

ORIGINAL RESEARCH

A DYNAMIC VALGUS INDEX THAT COMBINES HIP AND KNEE ANGLES: ASSESSMENT OF UTILITY IN FEMALES WITH PATELLOFEMORAL PAIN

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ABSTRACT

Background: Two-dimensional motion analysis of lower-extremity movement typically focuses on the knee frontal plane projection angle, which considers the position of the femur and the tibia. A measure that includes the pelvis may provide a more comprehensive and accurate indicator of lower-extremity movement.

Hypothesis/Purpose: The purpose of the study was to describe the utility of a two-dimensional dynamic valgus index (DVI) in females with patellofemoral pain. The hypothesis was that the DVI would be more reliable and valid than the knee frontal plane projection angle, be greater in females with patellofemoral pain during a single-limb squat than in females without patellofemoral pain, and decrease in females with patellofemoral pain following instruction.

Study Design: Controlled Laboratory Study

Methods: Data were captured while participants performed single limb squats under two conditions: usual and corrected. Two-dimensional hip and knee angles and a DVI that combined the hip and knee angles were calculated. Three-dimensional sagittal, frontal, and transverse plane angles of the hip and knee and a DVI combining the frontal and transverse plane angles were calculated.

Results: The two-dimensional DVI demonstrated moderate reliability (ICC = 0.74). The correlation between the two-dimensional and three-dimensional DVI's was 0.635 ($p < 0.001$). Females with patellofemoral pain demonstrated a greater two-dimensional DVI ($31.14^\circ \pm 13.36^\circ$) than females without patellofemoral pain ($18.30^\circ \pm 14.97^\circ$; $p = 0.010$). Females with patellofemoral pain demonstrated a decreased DVI in the corrected ($19.04^\circ \pm 13.70^\circ$) versus usual ($31.14^\circ \pm 13.36^\circ$) condition ($p = 0.001$).

Conclusion: The DVI is a reliable and valid measure that may provide a more comprehensive assessment of lower-extremity movement patterns than the knee frontal plane projection angle in individuals with lower-extremity musculoskeletal pain problems.

Level of Evidence: 2b

Key Words: Frontal plane projection angle, movement, rehabilitation

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