

Biomechanical Analysis of Basketball Shooting Techniques: A Motion Capture Study of Joint Angles and Movement Patterns

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Basketball shooting techniques require precise coordination of joint movements, which significantly influence shooting accuracy and efficiency. This study employed motion capture technology to analyse and compare biomechanical parameters in free throws, jump shots, and lay-ups among five skilled basketball players. Each player completed five trials per shooting technique. The study examined the correlation between minimum knee and elbow angles with shot success in free throws and jump shots. Wrist angle variations were analysed to identify distinct biomechanical profiles for each player. Additionally, knee angles during take-off and maximum height reached in lay-ups were investigated to understand their impact on shooting mechanics. In the free throw trials, the average knee angle was 122.59 degrees with a standard deviation of 15.98, reflecting moderate variability. The elbow angles had an average of 79.28 degrees with a standard deviation of 10.74, showing slightly less variability than the knee angles. The results showed a negative correlation between the elbow and knee angles during free throw and a positive correlation during jump shot. These insights could inform player training and performance enhancement strategies.

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