Abstract

Background: Throwing represents a complex motor skill involving intricate biomechanical patterns that integrate multiple body segments through coordinated kinetic chain activation[2,3,13,14]. While extensive research has examined throwing mechanics in elite populations, the relationships between biomechanical parameters and throwing performance among amateur athletes remain poorly understood, particularly regarding anterior pelvic tilt and stride length influences on spatial throwing parameters[1,2,4,5,6,7,8,11,12,15,16,18].

Objective: To evaluate the correlation of anterior pelvic tilt and stride length with spatial parameters (throwing deviation and distance) of throwing metrics among amateur throwers[1,2,6,9,10,11,13,14].

Methods: This cohort study examined 23 amateur throwers aged 18-24 years using convenient sampling methodology. Anterior pelvic tilt was measured using therapeutic pelvic inclinometer[6,7,11,12], stride length was assessed through digital motion capture analysis[2,3], and spatial parameters were evaluated using standardized throwing protocol with 1 kg spherical exercise ball[9,10,13,14]. Pearson correlation coefficients were calculated to determine relationships between biomechanical variables and throwing performance outcomes, with statistical significance set at $\alpha = 0.05$[17].

Results: Anterior pelvic tilt demonstrated negligible correlation with throwing distance ($r = 0.053$, $r^2 = 0.003$, $p = 0.812$) but showed moderate positive correlation with throwing deviation ($r = 0.372$, $r^2 = 0.138$, $p = 0.081$), suggesting reduced accuracy with increased anterior tilt[1,4,5,6,9,10,11,12]. Stride length showed weak positive correlation with throwing distance ($r = 0.234$, $r^2 = 0.055$, $p = 0.283$) and negligible correlation with throwing deviation ($r = 0.067$, $r^2 = 0.004$, $p = 0.763$)[2,3,13,14]. BMI demonstrated weak-to-moderate positive correlation with throwing deviation ($r = 0.293$, $p = 0.175$), indicating potential anthropometric influences on accuracy[9,10].

Conclusion: Biomechanical factors demonstrated differential relationships with throwing accuracy versus distance parameters in amateur populations[1,2,3,6,13,14]. Anterior pelvic tilt and anthropometric characteristics showed greater sensitivity to

accuracy outcomes than traditional stride mechanics, suggesting the need for task-specific training approaches[1,4,5,6,7,8,9,10,11,12,15,16,18]. These findings support postural assessment integration into amateur throwing skill development programs, particularly for accuracy improvement objectives[13,14].

Keywords: Anterior pelvic tilt, stride length, throwing mechanics, amateur athletes, spatial parameters, biomechanical analysis

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