



To Study the effect of Traditional Back Exercises vs Exercise Ball Exercise on Pain Intensity, Core Endurance and Limitation of Activities in Individuals with Nonspecific Low Back Pain: A Comparative Study

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Aims: Non specific Low back pain is defined as pain without any known pathology which affects almost all the leading occupation where body's awkward posture, twisting and stress forces are commonly encountered across the globe and it is highly prevalent 60% to 70% in a year. Studies have shown various exercise regimen individual effect on the same but superiority of regimen out of these is not clear.

Study Design: Comparative Study

Place and Duration of Study: Ahmedabad Institute of Medical Sciences, Duration 2013-15

Objective: To assess and compare the effect of core stability exercise, back school program and Swiss ball exercise on Pain, core endurance and Functional disability.

Methodology: A group of 24 patients having non-specific low back pain between age groups 18-40 were randomly selected and allocated in to two groups. Group A(n=12) received traditional exercise

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whereas Swiss ball exercise was given to Group B(n=12). The subjects were treated for two weeks. Baseline data for VAS, Core endurance and MODI were taken on day1 and at the end of two weeks

Result: The results were analyzed by wilcoxon signed rank test within both groups. Both groups showed significant improvement in VAS, core endurance and MODI at the end of 2weeks. Comparison between both the Group A and Group B was done by Mann- whitney U test and statistically no significant difference was seen in VAS, core endurance and MODI between the groups

Conclusion: The study concluded that both the exercises are equally effective in reducing pain intensity, improves core endurance and functional status in subjects with non specific low back pain

Keywords: Non-specific low back pain; core endurance; swiss Ball; core stability.

ABBREVIATIONS

NSLBP : Non Specific Low Back Pain

1. INTRODUCTION

Low back pain is an essential medical issue with critical outcomes from a financial perspective and is related with high costs, work non-appearance and illness [1] It is the main source of work related injury and incapacity in both created and creating nations [2] Prevalence of low back torment ranges from 12 to 33%, the one-year commonness of low back torment ranges from 22 to 65%, and the lifetime pervasiveness of low back torment ranges from 11 to 84%.1 Various examinations in India showed predominance of low backache as 11.1% to 51% [3,4] Despite of expenses to wellbeing in various nations, there is no uncertainty that low back pain leads to a significant monetary issue around the world. A basic and pragmatic grouping, which has increased worldwide acknowledgment, is to isolate low back pain into three classes –alleged "analytic triage" [5] Any Precise pathology, Nerve root involvement, indefinable underlying cause. NSLBP is defined by there is no underlying specific known pathology (for example disease, tumour, bone weakening diseases, ankylosing spondylitis, fracture, incendiary procedure, radicular disorder or cauda equine syndrome).[6] Acute low back pain is typically characterized as pain less than a month and half; sub-acute defined as pain between 6 to 12 weeks and chronic low back pain stands for 12 weeks or longer.[7] Core Stability (CS) showed up in the last decade of the 1990s. The core is square shaped power house covered with roof, floor, anterior and posterior wall. All these soft-tissues are directly or indirectly connected with thoracolumbar fascia and spinal segments which connects upper and lower limb. The focal point of ongoing exploration has been on the job of the

transverses abdominis (TrA) and multifidus muscles and their capacity as center stabilizers. Therefore during examination it was found that pain arises due to lacking in the core muscles endurance.[8] Low back pain is because of strain on the delicate structure of the spine that is because of lack in strength as well as endurance [9].

Endurance training plays an important role in subsiding this condition, training soft-tissues for their Stamina diminishes weakness thus it provides stability to the spinal column .[10] Different fantasies and studies states expanded articulation. To come out from such ideas the need rose to discover the productivity of conventional exercise and Swiss ball exercise on three key outcomes Pain, Core Endurance, and Functional Disability.

1.1 Hypothesis

Null Hypothesis (H0): There is no significant difference between the effects of Exercise Ball and traditional exercises on pain intensity, core endurance and limitation of activities in individuals with non-specific low back pain.

Alternative Hypothesis (H1): There is significant difference between the effects of Exercise Ball and traditional exercises on pain intensity, core endurance and limitation of activities in individuals with non-specific low back pain.

