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The efficacy of core stability exercises versus conventional physiotherapy in lower back pain

Megha Goswami [1, *], Madhusudan Tiwari [2], Yogesh Goswami, Vidhi Gupta [3] and Arvind Tomar [4]

[1] *Associate Professor, Mahatma Gandhi Physiotherapy College, MGUMST, Jaipur, India.*
[2] *Principal and Dean, Mahatma Gandhi Physiotherapy College, MGUMST, Jaipur, India.*
[3] *Assistant Professor, Mahatma Gandhi Physiotherapy College, MGUMST, Jaipur, India.*
[4] *Professor, Mahatma Gandhi Physiotherapy College, MGUMST, Jaipur, India.*

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Abstract

Context: Practice guidelines recommend various types of general exercise and core stability exercises with electrotherapeutic modalities for chronic back pain but it remains the primary cause of absenteeism and disability. Chronic low back pain causes activity limitation in persons younger than 45 years. Core stability exercise is becoming increasingly popular for low back pain.

Aims: To find out the effectiveness of core stability exercises on Pain and Disability in patients with chronic low back pain

Settings and Design: A comparative study was done in the Physiotherapy OPD of Mahatma Gandhi Medical College & Hospital Jaipur.

Methods and Material: 40 subjects suffering from low back pain as per the inclusion and exclusion criteria were enrolled. The subjects were divided into two Group A (core stability) and Group B (General exercises). Before the treatment session, the pain and disability of the patients in each group were assessed with the help of the VAS scale and ODI scale respectively. After 15 days they were again assessed and the improvement levels were calculated.

Statistical analysis used: Paired t-test was used to analyze significant changes between pre-test & post-test measurements.

Results: Statistical analysis made with the quantitative data revealed a statistically significant difference between the Core stability group & General exercises group on pain & disability level. Group A (core stability) improved in VAS and ODI compared to Group B (General exercises) with P values of 0.018 and 0.021 respectively.

Conclusions: The findings reveal that core stability exercises are more effective than General exercises in chronic low back pain patients.

Keywords: Visual analogue scale (VAS); Oswestry Disability Index; Low Back pain; Chronic Low Back pain; Transverse Abdominus; Transcutaneous Electrical Nerve Stimulation (TENS)

* Corresponding author: Megha Goswami

1. Introduction

Low back pain has been and continues to be one of the enigmas of modern medicine [1]. Low back pain is a common disorder involving the muscles and bones of the back [2]. Chronic low back pain (CLBP) is defined as low back pain that persists for more than 12 weeks, and it is the most frequently reported clinical symptom of orthopaedic diseases in Europe and the United States [5]. More than 50% of people in the United States are affected by CLBP [6], and it is the primary cause of work absence and permanent disability [7, 8].

Chronic LBP represents a greater financial burden in the form of direct costs resulting from loss of work and medical expenses as well as indirect costs. Paul W. Marshall says the term core stability is a generic description for the training of the abdominal and lumbopelvic region [9]. The global; stability system refers to the larger, superficial muscles around the abdominal and lumbar region, such as rectus abdominus, paraspinal, and external obliques. These muscles are the prime movers for trunk or hip flexion, extension, and rotation. Local stability refers to the deep, intrinsic muscles of the abdominal wall, such as transverses abdominus and multifidus. These muscles are associated with segmental stability of the lumbar spine during gross whole-body movements and where postural adjustments are required. There is a synergistic relation between the global and local stability systems that elicit a satisfactory training effect. [10,11]. Exercise therapy appears to be slightly effective for decreasing pain and improving function in adults with chronic LBP.

Exercises were developed to improve endurance, strength and flexibility of the spinal tissues. General exercise includes strengthening, stretching, and aerobic exercise. Exercise therapy seems to be an effective treatment to relieve the pain and to improve the functional status of patients with chronic LBP Therapeutic exercise is a common conservative intervention used by clinicians to decrease pain, improve disability, and restore muscular function. Exercise therapy appears to be slightly effective for decreasing pain and improving function in adults with chronic LBP [12].

Core stability exercises have become a popular form of therapeutic exercise and are seen as a critical component to restoring proper kinetic function. The aim of study was to find out the efficacy of core stability exercises versus conventional physiotherapy in patients with chronic low back pain. Exercises were developed to improve endurance, strength and flexibility of the spinal tissues. General exercise includes strengthening, stretching, and aerobic exercise. Exercise therapy seems to be an effective treatment to relieve the pain and to improve the functional status of patients with chronic LBP Therapeutic exercise is a common conservative intervention used by clinicians to decrease pain, improve disability, and restore muscular function. The collected data were tabulated & analysed using descriptive & inferential statistics. To all parameters mean & standard deviation (SD) were used. A paired t-test used to analyse significant changes between pre-test & post-test measurement global exercises are multidirectional and non-specific [13,14].

