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ROLE OF CORE STABILIZATION EXERCISES TO TREAT NON SPECIFIC LOWER BACK DISCOMFORT IN FAST BOWLERS

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KEYWORDS

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Abstract

The primary objective of the present study is to evaluate the effectiveness of core stabilization exercises of improving dynamic function in fast bowlers diagnosed with non specific lower back discomfort. Pre and post evaluation was performed on 30 participants using the VAS (Visual Analog Scale), Modified Oswestry Low Back pain disability Questionnaire. The findings suggest a significant reduction in pain level and improvement in range of motion and functional abilities and dynamic function following the intervention. These data suggest that the application of core stabilization exercises is effective intervention for treating with non specific lower back discomfort in fast bowlers.

INTRODUCTION

Lumbar stress injuries in fast bowlers develop as a result of multiple interacting factors rather than a single cause. Biomechanical characteristics such as

excessive shoulder counter-rotation, pronounced lateral trunk movement, inadequate lumbopelvic stability, and repeated exposure to high ground reaction forces can substantially increase mechanical stress on the lumbar spine. In contrast, certain physical attributes, including adequate ankle dorsiflexion, may help reduce spinal loading and provide a protective effect. Sudden increases in bowling workload and individual differences in spinal movement patterns can further elevate the likelihood of injury, particularly among younger athletes whose musculoskeletal systems are still developing[1,2]. The location and pattern of lumbar stress injuries often differ between sporting activities, suggesting that sport-specific movement techniques influence the magnitude, direction, and distribution of forces acting on the spine. In cricket fast bowling, a unique technical requirement is that the bowling arm must remain extended during ball delivery. To achieve an effective release position while maintaining this rule, bowlers frequently adopt a considerable degree of trunk side flexion toward the side opposite the bowling arm. This movement becomes particularly important during the front foot contact phase of the bowling action, when peak ground reaction forces are generated. Because maximal contralateral trunk side flexion often occurs at the same time as these high impact forces, substantial loads may be transferred through the lumbar spine. Repeated exposure to these forces over time can contribute to the development of lumbar bone stress injuries. Recent evidence has highlighted a potential association between excessive contralateral thoracolumbar side flexion during front foot contact and the occurrence of lumbar bone stress injuries as well as other forms of lower back pain in fast bowlers. These linkages emphasize the importance of bowling technique and movement control in reducing spinal stress and minimizing injury risk[3,4]. The term core[5] generally refers to the lumbo-pelvic–hip region, which serves as the central link between the upper and lower extremities[6]. Stability within this region is provided by both passive structures(ligaments and joint capsules) and active structures(surrounding musculature). Together, these components create a stable base that supports effectuve movement of the limbs and helps the body respond to the physical demands of daily and sporting activities. Effective core stability depends not only on muscular strength and endurance but also on precise neuromuscular coordination, allowing the trunk to maintain

appropriate alignment over the pelvis and lower limbs while absorbing and distributing forces generated during movement.

Muscles contributing to core function can be broadly classifies into two group on the basis of their role or function. The first group consists of local muscles (localizers), which are situated close to the spine and typically span only one or two vertebral segments. Their primary function is to provide segmental control and maintain spinal stability during movement. The second group is known as global muscles (globalizers), which generate larger body movements and transfer forces between different regions of the body[7]. Although these muscles contribute significantly to movement production, they play a comparatively smaller role in maintaining segmental spinal stability. Research has suggested that impaired neuromuscular control of the deep stabilizing muscles, particularly the transverse abdominis, may be associated with the development and persistence of nonspecific low back pain. Rather than a structural defect within the muscle itself, the problem often lies in the timing and coordination of muscle activation. Under normal conditions, the transverse abdominis activates before limb movement begins, preparing the spine and trunk for the upcoming task. However, in individuals with low back pain, this anticipatory activation may be delayed or altered, resulting in reduced spinal support during movement. When core stability is compromised, inefficient movement patterns and compensatory neuromuscular strategies may develop[8]. Because individuals must continue performing daily activities despite pain or dysfunction, these compensations can become habitual over time. Persistent abnormal movement patterns may place excessive or uneven stress on spinal joints and surrounding tissues, increasing the risk of recurrent episodes of low back pain. Such adaptations can further limit physical activity, reduce functional capacity, and negatively affect overall quality of life. Consequently, restoring proper core muscle function and neuromuscular control is considered an important component in the prevention and management of recurrent low back pain[9]

In this study, the tools we will use for assessment are the visual analog scale (VAS) and the Modified Oswestry Low Back pain disability Questionnaire is well

known condition specific outcome measure that helps to quantify disability in patient with low back pain. [10]. This study aims to add to the currently contribute literature by investigating the effects of sport specific core strengthening[11,12,13] to reduce lower back pain/discomfort in fast bowlers through identifying influence upon performance metrics this research may provide invaluable information to coaches, trainers and physiotherapists who work with youth sports development. The results may contribute to evidence-based remedies for proper performance and injury risk reduction that will promote long-term career progression.

