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Effects of Manual Therapy (McKenzie Approach) Versus Therapeutic Exercise (Core Strength) for Lower Back Pain in Fast Bowlers: A Randomized Controlled Trial

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Abstract
Background: Fast bowling repeatedly exposes the lumbar spine to extension, rotation, side flexion, impact and high cumulative training loads. Both the McKenzie Approach and core-strength therapeutic exercise are used for mechanical or non-specific lower back pain, but direct comparative evidence in fast bowlers is limited. Objective: To compare the short-term effects of McKenzie-based manual therapy with progressive core-strength therapeutic exercise on pain, disability and patient-specific function in fast bowlers with lower back pain. Methods: Thirty male fast bowlers were randomly allocated to Group A (McKenzie Approach / Manual Therapy, n=15) or Group B (Core Strength / Therapeutic Exercise, n=15) for 8 weeks. Pain was measured with the Visual Analogue Scale (VAS), disability with the Oswestry Low Back Pain Disability Questionnaire (OLBPDQ), function with the Patient-Specific Functional Scale (PSFS), and perceived recovery with Global Perceived Effect (GPE). Paired t-tests assessed within-group change, independent-samples t-tests compared groups, and chi-square tests were used for categorical variables. Results: Both groups improved significantly in VAS, OLBPDQ and PSFS (all within-group $p<0.001$). VAS decreased from 4.60 ± 1.06 to 2.40 ± 0.63 in Group A and from 4.66 ± 0.72 to 3.33 ± 0.62 in Group B. VAS improvement was greater in Group A (2.20 ± 0.67 vs 1.33 ± 0.72; $p=0.002$; $d=1.25$), as was OLBPDQ improvement (3.38 ± 1.19 vs 1.18 ± 0.65; $p<0.001$; $d=2.29$). PSFS improvement was substantial in both groups but not significantly different (10.56 ± 3.46 vs 9.93 ± 4.44; $p=0.669$). Group B attended more sessions and had higher session attendance, while adverse events were uncommon and mild. Conclusion: Both interventions were effective, but McKenzie-based care produced greater short-term reduction in pain and disability. Core-strength training provided meaningful functional gains and remains important for lumbopelvic control and return-to-bowling conditioning.

Keywords: fast bowlers; lower back pain; McKenzie Approach; manual therapy; core strengthening; therapeutic exercise; VAS; Oswestry disability; randomized controlled trial

1. Introduction

Lower back pain is a major cause of disability and an important clinical problem in physically active populations. Contemporary guidance emphasizes education, maintenance of activity, exercise-based rehabilitation and selective use of manual therapy rather than passive dependency or unnecessary investigation in uncomplicated presentations [1-6]. In fast bowlers, the clinical problem is distinct because repeated high-velocity delivery exposes the lumbar spine to combined axial compression, extension, rotation and side flexion. Symptoms may therefore reflect cumulative mechanical load, fatigue, altered movement control and inadequate recovery as well as local tissue irritation.

Fast bowling requires a kinetic chain that transfers force from the run-up and lower limbs through the pelvis and trunk to the upper limb. At front-foot contact, rapid deceleration and trunk rotation create substantial compressive and shear forces across the lumbar region. MRI-based and prospective studies in fast bowlers have reported lumbar stress injury, disc degeneration and other structural abnormalities, while bowling workload and technique have been identified as modifiable contributors [8-11]. These demands make sport-specific rehabilitation necessary: pain relief alone is insufficient if the bowler cannot tolerate repeated overs, restore trunk control or return confidently to training.

The McKenzie Approach, or Mechanical Diagnosis and Therapy, organizes assessment around repeated movement testing, directional preference, centralization or peripheralization of symptoms, posture correction and self-management. A movement direction that reduces or centralizes symptoms is used therapeutically and reinforced through a home programme. Systematic reviews suggest that McKenzie-based care can reduce pain and disability in selected patients with low back pain, although effects vary with classification and comparison treatment [13-15]. In contrast, core-strength and motor-control exercise aims to improve abdominal and spinal muscle activation, trunk endurance, lumbopelvic control and the capacity to tolerate repeated loading. Evidence supports core-stability and motor-control exercise for chronic or non-specific lower back pain, and fast-bowler-specific work has reported beneficial effects of stabilization exercise [7,16-18].

