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The Effect of Core Stability and Lumbopelvic Control Exercises on Reducing Dynamic Knee Valgus and Landing Errors during Functional Rehabilitation in Athletes following Anterior Cruciate Ligament Reconstruction

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Backgrounds

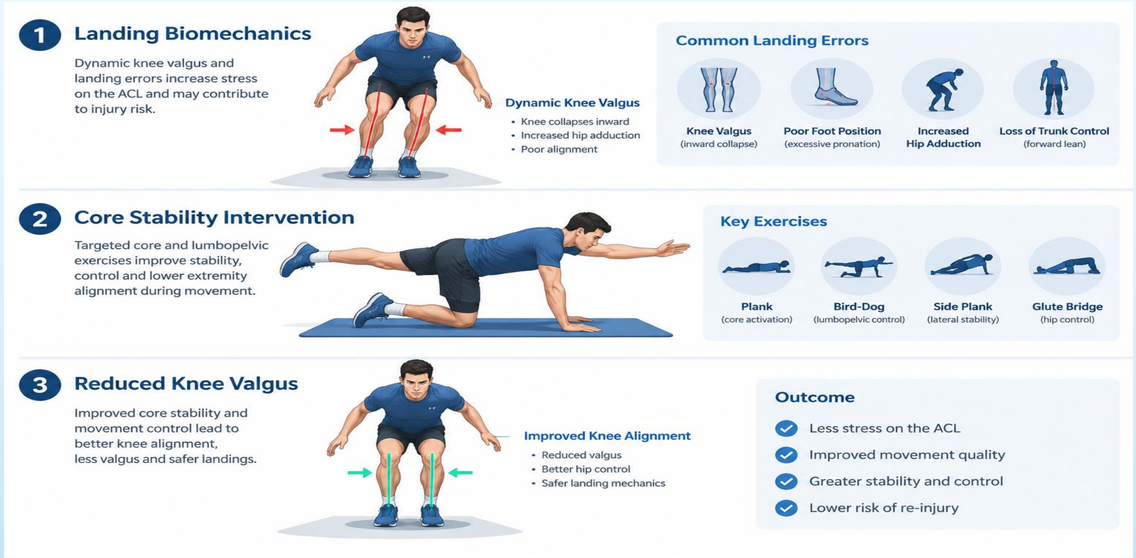
Deficits in lumbopelvic control and the presence of dynamic knee valgus (DKV) are key factors contributing to an increased risk of anterior cruciate ligament (ACL) re-rupture. This systematic review aimed to investigate the effect of core stability and lumbopelvic control exercises on dynamic knee valgus and landing errors during functional rehabilitation in athletes following anterior cruciate ligament reconstruction (ACLR).

Methods

A systematic search was conducted in PubMed, Scopus, Web of Science, Embase, and Google Scholar databases, in accordance with the PRISMA 2020 guidelines, up to the end of 2026. Randomized clinical trials (RCTs) and intervention studies that evaluated the effects of core stability or lumbopelvic control exercises on landing biomechanics in athletes following ACLR were included. Methodological quality was assessed using the Downs and Black checklist.

Findings

The synthesis of evidence indicated that core stability exercises and strengthening of hip abductor and external rotator muscles significantly reduced dynamic knee valgus angles, increased peak knee flexion angles during landing, and improved functional hop test performance. However, evidence regarding the comprehensive correction of all landing errors, based on the Landing Error Scoring System (LESS) and kinetic parameters, remained inconclusive due to heterogeneity in protocols and limited sample sizes.



Conclusion

Core stability exercises serve as an effective, complementary intervention to improve frontal and sagittal plane kinematic control during landing following ACLR. However, given the lack of conclusive evidence regarding the independent efficacy of these exercises in definitively preventing re-injury, their integration into multimodal rehabilitation programs and comprehensive return-to-sport testing batteries is essential.

References

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