2. MATERIAL AND METHODS / EXPERIMENTAL DETAILS / METHODOLOGY

2.1 Inclusion and Exclusion Criteria

The subjects included age between 18-40 years genders, clinically diagnosed, suffering from pain since 3 months or more than that.

The subjects excluded Patients with Fractures, tumours, inflammatory disease, Nerve root compromise, known case of open or minimal invasive surgeries, deformities, cord compressions, bone weakening condition, pregnancy or underlying Cardio-respiratory illness.

study. 6 patients were selected in each group at 90% of power of study. However, following number of patients were selected in to the study.

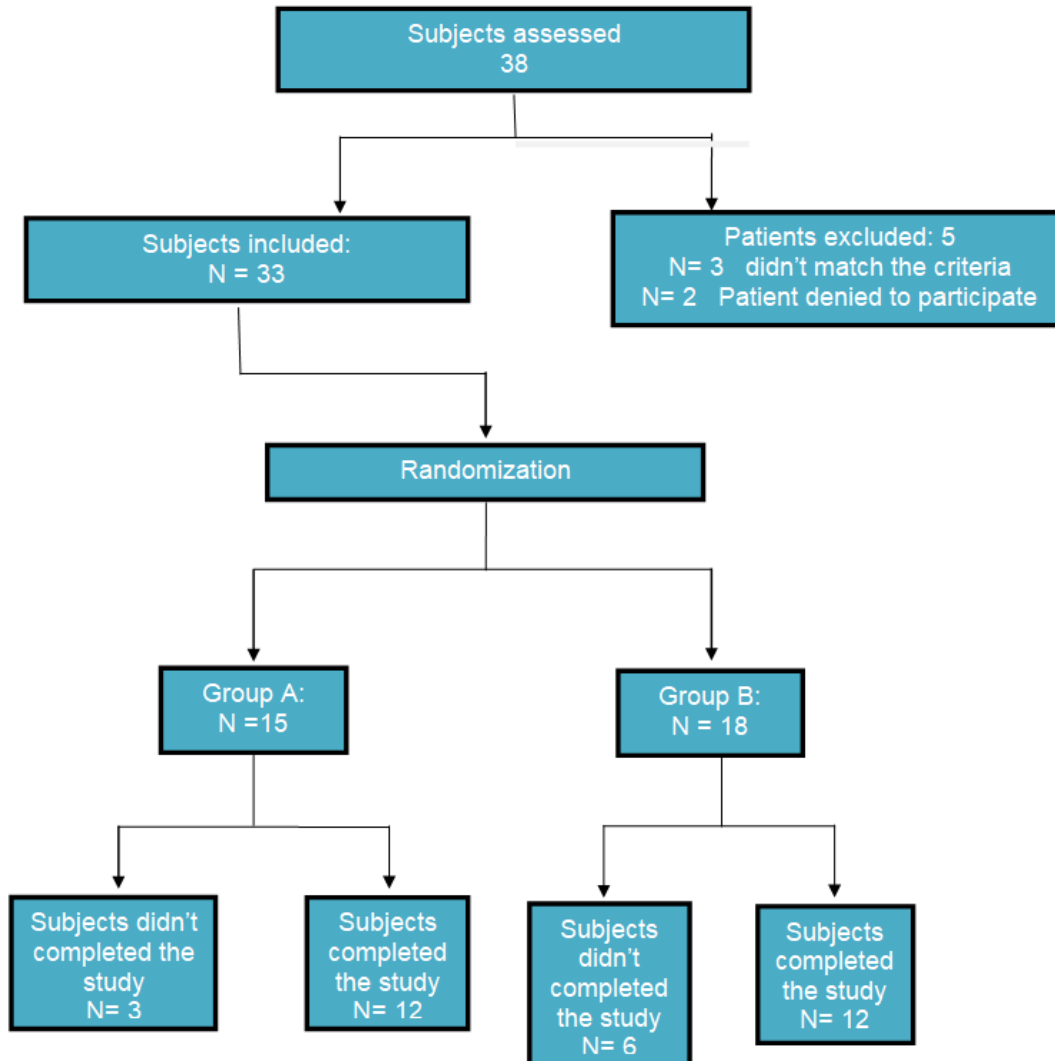
Group A: 12 patients, Group B: 12 patients

The total number of subjects were screened are 38. Out of which 33 were included in the study and 5 patients were excluded out of which 03 patients didn't match the inclusion criteria and 2 patients didn't complete the two weeks of duration of intervention.

