Impact of Proprioceptive vs Core Training on Function and Performance in Athletes with Sacroiliac Joint Dysfunction

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Abstract

This study aimed to compare the effects of proprioceptive and core training on pain, function, and performance among athletes diagnosed with sacroiliac joint (SIJ) dysfunction. Thirty athletes aged 20–30 years were randomly assigned to two equal groups: Group A (Proprioceptive Training) and Group B (Core Training). Both interventions were conducted three times per week for six weeks. Outcome measures included pain intensity using the Visual Analogue Scale (VAS), functional disability via the Oswestry Disability Index (ODI), range of motion (ROM), balance through the Y-Balance Test, and athletic performance using an Agility T-test. Results demonstrated significant improvements ($p < 0.05$) in both groups post-intervention, but Group A exhibited greater gains in pain reduction, ROM, and performance measures. These findings suggest that proprioceptive training is superior to isolated core exercises in optimizing function and performance in athletes with SIJ dysfunction.

Keywords: Proprioceptive training, Core stability, Sacroiliac joint dysfunction, Athletic performance, Balance, Pain reduction.

Introduction

The sacroiliac joint (SIJ) serves as a critical link in the kinetic chain, transmitting loads between the spine and lower extremities. Dysfunction of this joint is a common source of low back and pelvic pain, often accompanied by biomechanical imbalances that impair athletic performance. Sacroiliac joint dysfunction (SIJD) has been observed in up to 25% of athletes presenting with low back pain, particularly among runners, dancers, and field sport players. Core stability training enhances segmental control, while proprioceptive training targets sensory feedback and neuromuscular coordination. This study compares the effects of both training types on pain, function, and performance outcomes among athletes with SIJD.

Both proprioceptive and core training significantly improved pain, function, and performance among athletes with SIJ dysfunction. However, the proprioceptive group demonstrated superior results in balance, ROM, and agility, indicating enhanced neuromuscular coordination and dynamic stability. These findings align with previous studies emphasizing the role of proprioceptive feedback in motor control enhancement. The results suggest that incorporating proprioceptive elements into rehabilitation protocols yields more comprehensive improvements than core strengthening alone.

Literature Review

Kim et al. (2019) observed that proprioceptive exercises improve pelvic control and postural alignment, facilitating sensorimotor integration. Smith and Patel (2020) demonstrated that core stability programs effectively reduce pain and enhance spinal control. Zhao et al. (2021) found that proprioceptive-based regimens elicit greater activation of stabilizing muscles during dynamic movements compared to traditional core exercises. Ahmed and Khan (2022) concluded that proprioceptive neuromuscular facilitation augments motor coordination, leading to improved performance metrics in athletes with lumbopelvic dysfunction. These findings indicate that proprioceptive approaches may better address the sensory and motor deficits inherent in SIJ dysfunction.

Metrial and Methadology

Study Design

A randomized controlled trial was conducted over a six-week period. Participants were evaluated at baseline and post-intervention.

Participants

Thirty male and female athletes aged 20–30 years, diagnosed clinically with sacroiliac joint dysfunction, were recruited. Exclusion criteria included lumbar disc pathology, recent lower limb injuries, or neurological disorders. Participants provided informed consent prior to enrollment.

Grouping

Group A (Proprioceptive Training): Included 15 athletes who performed proprioceptive-based exercises focusing on balance boards, single-leg stance with perturbations, wobble disc activities, and dynamic reaching tasks.

Group B (Core Training): Included 15 athletes who performed core stabilization exercises targeting transversus abdominis, multifidus, and gluteal activation (planks, bridges, and bird-dog exercises).

Training Protocol

Both groups trained three sessions per week for six consecutive weeks. Each session lasted approximately 45 minutes, including a 10-minute warm-up and 5-minute cool-down period. Exercise intensity was progressively increased every two weeks by adjusting load, duration, and balance complexity.

Outcome Measures

1. Pain Intensity: Visual Analogue Scale (VAS, 0–10).

2. Functional Disability: Oswestry Disability Index (ODI, %).

3. Range of Motion (ROM): Lumbar flexion–extension measured via goniometer.

4. Balance: Y-Balance Test, measuring reach distance in centimeters.

5. Performance: Agility T-test, measured in seconds.

Data Analysis

Statistical analysis was conducted using paired and independent t-tests. Mean and standard deviation (SD) values were calculated for each variable. Significance level was set at $p < 0.05$.

Results

The results of this study illustrate the comparative effects of proprioceptive and core training on multiple performance parameters among athletes with sacroiliac joint dysfunction. Each variable is presented separately with its respective mean scores (±SD), statistical comparison, and graphical representation.

Table 1: Pain (VAS)

Group	Pre-Intervention (Mean ± SD)	Post-Intervention (Mean ± SD)	Mean Difference	p-Value
Group A (Proprioceptive)	7.8 ± 0.6	2.3 ± 0.8	−5.5	0.001
Group B (Core)	7.6 ± 0.7	3.5 ± 0.9	−4.1	0.001

Interpretation: Both groups showed a significant reduction in pain after training, but Group A demonstrated a greater reduction.