Direct comparison between these two active rehabilitation strategies is clinically relevant because they address different but complementary mechanisms. McKenzie-based treatment is symptom-response and classification driven, whereas core-strength exercise is primarily capacity and control oriented. A previous randomized trial in people with chronic low back pain and directional preference compared the McKenzie method with motor-control exercise, but sport-specific evidence in fast bowlers remains sparse [19,20]. The present randomized controlled trial therefore compared an 8-week McKenzie Approach / Manual Therapy programme with an 8-week Core Strength / Therapeutic Exercise programme in fast bowlers with lower back pain. The primary outcome was change in VAS pain; secondary outcomes included OLBPDQ disability, PSFS function, GPE, treatment exposure, adherence, medication use, protocol completion and adverse events.

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Aims & Objectives

The aim of the study was to compare the effect of Manual Therapy using the McKenzie Approach versus Therapeutic Exercise using Core Strength training on pain, functional disability and patient-specific functional performance among fast bowlers with lower back pain over an 8-week rehabilitation period.

1. To assess baseline demographic, bowling and clinical characteristics of fast bowlers in both intervention groups.
2. To evaluate the within-group change in pain intensity after 8 weeks of McKenzie Approach / Manual Therapy.
3. To evaluate the within-group change in pain intensity after 8 weeks of Core Strength / Therapeutic Exercise.
4. To compare the post-treatment and change scores of VAS, OLBPDQ and PSFS between both groups.
5. To compare perceived recovery, treatment adherence, medication use, protocol completion and adverse events between both groups.
6. To determine whether McKenzie-based manual therapy or core strength exercise produces superior short-term outcomes for lower back pain in fast bowlers.

2. Materials and Methods

2.1 Study design and participants

A two-group randomized controlled pre-test/post-test design was used. Thirty fast bowlers with lower back pain were enrolled and allocated in a 1:1 ratio to Group A (McKenzie Approach / Manual Therapy) or Group B (Core Strength / Therapeutic Exercise), with 15 participants in each group. Potential participants were screened using predefined criteria and were randomized after baseline assessment using allocation codes.

2.2 Eligibility criteria

Eligible participants were approximately 18-26 years of age, reported lower back pain during daily or bowling-related activity, could understand and perform the intervention, and were willing to attend supervised treatment and complete home exercise.

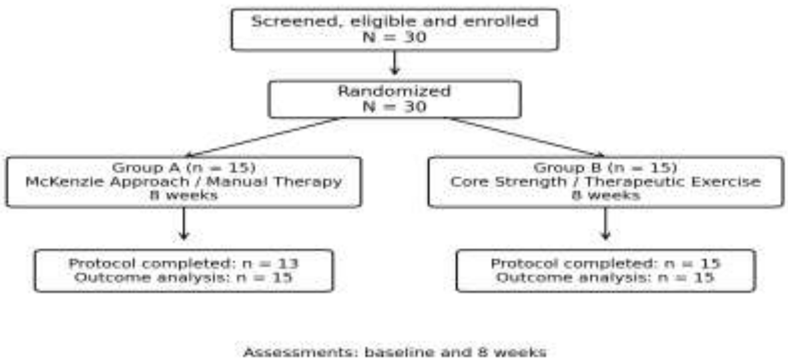

Figure 1. Participant allocation, protocol completion, assessment schedule and analysis population

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Exclusion criteria included spinal fracture or surgery, tumour, infection, inflammatory spinal disease, progressive neurological deficit, severe radicular symptoms requiring urgent referral, acute traumatic injury, systemic illness preventing exercise, non-spinal visceral pain, inability to comply with treatment, or concurrent structured physiotherapy. The analysed sample consisted of male fast bowlers. Assessments were performed at baseline and after 8 weeks.

