EFFECTS OF JOINT MOVEMENT ON THE ACCURACY OF 3-POINT SHOOTING IN BASKETBALL

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INTRODUCTION: The 3-point shot is particularly important, since a player is required to shoot from a distance that requires both momentum of a ball and movement accuracy. However, there have been only few studies on a 3-point shot. The purpose of this study is to clarify characteristics of players who possess high accuracy of a 3-point shot with respect to joint movements and the ball trajectory.

METHOD: 12 experienced male basketball players (9 right-handed and 3 left-handed) participated in the experiment. The goal of task was to shoot the ball from a line 6.25m from the backboard into the basket. All participants were requested to shoot the ball through the ring with the ball not touching the rim. A high speed camera (sampling frequency: 250Hz, shutter speed: 1/2000; Nac, HSV-500) was positioned at the right or left side of the player's shooting position, perpendicular to the plane of intended ball motion. The following 8points were digitized: Right and left glenohumeral, elbow, wrist, 3rd metacarpophalangeal, hip, knee and ankle joints, distal end of right and left feet. The coordinates of the external markers were used to calculate the following variables: release height, release speed, release angle of the ball, and the angle, angular velocity and angular acceleration of joints.

RESULTS AND DISCUSSION: The distance between a ball and the center of the ring showed significant positive correlations with the ball release velocity, ball release angle, the ankle plantar flexion angle, hip angular acceleration, knee angular acceleration and ankle angular acceleration. That distance also showed significant negative correlations with the ball release height, vertical jump height, and the wrist volar flexion angle. Good shooters were able to achieve a low release speed by shooting a ball at the optimal release angle. Good shooters were also characterised by a lower jump height, a larger wrist volar flexion angle, and smaller joint movements of the lower limb compared with poor shooters.

CONCLUSION: Good shooters shoot a ball at the release angle that is almost the optimal release angle.

Table1 Correlation with distance from center of the ring

	coefficient of correlation			coefficient of correlation	
Release speed	0.749	*	ankle planter flexion angular velocity	0.754	*
Release angle	0.877	*	hip extension angular acceleration	0.785	*
Release height	-0.620	*	knee extension angular acceleration	0.837	*
Jump height	-0.618	*	ankle planter flexion angular acceleration	0.710	*
wrist volar flexion angle	-0.599	*			

*: $p < 0.05$

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