AIM & OBJECTIVES OF THE STUDY

To assess the efficacy of Core stabilization exercise in the treatment of non specific lower back discomfort in fast bowlers.

MATERIALS AND METHODOLOGY

The cross sectional research design was used in study. A cross sectional study is a sort of observational research in which data is collected at a single moment in time to evaluate the relationship between variables. The study used randomized sampling as its sample design. The participants (fast bowlers) were affected with non specific lower back discomfort. These individuals were involved in the study to see how Core stabilization exercise program affected their condition.

Paper and pencil for data recording, chair for participants to sit on during assessment and treatment, a treatment couch, Thera-band, assessment form, consent form, towel for comfort or support were all used in the study.

SELECTION CRITERIA:

Inclusion Criteria:

1. Mean age 18-40 years
2. Individual specifically fast bowlers with low back pain from 1 week to 12 weeks
3. Non- specific low back discomfort
4. Dull aching pain

Exclusion criteria

1. Persons with pain in upper and middle back pain
2. Lumbar vertebrae fracture
3. Radiating pain to the limbs
4. Malignancy
5. Any auto immune disorder
6. Any neurological or pathological condition

SAMPLE SIZE AND STUDY DURATION

For this study the sample size was 30 people the individual were chosen at random from the research population to ensure representativeness and adequate data for analysis. The Study was carried out (5 times a week) for eight weeks, individuals in a clinical environment had therapy as part of the study in pacific college of physiotherapy, department of physiotherapy (PMCH) pacific medical university (Udaipur), after obtaining ethical committee approval dated 6-10-2025, PMU/IEC/MPT/2025/66. All participants completed information and consent form at recruitment. This time frame allowed for evaluation of subjects response to the therapy as well as any changes in their pain, range of motion and functional ability. Each session was scheduled for 40-45 minutes. This period was set aside to ensure the patient had enough time to execute the procedure correctly.

PROCEDURE

Permission for conduct of research is taken from the institutional ethical committee of PMCH, (**Protocol no. PMU/IEC/MPT/2025/66**) Pacific medical university bhilo ka bedla Udaipur(RAJ).

Fast bowler's Diagnosed with lower back discomfort by the Physiotherapy department, Orthopedic department OPD; initially assessed for the inclusion or exclusion criteria. Prior to the treatment procedure, all participants were informed about the purpose, procedures, potential benefits, and possible risks of the study. Written informed consent was obtained from each participant prior to enrollment.

30 subjects were selected on the basis on inclusion criteria treated with core stabilization exercise.

Week (0-2)

Dead Bug → 3 × 8 reps each side

Bird Dog (hold 3–5 sec) → 3 × 8 reps each side

Glute Bridge Hold → 3 × 20 sec hold

Side-Lying Hip Lift (knees bent, short lever) → 2 × 15 sec hold each side

Week (3-4)

Dead Bug with Stability Ball (press ball with hands & knees) → 3 × 8 reps

Bird Dog with Elbow-to-Knee Crunch → 3 × 8 reps each side

Pallof Press (band) → 3 × 10 reps each side

Side-Lying Hip Lift (legs straight) → 2 × 20–25 sec each sid

Week (5-6)

Medicine Ball Russian Twist (slow, controlled) → 3 × 10 reps

Cable/Band Anti-Rotation Press → 3 × 8–10 reps each side

Bird Dog Row (resistance band/dumbbell) → 3 × 6 reps each side

Suitcase Carry (1 DB/KB, walk 15–20 m) → 3 × each side

Week (7-8)

Medicine Ball Rotational Throw (standing, mimic bowling action) → 3 × 6 reps each side

Half-Kneeling Chop (band or cable) → 3 × 8 reps each side

Farmer's Carry (double KB/DB) → 3 × 20–30 m

Single-Leg Glute Bridge (hold 3–5 sec) → 3 × 8 reps each leg

RESULTS

A total of 30 participants were included in the study, 16 females and 14 males. In the 18–22 years age group 9 participants, 23–27 years age group,8 participants, 28–31 years age group, 7 participants, 32–35 years age group, 4 participants, 36-40 years age group, 2 participants were participated.