2. Material and Methods:

- **Evaluation of study subject –** A comparative study design was done on 40 Chronic Low Back Pain patients were considered for the study from the orthopaedics department of Mahatma Gandhi Medical College under the guidance of an orthopaedician. Groups A and B, each had 20 subjects. A simple Random Sampling Method was used.
- **Inclusion Criteria:** - Patient with Chronic low back pain of more than two months with age criteria between 30 to 45 years Both sexes were included. Patients with minimum to moderate disability (upto40%)on the ODI scale.
- **Exclusion Criteria** -Spinal or disc pathologies. History of fractures (spine, rib) or injury, patient with a history of abdominal surgery, subject who is on regular fitness program, any other systemic illness, and any previous or current experience of performing core strengthening exercises
- **Modified Oswestry Low Back Disability Questionnaire -**This questionnaire has been designed to give your therapist information as to how your back pain has affected your ability to manage in everyday life. [13] Please answer every question by placing a mark in the one box that best describes your condition today. We realize you may feel that 2 of the statements may describe your condition, but please mark only the box that most closely describes your current condition. The modified Oswestry Index was used to measure disability and consists of 10 questions. Each question is scored from 0 to 5, with high scores indicating greater disability. The scores are then converted to a percentage out of 100. A written informed consent after explaining the advantages and disadvantages of the study was taken from them. Before the treatment session, the pain and disability of the patients in each group were assessed with the help of the VAS scale and ODI scale respectively. After 15 days they were again assessed and the improvement levels were calculated. Both groups will receive exercises on a regular basis for 2 weeks.

- **Procedure -** 40 patients suffering from chronic low back pain and those who met the inclusion criteria were selected. The subjects were divided into two groups, A and B. Sample size **40.** All the participants with chronic low back pain who reported to Mahatma Gandhi Physiotherapy College Sitapura Jaipur during the study period were included. Their suitability as per the inclusion and exclusion criteria was made before enrolment.
- **Group A** received core stability exercises for muscles rectus abdominis, gluteal muscles, transverse abdominis, lower abdominals, deep transverse spine stabilizers and extensor of the lumbar spine. The exercise protocol included, Abdominal hallowing, Bridging, Cat Stretch, Quadruped Alternate Arm/ Leg raise, Prone Plank, and Modified Curl- Up.
- **Group B** received ultrasound and TENS with general strengthening exercises. The exercise protocol included Warm-ups, Supine Cycling, Knee to the chest, Heel Slides, Leg Slides, and Trunk Curls. The **Ultrasound w**as given at a frequency of 3 MHz 1.2 cm for 7mins with **TENS** continuous mode 15 min on 100 hertz. Each exercise was given for 10 repetitions with 10 sec hold and progression of 15 repetitions with 10 sec of hold

A written informed consent after explaining the advantages and disadvantages of the study was taken from them. Before the treatment session, the pain and disability of the patients in each group were assessed with the help of VAS scale and ODI scale respectively. After 15 days they were again assessed and the improvement levels were calculated. Both groups received exercises on a regular for 2 weeks.

2.1. Statistical Analysis

Outcome measures of all the individuals were analysed on day 1 before the start of therapy (pre-intervention) and at the end of 15 days (post-intervention). The collected data were tabulated & analysed using descriptive & inferential statistics. To all parameters mean & standard deviation (SD) were used. Paired t-test was used to analyse significant changes between pre-test & post-test measurements.

3. Results

In this study paired t – test was, used for all two variables, ODI questionnaire score.

3.1. Comparison of pre and post-scores of VAS within two groups

Comparison of Pre and post-scores of VAS within two groups were done with Group A with Core stability Exercises and Group B with general exercises Results are presented in Mean ± SD. The figure below describes the comparison of pre and post-scores of VAS within two groups. It shows, in both the groups there was significant improvement between pre and post mean scores. In Group A (core stability) when compared for pre and post mean score there was significant improvement from 4.45±0.80 to 3.00±1.00 with p value <0.01* and Group B (General exercises) there was significant improvement from 4.60±0.86 to 3.8±1.08 with p value < 0.01*.

