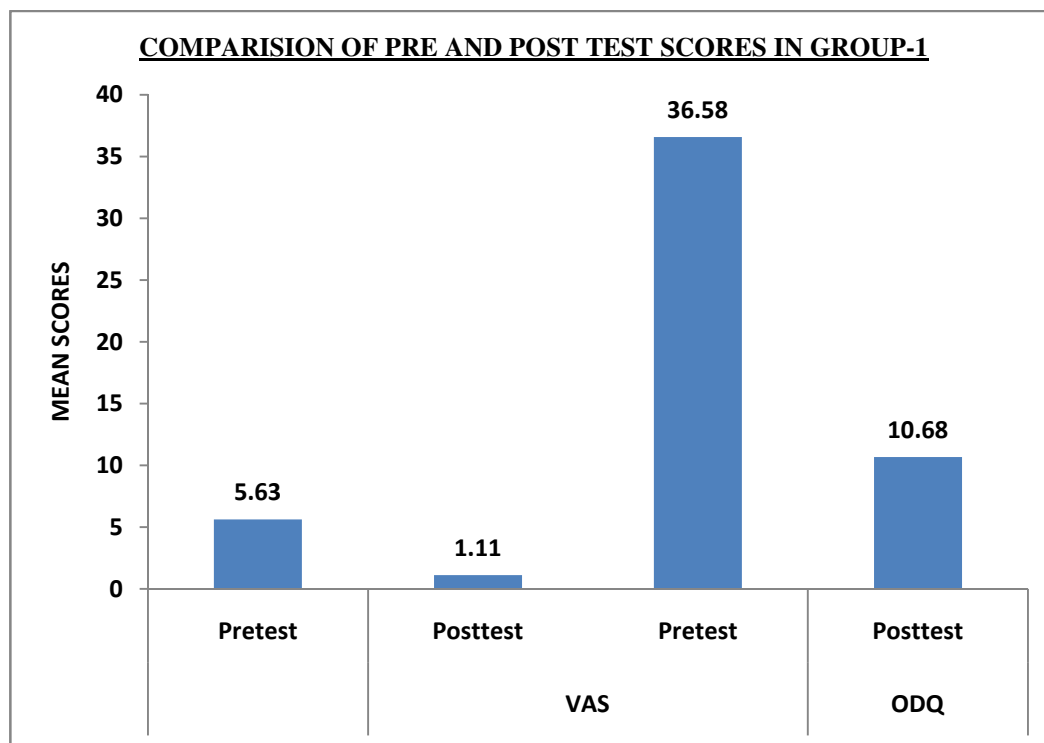


Figure-1
Comparison of pre and post test

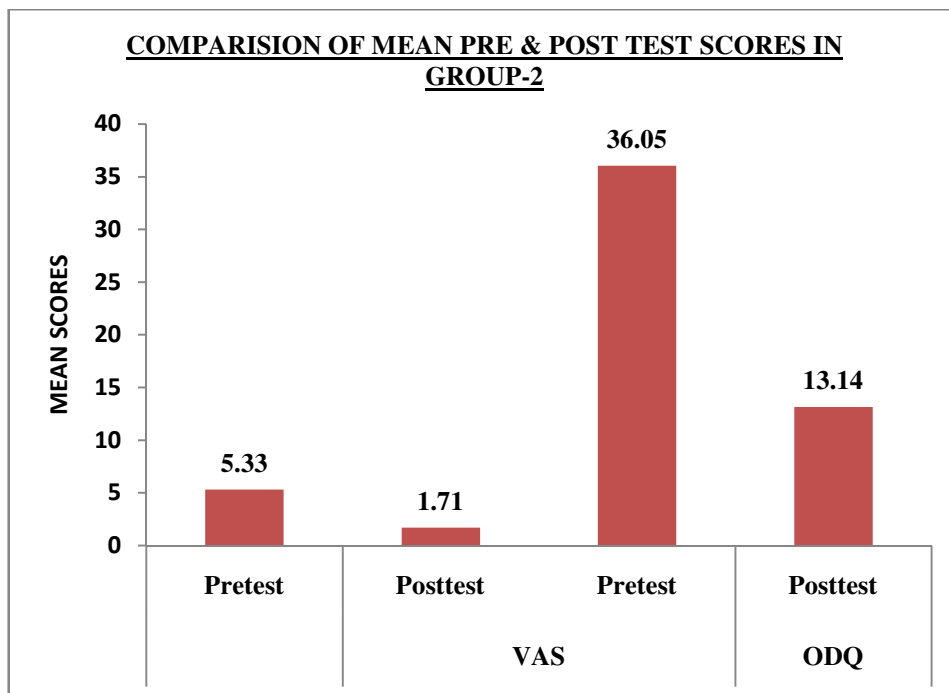


Figure-2
 Comparison of mean pre and post test score in group-2

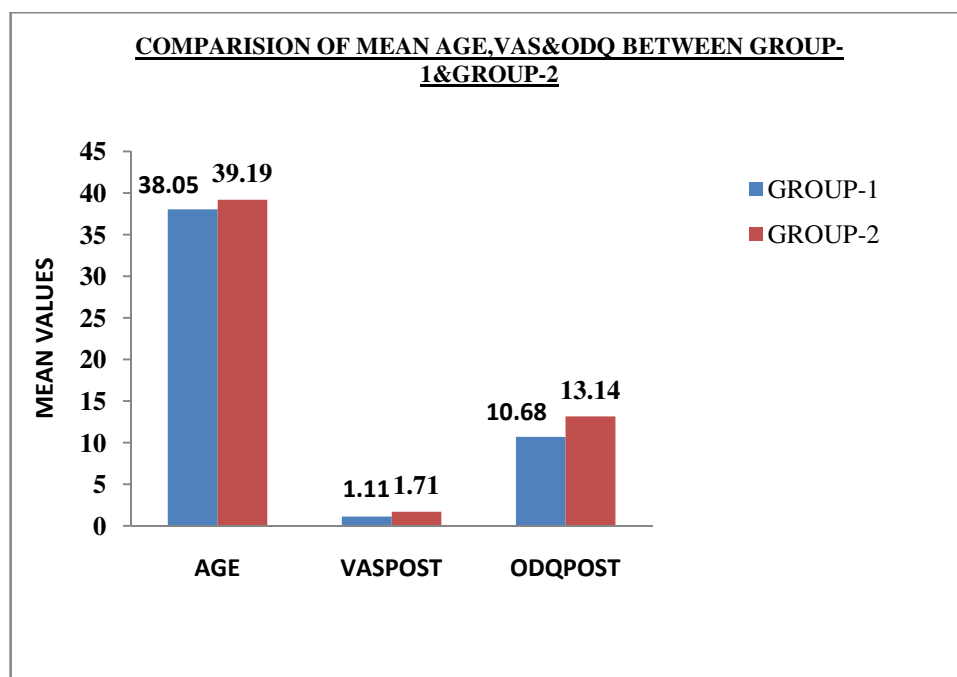


Figure-3
 Comparison of mean age,vas and ODQ

There is a significant difference in VAS and ODQ score between the group-I and group-II $p < 0.05$

Stabilization with general exercise is effective when compare to General exercise only.

The main pain score in VAS and disability score in ODQ was found to be less in group-I when compare to group-II i.e

Discussion: Our findings suggest that stabilization exercises reduce subject's pain and improve disability more effectively

immediately after the end of treatment protocol over general exercise protocol with statistical significant. Ferreira et al, suggested that TrA exercising improve muscle activation in individuals with low back pain. The trunk muscle stabilization exercise group exercised the TrA and LM muscle¹⁴. Hides identified selective atrophy of the deep muscle TrA and LM after the first episode of back pain, the atrophy was unlikely to revert without specific training. In individual with low back pain, the TrA has decreased anticipatory capacity, meaning that it has reduced segmental protective function¹⁵. Snijders et al, postulated that the co-contraction of the TrA and LM muscle is the basis of the lumbo-sacral biomechanics stability and that these muscle act by reducing the compressive overloading, attenuating or eradicating pain perception³. 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 observed¹⁶. The better improvement in pain and disability yielded by the trunk stabilization relative to general exercise may be explained by the hierarchical structure of the muscular control system³. 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^{5,17,15,18}. Increase in doses of exercise, increase in benefit of exercise¹⁵. 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 Punjabi¹⁹. 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 incorporated with dynamic functional exercise. In addition, both disuse and reflex inhibition are likely to affect the slow twitch or tonic holding contraction at a low level would be most effective in retraining the stability function of these muscle²⁰. The objective of the stabilization exercise is usually to stress both damaged tissue and healthy supporting tissues to foster tissue repair while avoiding further excessive loading, which can exacerbate an existing structural weakness. 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.

Conclusion

Both the exercise groups showed statistical significance but stabilization exercise with general exercise group showed more significant over general exercise group only both in reducing pain and disability in nonspecific low back pain. Specific stabilization exercise improves TrA and LM muscle activation capacity. So specific stabilization exercise with general exercise group 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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