Abstract

Background : Stride length represents a critical kinematic variable directly influencing momentum generation and force production in throwing sports[1]. The hip adductor muscle group plays a fundamental role in pelvic stability and lower extremity coordination during dynamic athletic movements[2]. Despite theoretical foundations suggesting a relationship between adductor strength and stride mechanics, no studies have directly investigated the effects of targeted adductor strengthening on stride length parameters in amateur throwing populations[3].

Objective : To systematically examine the effects of a structured adductor strengthening exercise program on stride length parameters and performance metrics in amateur throwing athletes.

Methods : A quasi-experimental study was conducted with 45 amateur throwers (equal gender distribution, aged 18-24 years) at Brainware University, West Bengal, India. Following comprehensive baseline assessments including anthropometric measurements[10], bilateral adductor strength testing, and stride length analysis using digital motion capture[24], participants underwent a six-week adductor strengthening intervention based on American College of Sports Medicine (ACSM) guidelines[1]. The protocol included side-lying hip adduction and Copenhagen plank exercises performed 2 -4 sessions weekly. Post- intervention measurements were obtained using identical assessment protocols. Statistical analysis employed paired t-tests to evaluate pre-post differences[16], with correlation analysis examining relationships between anthropometric characteristics, strength parameters, and performance outcomes[16].

Results : The intervention demonstrated extraordinary effectiveness across multiple parameters. Bilateral adductor strength improvements were highly significant ($p < 0.0001$ for both

limbs). The most remarkable finding was exceptional stride length enhancement ($p = 1.15 \times 10^{-19}$), indicating virtually no probability of chance occurrence[16]. Correlation analysis revealed that left adductor strength was a powerful predictor of throwing distance, explaining 88% of variance ($r = 0.939804$), while showing weak negative correlation with accuracy ($r = -0.16874$). Body Mass Index demonstrated almost perfect correlation with right adductor strength ($r = 0.998773$) and strong correlation with left adductor strength ($r = 0.714337$)[10]. All 45 participants completed the intervention without adverse events or dropouts.

Conclusions: Targeted adductor strengthening following ACSM guidelines[1] produces significant bilateral strength improvements and extraordinary stride length enhancements in amateur throwers within six weeks. Left adductor strength emerges as the dominant factor in throwing distance performance, while anthropometric factors strongly influence strength development patterns. The intervention's universal effectiveness and safety profile make it suitable for integration into training programs across amateur throwing populations. These findings support kinetic chain theory[24] and provide evidence-based justification for incorporating targeted adductor conditioning into performance enhancement strategies for throwing sports.

Keywords: adductor strengthening, stride length, amateur throwers, biomechanics, athletic performance, kinetic chain

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