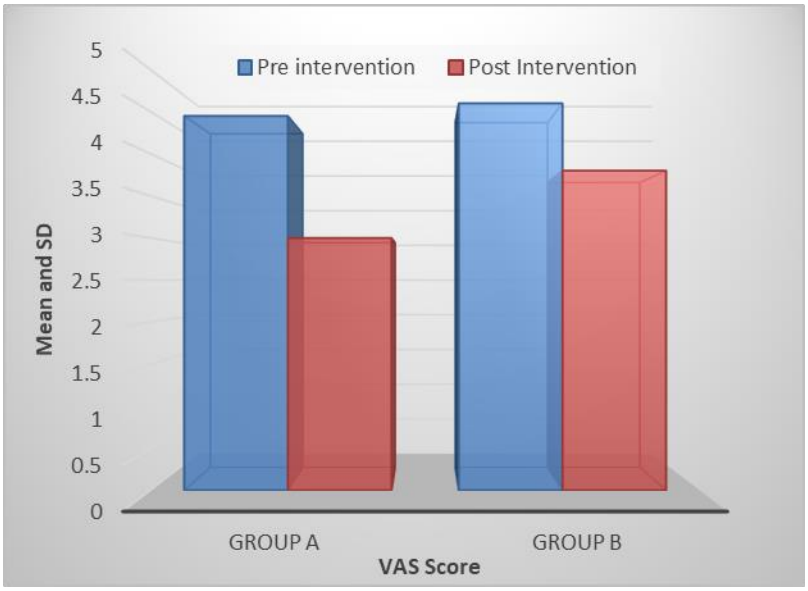

Figure 1 Comparison of pre and post-scores of VAS within two groups

3.2. Comparison of pre and post-scores of the ODI Index within two groups

The Results are presented in Mean +_SD. The figure describes the comparison of pre and post-scores of ODI within two groups. It shows, in both the groups there was significant improvement between pre and post-mean scores. In Group A (core stability) when compared for pre and post-mean scores there was a significant improvement from 23.6 ± 4.50 to 21.1± 4.36 with p-value <0.01** and in Group B (General exercises) there was a significant improvement from 27.8 ±7.10 to 26.8±6.31 with p-value < 0.05.