2.3 Interventions

Group A received a symptom-guided McKenzie programme. Lumbar movement response was reassessed to identify directional preference and centralization. Repeated movements were then selected according to the response; extension-based movements and postural correction were used when extension preference was present, while flexion or lateral strategies were used when indicated. Movements that reduced pain or centralized symptoms were continued and progressed, while movements causing persistent peripheralization or sustained aggravation were modified. Education, posture correction, symptom monitoring, gradual return to activity and an individualized home programme were integral components.

Group B received progressive core-strength therapeutic exercise for the same 8-week period. Treatment began with neutral-spine awareness, controlled breathing and abdominal bracing and progressed through bridging, side bridge, prone plank, bird-dog, dead-bug variations and functional trunk-control tasks. Progression depended on pain response, exercise tolerance, trunk endurance and movement quality. Exercises causing sharp pain, increasing radiating symptoms or sustained post-exercise aggravation were modified. Both groups were advised to continue usual activities within pain tolerance and avoid sudden increases in bowling workload. Treatment sessions, attendance, home-programme adherence, medication use, adverse events and protocol completion were recorded.

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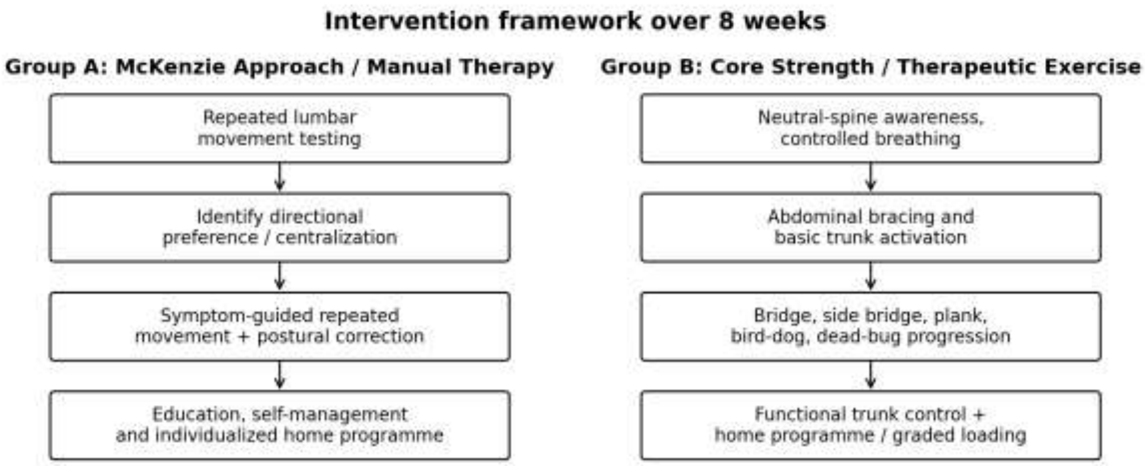


Figure 2. Schematic representation of the McKenzie and Core Strength intervention pathways.

2.4 Outcome measures

The primary outcome was pain intensity measured by VAS, with lower scores indicating less pain. Functional disability was measured with the OLBPDQ, where lower scores indicate less disability [22]. Patient-specific functional performance was measured with the PSFS, in which higher scores indicate better performance of individually relevant activities [24,28]. Perceived overall recovery after treatment was measured using GPE [25]. Supporting clinical variables included bowling history, pain duration, pain region, directional preference and centralization status. Treatment exposure, session attendance, home-programme adherence, medication use, adverse events and protocol completion were analysed as feasibility and safety variables.

2.5 Statistical analysis

Continuous variables were summarized as mean ± standard deviation and categorical variables as frequency and percentage. Independent-samples t-tests assessed baseline comparability and between-group differences in continuous outcomes. Paired t-tests tested pre-to-post change within each group. Chi-square tests were applied to categorical variables as appropriate. Cohen's d or paired standardized effect sizes were used to support interpretation of magnitude. Statistical significance was set at $p<0.05$.