2.2 Sample Size

It was calculated using Standard deviation (s.d. = 9.83) and difference of mean (= 30) from pilot

2.3 Flow Chart



2.3 Procedure

Patients with NSLBP referred to physiotherapy department by expert orthopaedic specialist were screened as per their inclusion and exclusion criteria & informed consent form was filled by them. As base line data, the pain intensity was estimated by utilizing visual analogue scale (VAS) and core endurance was checked by Core Stabilizer (chattanooga) and functional disability was assessed by filling Modified Oswestry disability index (MODI). At the end of 2 weeks, all above mentioned outcomes were re-assessed.

2.4 Intervention

Subjects were instructed to continue their routine activities and not to involve themselves in other regime or sports activity. With the lottery method they were assigned in group. Both the group received acupuncture TENS for 15 minutes, each exercise they have to perform 10 times with 5 seconds of hold, in the fourth coming week exercise sets were increase which became two sets of exercise (10*2) with 10 seconds of hold. [11,12,13] For measuring core endurance Chattanooga pressure biofeedback unit was used and standard procedure described in the manual was followed. The performance index was calculated by the formula i.e. number of times subjects can perform multiply by the holding capacity of patient. The functional activity was assessed by modified oswestry disability scale. Both the group received same type of exercise as mentioned below. Additionally in Group B subjects were trained how to maintain balance on ball initially and they performed

Abdominal curl up exercise, Back extension exercise, Pelvic bridge, Straight leg raise. Same exercises were performed by group A participants on mat (Traditional back exercise).

Wilcoxon signed rank test, Man Whitney U test were used for statistical analysis

3. RESULTS

Table 1 shows pre and post treatment values of pain calculated by Wilcoxon signed rank test within the group. Group A shows mean and SD of pre-treatment value is 6.61 and ± 0.54 respectively and of post treatment value shows mean and SD is 3.38 and ± 1.17 respectively with Z value -3.02 and *P value* .002. Group B shows mean and SD of pre-treatment value is 6.58 and ± 0.78 respectively while post treatment value shows mean and SD of 3.35 and ± 0.81 respectively with Z value - 3.13 and *P value* .002. This shows that both the groups have significant improvement in reducing pain.

Table 2 shows pre and post treatment values of Core Endurance calculated by Wilcoxon signed rank test within the group. Group A shows mean and SD of pre-treatment value is 29.15 and ± 20.18 respectively and of post treatment value shows mean and SD is 51.65 and ± 16.94 respectively with Z value -3.10 and *P value* .002. Group B shows mean and SD of pre-treatment value is 19.15 and ± 07.91 respectively while post treatment value shows mean and SD of 46.65 and ± 11.52 respectively with Z value - 3.10 and *P value* .002. This shows that both the groups have significant improvement in Core Endurance.

Table 1. Intra Group Pre and Post Comparison of VAS

Groups	VAS	Mean	\pm SD	Z	P
Group A	Pre	6.61	0.54	-3.02	.002
	Post	3.38	1.17		
Group B	Pre	6.58	0.78	-3.13	.002
	Post	3.35	0.81		

Table 2. Intra Group Pre and Post Comparison of Core Endurance

Groups	Core	Mean	\pm SD	Z	P
Group A	Pre	29.15	20.18	-3.10	.002
	Post	51.65	16.94		
Group B	Pre	19.15	07.91	-3.10	.002
	Post	46.65	11.52		

Table 3. Intra Group Pre and Post Comparison of MODI

Groups	MODI	Mean	±SD	Z	P
Group A	Pre	43.81	11.62	-3.070	.002
	Post	26.31	9.43		
Group B	Pre	42.3	13.02	-3.063	.002
	Post	26.65	6.60		

Table 4. Inter Group difference between three outcome measures

Outcome		Group A	Group B	U-Value	P-Value
VAS	MEAN	3.20	3.20	72.00	1.00
	±SD	1.10	1.18		
Core	MEAN	22.3	27.3	44.00	.072
	±SD	6.19	6.19		
MODI	MEAN	17.3	15.81	58.00	.414
	±SD	5.95	7.72		

Table 3 shows pre and post treatment values of MODI calculated by Wilcoxon signed rank test within the group. Group A shows mean and SD of pre-treatment value is 43.81 and ± 11.62 respectively and of post treatment value shows mean and SD is 26.31 and 09.43 respectively with Z value -3.070 and *P value* .002. Group B shows mean and SD of pre treatment value is 42.3 and ± 13.02 respectively while post treatment value shows mean and SD of 26.65 and 6.60 respectively with Z value - 3.063 and *P value* .002. This shows that both the groups have significant improvement in reducing functional disability.