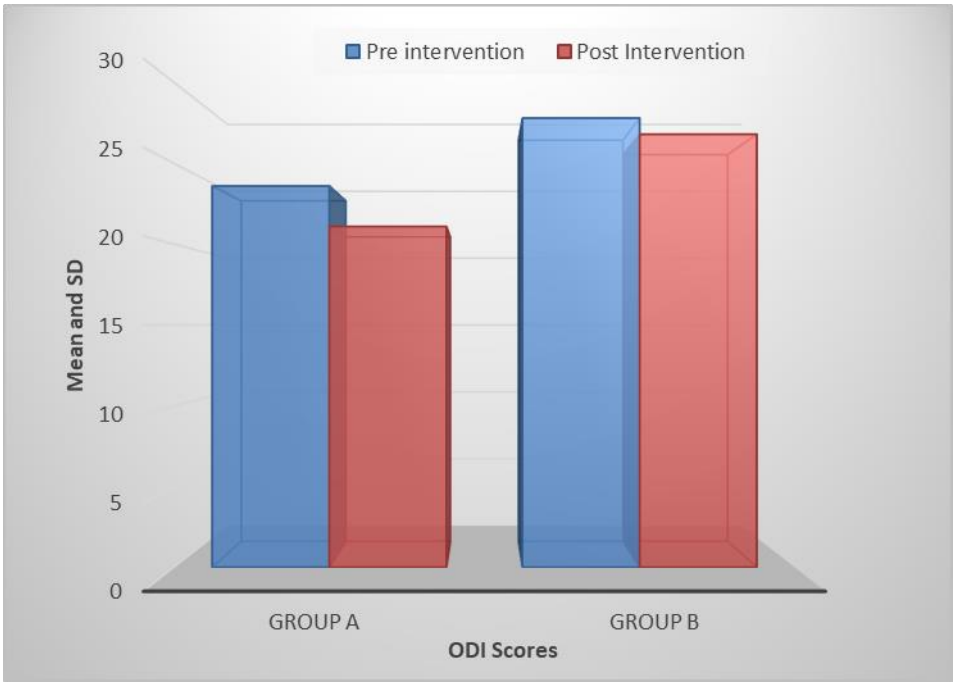

Figure 2 Comparison of pre and post-scores of ODI within two groups

3.3. Comparison of the difference in the improvement of VAS and ODI between the groups

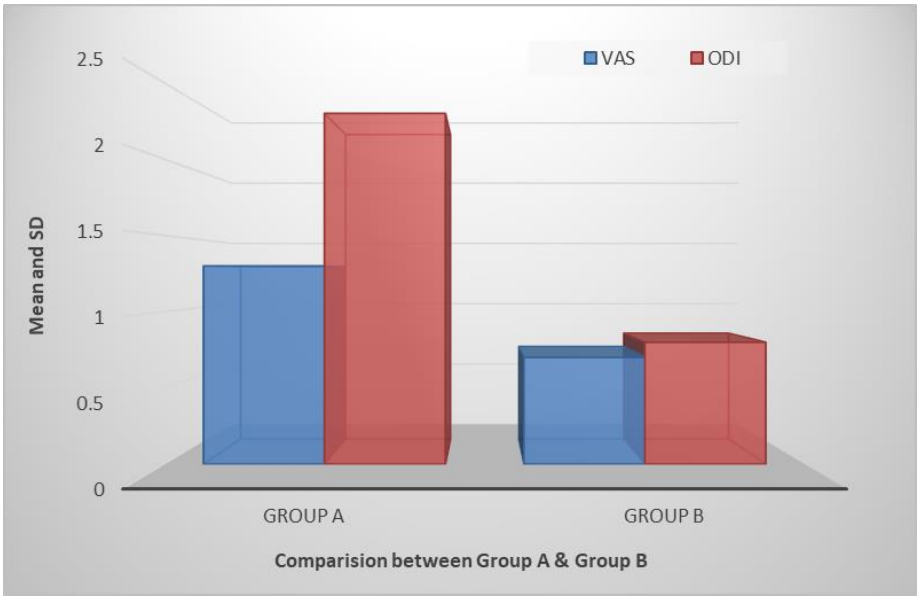

Figure 3 Comparison of the difference in the improvement of VAS and ODI between the groups

The above figure describes the comparison of differences in improvement in VAS and ODI between the two groups. It shows, in both that there was significant difference in improvement of VAS and ODI groups. Group A (core stability) showed better improvement in VAS and ODI compared to Group B (General exercises) with P value of 0.018 and 0.021 respectively. Findings reveal that core stability exercises are more effective than general exercises in chronic low back pain patients.

4. Discussion

The study was for two weeks, core stability exercises reduced pain and disability in patients with chronic low back pain. The study is entitled as" The efficacy of core stability exercises versus conventional physiotherapy in chronic low back pain".

The Group A subjects were allowed to perform core stability exercises and Group B performed general exercises with tens and ultrasound therapy. The primary aim of this study was to determine if core stability exercises versus conventional physiotherapy treatment resulted in reducing back pain and disability in chronic low back pain patients.

- Within the group comparison of pain and Disability [Group A] values of VAS and ODI were done using a paired t-test, with level of significance, p set at 0.05. The comparison of VAS and ODI readings for pain and Disability at various stages of group A was found to be statistically significant ($p<0.0001$).
- Within the group comparison of pain and Disability [Group B] - values of VAS and ODI were done using a paired t-test, with level of significance, p set at 0.05. The comparison of VAS and ODI readings for pain and Disability at various stages of group A was found to be statistically significant with $P<0.0001$ and $P<0.05$ respectively.
- The comparison between Group A & Group B for the Visual Analogue Scale & Oswestry Disability Scale was done The pain reduction on VAS scale in Group A was statistically significant compared to Group B with $p < 0.05$. The reduction in disability on ODI score in Group A was statistically significant compared to Group B
- with $p < 0.05$.

Core stability exercise focuses on spinal stability by strengthening transverses abdominus and lumbar multifidus.[14] These exercises in comparison to general exercises focus more on lumbar stability and improve the postural imbalance created by a weak core. Thus, core exercises are useful in CLBP as shown by comparative study based on ODI scale and VAS scale. The reduction of pain and disability proves that CLBP have improved greatly by core stability. Further study can be done by including more scales to evaluate core strength and further adding modified core training.

5. Conclusion

The study concluded that both core stability exercises and general exercises showed significant improvement in pain and disability in chronic low back pain patients. Findings reveal that core stability exercises are more effective than general exercises in chronic low back pain patients.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

Ethical approval was taken for this study from the institutional ethical board of Mahatma Gandhi university of medical sciences and technology.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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