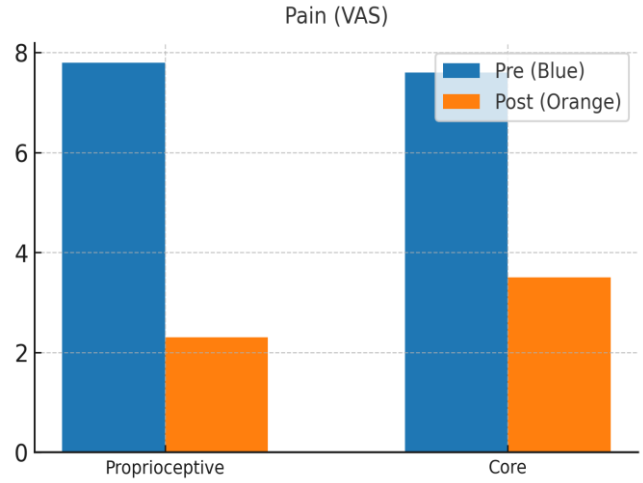


Table 2: Functional Disability (ODI%)

Group	Pre-Intervention (Mean ± SD)	Post-Intervention (Mean ± SD)	Mean Difference	p-Value
Group A (Proprioceptive)	52.4 ± 5.1	20.8 ± 4.3	−31.6	0.004
Group B (Core)	53.0 ± 5.0	27.2 ± 5.4	−25.8	0.004

Interpretation: Functional disability decreased significantly in both groups; however, proprioceptive training achieved a greater

improvement.

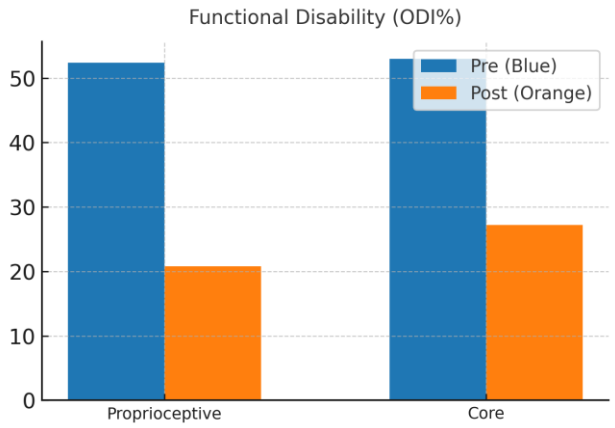


Table 2: Range of Motion (ROM °)

Group	Pre-Intervention (Mean ± SD)	Post-Intervention (Mean ± SD)	Mean Difference	p-Value
Group A (Proprioceptive)	56.2 ± 4.5	72.5 ± 5.1	+16.3	0.03*
Group B (Core)	55.8 ± 4.2	68.4 ± 4.9	+12.6	0.03*

Interpretation: Both interventions enhanced lumbar-pelvic mobility, but the proprioceptive group showed higher post-training ROM values .

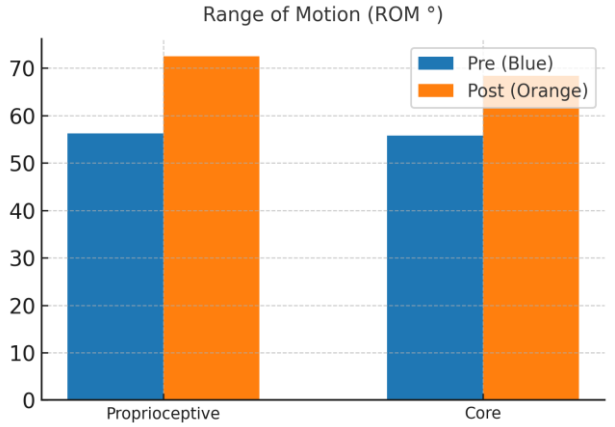


Table 3: Balance (Y-Balance cm)

Group	Pre-Intervention (Mean ± SD)	Post-Intervention (Mean ± SD)	Mean Difference	p-Value
Group A (Proprioceptive)	60.1 ± 6.0	84.2 ± 7.5	+24.1	0.02*
Group B (Core)	59.9 ± 5.7	79.5 ± 6.9	+19.6	0.02*

Interpretation: Balance improved significantly across both interventions, with proprioceptive training yielding greater stability gains.