3. Results

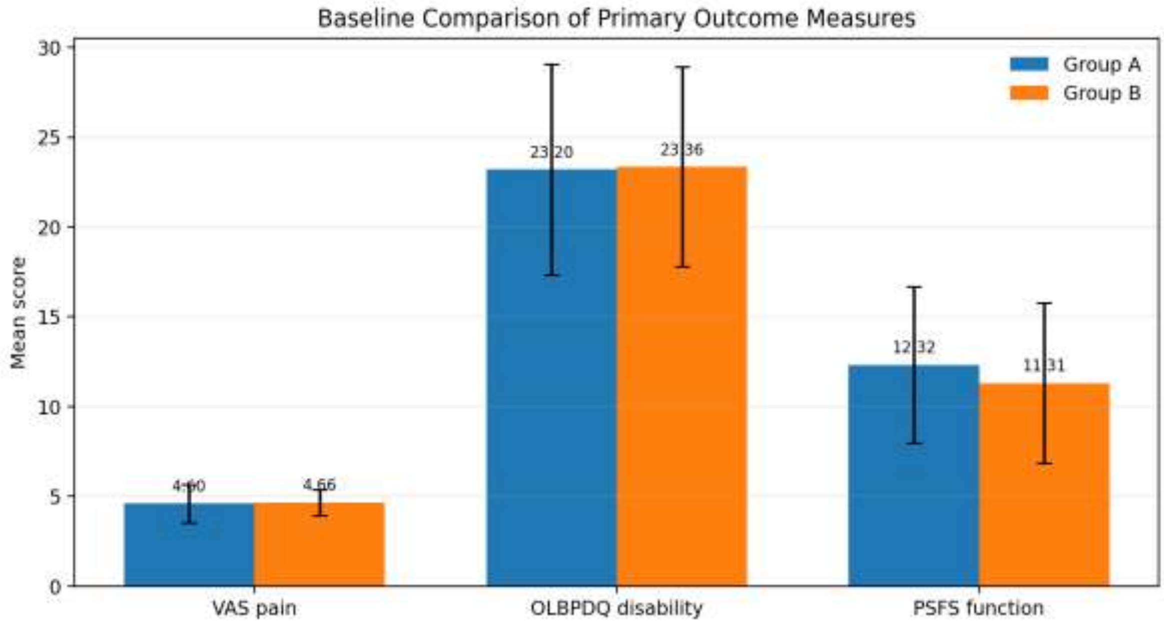
3.1 Baseline characteristics

Both groups contained 15 male fast bowlers. Mean age was identical (20.79 ± 2.08 years in each group), and height, weight, BMI, years of bowling, weekly training days, overs per week, lower back pain duration, baseline VAS, baseline OLBPDQ and baseline PSFS were not significantly different. Most categorical bowling and pain characteristics were also similar. However, centralization status differed: all 15 participants in Group A were classified as centralizers compared with 7 of 15 in Group B ($p=0.004$). This imbalance is clinically important when interpreting the stronger symptom response in the McKenzie group.

Table 1. Baseline demographic, bowling and clinical characteristics

Characteristic	Group A (n=15)	Group B (n=15)	p-value
Age, years	20.79 ± 2.08	20.79 ± 2.08	1.000
Years of bowling	4.27 ± 1.49	4.27 ± 1.28	1.000
LBP duration, months	8.40 ± 3.83	8.13 ± 3.68	0.847
VAS pain score	4.60 ± 1.06	4.66 ± 0.72	0.859
OLBPDQ disability	23.20 ± 5.86	23.36 ± 5.55	0.939
PSFS functional score	12.32 ± 4.35	11.31 ± 4.46	0.535
Right bowling arm, n (%)	13 (86.7)	13 (86.7)	1.000
Extension preference, n (%)	12 (80.0)	14 (93.3)	0.341
Centralizer, n (%)	15 (100.0)	7 (46.7)	0.004

Values are mean ± SD unless otherwise indicated. Group A = McKenzie Approach / Manual Therapy; Group B = Core Strength / Therapeutic Exercise.



Graph 1: Comparison of baseline clinical scores between Group A and Group B.