TABLE 1: VAS SCORE (0 WEEK vs 8 WEEKS)

Timepoint	N	Min	Max	Mean	Std. Dev.	t-value	p-value	Result
0 Week (Pre)	30	5.5	8.5	6.82	0.85	14.82	< 0.001	Significant
8 Week (Post)	30	2.2	4.2	3.05	0.57	–	–	–

Overall	60	2.2	8.5	4.93	0.73	–	–	–

GRAPH 1: VAS SCORE (0 WEEK vs 8 WEEKS)

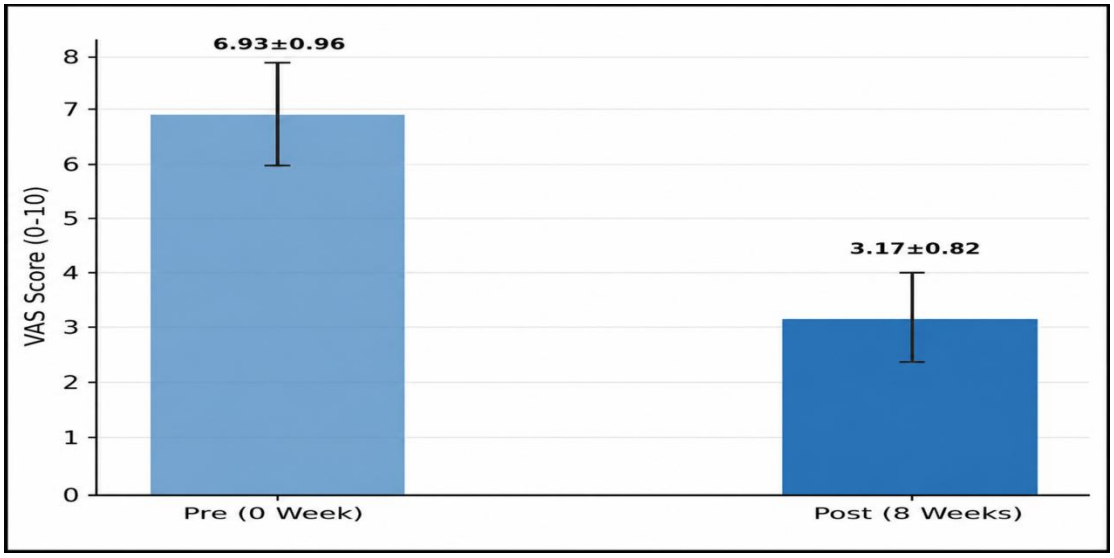

Table 1 and Graph 1 show the change in pain intensity (VAS) after CORE STABILIZATION EXERCISES over 8 weeks. The mean VAS decreased significantly from 6.82 (±0.85) at baseline to 3.05 (±0.57) at 8 weeks - a mean reduction of 3.77 points (55.3% improvement). The paired t-test confirmed high statistical significance ($t = 14.82$, $p < 0.001$). Participants who were younger (18–22 yrs) and had normal BMI showed the greatest reductions (up to 5.5 points), while older participants (36–40 yrs) with overweight BMI showed more modest improvements (~3.0 points), consistent with slower tissue adaptation.

TABLE 2: MODIFIED OSWESTRY DISABILITY INDEX (0 WEEK vs 8 WEEKS)

Timepoint	N	Min	Max	Mean	Std. Dev.	t-value	p-value	Result
0 Week (Pre)	30	44.0	70.0	56.50	7.03	18.64	< 0.001	Significant

8 Week (Post)	30	16.0	35.0	22.73	5.44	–	–	–
Overall	60	16.0	70.0	39.62	6.28	–	–	–

GRAPH 2: ODI SCORE (0 WEEK vs 8 WEEKS)