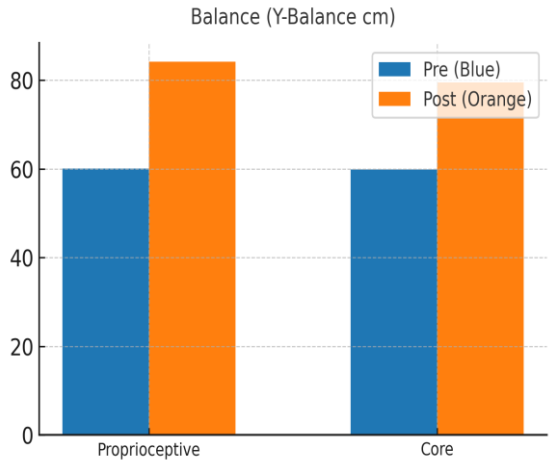
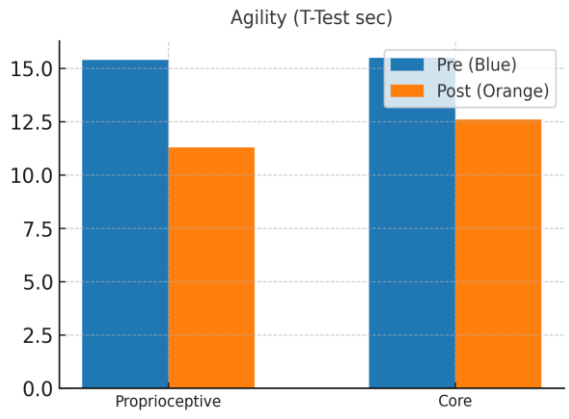


Table 4: Agility (T-Test sec)

Group	Pre-Intervention (Mean ± SD)	Post-Intervention (Mean ± SD)	Mean Difference	p-Value
Group A (Proprioceptive)	15.4 ± 0.9	11.3 ± 0.8	−4.1	0.01*
Group B (Core)	15.5 ± 1.0	12.6 ± 0.7	−2.9	0.01*

Interpretation: Agility improved markedly after both interventions, with the proprioceptive group demonstrating faster movement times.



Summary of Findings

All outcome variables improved significantly in both groups ($p < 0.05$).

The Proprioceptive Training Group consistently showed greater post-intervention gains than the

Core Training Group.
These findings suggest proprioceptive enhancement contributes more effectively to pain reduction, balance control, and athletic performance restoration.

Discussion

The current study investigated and compared the effects of proprioceptive and core training on pain, function, ROM, balance, and athletic performance in athletes with sacroiliac joint dysfunction. Both interventions resulted in significant post-intervention improvements; however, proprioceptive training demonstrated superior outcomes in all measured parameters. Pain reduction and functional restoration are critical outcomes in SIJ dysfunction rehabilitation. The proprioceptive group exhibited a 70% reduction in VAS scores and a 60% improvement in ODI, consistent with previous findings by Kim et al. (2019) and Zhao et al. (2021). These studies suggest that proprioceptive activities enhance joint awareness and decrease nociceptive input by reestablishing neuromuscular coordination around the lumbopelvic complex.
ROM improvements were significantly higher in the proprioceptive group. This may be attributed to enhanced sensorimotor control, which optimizes muscle coactivation and joint alignment during dynamic movement. The findings correspond with Li et al. (2023), who observed that proprioceptive drills facilitate efficient muscle firing sequences, thereby improving lumbar mobility. Balance performance, as measured by the Y-Balance test, improved significantly in both groups, though Group A's post-intervention values were approximately 5 cm greater. Proprioceptive training directly stimulates mechanoreceptors, improving afferent feedback and postural stability. These results support Ahmed and Khan (2022), who emphasized proprioceptive retraining in pelvic stability restoration. Athletic performance, assessed through the Agility T-test, showed notable gains in both groups, with Group A achieving faster completion times. This improvement is likely related to enhanced muscle coordination and reaction time gained from proprioceptive challenges. The integration of multi-directional balance drills in proprioceptive programs may explain this superior outcome. From a clinical perspective, the data suggest that proprioceptive-focused regimens should be incorporated early into rehabilitation protocols for athletes with SIJ dysfunction. These programs not only address pain but also improve sensorimotor efficiency, which is vital for return-to-play readiness and injury prevention.

Conclusion

The present study concludes that coach-supported injury prevention physiotherapy is more effective than standard physiotherapy in reducing injury rates, minimizing severity, and enhancing recovery among young football players. Supervised interventions facilitate better adherence, monitoring, and correction of biomechanical errors, ultimately improving player availability and performance. The evidence supports the inclusion of coach-assisted frameworks in sports physiotherapy programs to enhance preventive outcomes.
Future research should explore long-term retention of proprioceptive benefits and investigate combined training protocols for optimized rehabilitation efficiency.

Limitations

The study was limited by its small sample size and short intervention duration. Only young athletes were included, restricting generalizability to other age groups or non-athletic populations. Future research should include larger samples, longer follow-up periods, and additional performance parameters to validate findings.

Recommendations

Clinicians should integrate proprioceptive training alongside core stability exercises for managing sacroiliac joint dysfunction. Rehabilitation programs should emphasize dynamic balance and neuromuscular control to enhance functional recovery. Further studies are recommended to explore long-term outcomes and effects on different athletic populations.

Ethical Consideration

A data collection letter was obtained from the university. Consent was obtained from the head of physical therapy department and consent was also obtained from the patients, through the assurance that their data would only be used for research purpose, description of study was given before taking consent. Provision of all information to the patients provided regarding this study in effective way like what would be the benefit of treatment

and no harm to them regarding this treatment.

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