3.2 Primary and secondary outcomes

Both interventions produced statistically significant within-group improvement in pain, disability and patient-specific function. In Group A, VAS decreased from 4.60 ± 1.06 to 2.40 ± 0.63 (improvement 2.20 ± 0.67; paired t=12.73; p<0.001), OLBPDQ decreased from 23.20 ± 5.86 to 19.82 ± 4.93 (improvement 3.38 ± 1.19; p<0.001), and PSFS increased from 12.32 ± 4.35 to 22.88 ± 4.30 (improvement 10.56 ± 3.46; p<0.001). In Group B, VAS decreased from 4.66 ± 0.72 to 3.33 ± 0.62 (improvement 1.33 ± 0.72; p<0.001), OLBPDQ decreased from 23.36 ± 5.55 to 22.18 ± 5.40 (improvement 1.18 ± 0.65; p<0.001), and PSFS increased from 11.31 ± 4.46 to 21.24 ± 5.77 (improvement 9.93 ± 4.44; p<0.001).

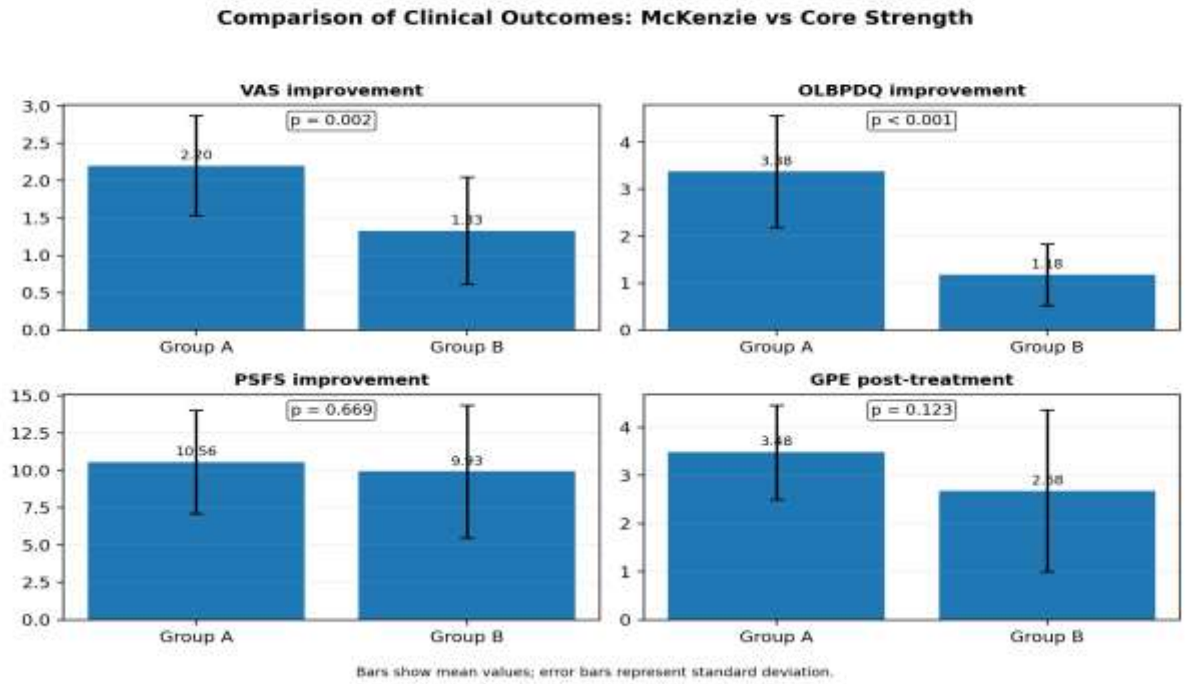
Between groups, post-treatment VAS was lower in Group A (2.40 ± 0.63 vs 3.33 ± 0.62; p<0.001; d=-1.49), and VAS improvement was greater (2.20 ± 0.67 vs 1.33 ± 0.72; p=0.002; d=1.25). OLBPDQ improvement also strongly favoured Group A (3.38 ± 1.19 vs 1.18 ± 0.65; p<0.001; d=2.29), although the post-treatment OLBPDQ difference did not reach significance (p=0.222). PSFS post-treatment scores and PSFS improvement were not significantly different (p=0.385 and p=0.669, respectively), showing that functional gains were substantial in both groups. GPE was numerically higher in Group A (3.48 ± 0.98 vs 2.68 ± 1.68) but the difference was not statistically significant (p=0.123).