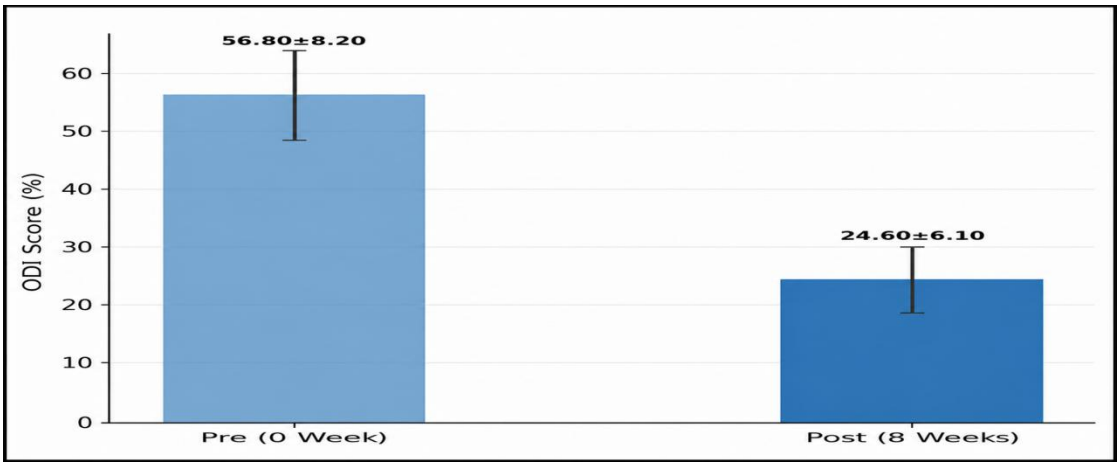

Table 2 and Graph 2 show the change in functional disability (Modified ODI) after 8 weeks. The mean ODI score decreased from 56.50% (±7.03) at baseline to 22.73% (±5.44) at 8 weeks - a mean reduction of 33.8 percentage points (59.8% improvement). This shift from the Severe disability category (40–60%) at baseline down to Minimal disability (<20%) post-intervention. The paired t-test ($t = 18.64$, $p < 0.001$) confirms highly significant improvement in functional ability.

DISCUSSION

The present study was design to examine the effects of core stabilization exercises, in fast bowlers affected with non specific lower back discomfort. A total of 30 patients were included and assessed using pre- and post-intervention outcome measures. The outcome measures used were the VAS (Visual Analog Scale), Modified Oswestry Low Back pain disability Questionnaire. The findings suggest a significant reduction in pain level and improvement in range of motion and functional abilities following the intervention. These data suggest that the application of core stabilization exercises is

effective intervention for treating non specific lower back discomfort in fat bowler's.

The study is based on the understanding that lower back discomfort in fast bowlers is a multifactorial condition influenced by several interrelated factors, including bowling mechanics, force generation, and ball release techniques. These bowling movements can be performed efficiently only when adequate trunk or core strength is maintained. The trunk plays a crucial role in providing spinal stability while facilitating mobility and effective force transfer between the upper and lower extremities. Similarly, optimal spinal mobility is closely linked to proper trunk function. Many factors may contribute to the development of lower back symptoms in bowlers, including reduced trunk mobility associated with inadequate activation of core musculature, particularly the transverse abdominis, deficits in neuromuscular control and timing, altered extremity alignment, impaired movement coordination, and decreased functional stability. Together, these impairments can increase mechanical stress on the lumbar spine and increase symptoms during bowling activities in fast bowlers. These relationships have been consistently reported in biomechanical, neuromuscular, and clinical research, providing the theoretical basis for this study.

Existing literature supports the view that an effective rehabilitation program for fast bowlers experiencing lower back discomfort should incorporate core and trunk strengthening and stabilization exercises. Reduced strength, endurance, and neuromuscular control of the core musculature have been identified as important contributing factors to the development of lower back symptoms. Therefore, interventions aimed at improving trunk stability and core function may help reduce spinal stress, enhance movement efficiency, and support recovery in this population. Previous published studies by Olivier FM ET.AL,(2024), Dash U et.al,(2024) and Dong K, Yu T, Chun B (2023) has demonstrated that strengthening programs integrating core stability strength and training produce superior improvements in pain, activity levels, and functional performance in athletes, pace bowlers and cricketers.

The intervention period was limited to 8 weeks but core stabilization exercises both produced satisfactory clinical improvements.

CONCLUSION

The findings of the study showed that core stabilization exercises program is statistically significant improvements over a 8-week intervention period in terms of improvements in range of motion and functional ability. The findings and results of the present study are clinically important for physiotherapists involved in musculoskeletal and orthopedic rehabilitation, as well as for rehabilitation professionals and rehabilitation specialists. The use of core stabilization exercises program may contribute to improving treatment strategies in the field of Non specific lower back rehab. The results of this study can be applied clinically to assist healthcare professionals in the better management. However, further studies with a larger sample size and more rigorous inclusion and exclusion criteria are required to validate and generalize these findings.

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