Here, the data was not normally distributed. Hence, Man Whitney U test was used for analysis. In Table: 4, *P value* of VAS, Core Endurance and MODI are 1.00, 0.072 and 0.414 respectively. This shows no significant difference between two groups.

DISCUSSION

The findings of this study depicted that participants had significant reduction in pain, disability and progress was noted in the endurance of soft-tissues of lumbar musculature. Group A subjects were given traditional exercises while Group B subjects were given Swiss ball exercises along with it, they were given TENS.

Comparing VAS measures taken after 2 weeks of the treatment, in group A (z -value= -3.02, *p*-value=.002), it showed a statistically significant improvement. This result is supported by

Jalalvand et al. found that conventional exercises decreases pain in low back, the explanation could be practice reinforces the delicate tissues which prompted decrease in pain notwithstanding this the activities encourages the patient to keep up the parity in the space which may prompt increment in the certainty of the patient while strolling. Those exercises or developments which were limited can be continued by the patients.[14] Jalalvand et al. did demonstrate the greater efficacy of specific exercises for transverses abdominis compared with general exercise and spinal manipulative therapy in patients with Low Back Pain. He found that there was significant reduction in the pain in the group which was administered exercises for transvers abdominis the reason behind is, those exercises improved motor control of the musculature which reduces pain to a greater extend compared with other groups. [15].

The present study also showed a decrease in VAS in group B (z = -3.13, *P*=.002). which is supported by the study done by Joo Soo Yoon et al. supports the present result which concluded that compared to traditional exercise; exercising on ball is evidently proving that it decreases pain. That could be because of comprehensively improving muscle strength, endurance, balance, and flexibility of the trunk and the reflexes, cognitive sense, balance, and proprioceptive sense while the individual does exercises on ball. [16]

In the study of Kang et al. concluded that there is significant improvement in VAS compare with another group. These results verify the theory

that the use of Swiss ball as we exercise on it, it may increase the activation of global and local trunk muscles during bridging exercises in the supine and prone positions which helps in reducing low back pain as well as it improves muscles strength, endurance. [14]

Comparing core endurance taken after 2 weeks of the treatment, in group A (z-value= -3.10, P-Value=.002), it showed a statistically significant improvement.

Gauri Shankar et al. stated that exercises without swiss ball are effective and improves trunk endurance. Because specific set of training provides the muscles to be trained & Subject finds it easy to perform as surface is stable. [17]

Comparing core endurance taken after 2 weeks of the treatment, in group B (z-value= -3.14, P-value=.002), it showed a statistically significant improvement.

Exercises with swiss ball are effective in improving in trunk endurance at the end of 5 weeks of endurance training this is because performing abdominal and back exercises on unstable surfaces stressed the musculature and activated the neuroadaptive mechanisms that led to the early phase gains in stability and proprioceptor activity. Which was supported by the previous study done by chaurasiya et al.

Modified Oswestry disability index was compared for both the group which also showed identical results in both the. This result is due to reduction of pain in both the groups as well as improvement in the core endurance enhanced their performance.

Wolfson et al. demonstrated that short term exposure to alter sensory input resulted in significant improvement in sway control and inhibit the inappropriate motor responses and improves the stability. While comparing core endurance in both the groups showed analogous result. The reason behind could be in both the groups exercises focuses mainly on the deepest muscles; therefore, identical result is found. [17]

4. CONCLUSION

The study concluded that conventional exercise played key role in reducing intensity of pain where as core endurance is enhanced in the both the groups therefore functional individuals

participation in activities is enhanced than the previous status. This shows both the form of exercises are effective in all the parameters mentioned above.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

The study was approved by Institutional ethical committee. A comparative and randomized controlled trial was conducted.

This study has been conducted in Out Patient physiotherapy Department of Ahmadabad. All patients were referred from Consulting Orthopaedic surgeon to Physiotherapy department.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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