Table 2. Between-group comparison of post-treatment and change outcomes

Outcome	**Group A Mean ± SD**	**Group B Mean ± SD**	**t value**	**p-value**	**Cohen d**
VAS post-treatment	2.40 ± 0.63	3.33 ± 0.62	-4.08	<0.001	-1.49
VAS improvement	2.20 ± 0.67	1.33 ± 0.72	3.43	0.002	1.25

Outcome	Group A Mean ± SD	Group B Mean ± SD	t value	p-value	Cohen d
OLBPDQ improvement	3.38 ± 1.19	1.18 ± 0.65	6.27	<0.001	2.29
PSFS improvement	10.56 ± 3.46	9.93 ± 4.44	0.43	0.669	0.16
GPE post-treatment	3.48 ± 0.98	2.68 ± 1.68	1.59	0.123	0.58

Independent-samples t-test. For VAS and OLBPDQ, lower scores and greater reductions are favourable; for PSFS and GPE, higher scores are favourable.



Graph 2: Primary and secondary clinical outcomes after 8 weeks

4. Discussion

Both the McKenzie approach and core strength training significantly improved lower back pain, disability, and function in fast bowlers over eight weeks. However, the McKenzie group achieved greater short-term reductions in pain (VAS) and disability (OLBPDQ). This advantage likely stems from a baseline imbalance favoring centralizers in the McKenzie cohort, who respond particularly well to directional preference and mechanical self-management strategies, rather than universal superiority of the method.

Conversely, core strength exercise demonstrated strong value for sport-specific trunk endurance and stability, matching the McKenzie group's improvements in patient-specific function (PSFS) despite lower pain reduction. Higher attendance in the core group highlighted its need for ongoing technique supervision, whereas McKenzie prioritized self-care. Because pain and functional task performance recover at different rates, clinical rehabilitation may be best sequenced by using early directional classification for rapid symptom relief, followed by progressive trunk conditioning for long-term athletic capacity.

4.1 Strengths and limitations

Strengths of the study include randomized allocation after baseline assessment, equal group sizes, use of validated clinical outcome measures, standardized 8-week intervention periods, analysis of both within-group and between-group change, reporting of standardized effect sizes, and inclusion of treatment exposure, adherence and safety outcomes. The main limitations are the small sample (n=30), male-only analysed population, short follow-up and absence of sport-performance outcomes such as bowling speed, overs tolerated without symptom aggravation, return-to-play status and recurrence. The unequal distribution of centralization status is particularly important because it may have favoured the McKenzie group. The study also did not include blinded outcome assessment, objective biomechanical or neurophysiological measures, or long-term follow-up; consequently, generalization beyond similar young male fast bowlers should be cautious.

4.2 Clinical implications and future research

Physiotherapists managing fast bowlers with lower back pain should first screen for red flags and features suggestive of bone stress injury. Repeated movement testing can be considered when symptoms demonstrate a directional preference or centralization response, while progressive core-strength and motor-control exercise remains important for trunk endurance, load tolerance and return-to-bowling preparation. Future trials should recruit larger and more diverse samples, stratify randomization by centralization status or directional preference, include female fast bowlers and different competitive levels, and add longer follow-up. Sport-specific outcomes should include bowling workload tolerance, overs completed, bowling speed, return-to-play time and recurrence. A factorial or sequential trial could also test whether early symptom-guided McKenzie care followed by progressive trunk conditioning produces better overall recovery than either strategy alone.

5. Conclusion

An 8-week programme of either McKenzie Approach / Manual Therapy or Core Strength / Therapeutic Exercise significantly improved pain, disability and patient-specific function in fast bowlers with lower back pain. The McKenzie-based programme produced greater short-term reduction in VAS pain and OLBPDQ disability, whereas both groups achieved substantial and statistically similar improvement in patient-specific function. Core-strength training also showed high treatment attendance and remains clinically important for lumbopelvic control and sport-specific conditioning. The results support individualized rehabilitation that matches symptom behaviour while restoring trunk capacity, with larger and longer-term trials required to confirm comparative effectiveness.

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