

A BIOMECHANICAL ANALYSIS OF LAYUP SHOT FROM DIFFERENT FIELD POSITIONS

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Abstract

Basketball is a non-contact team sport played on a rectangular court by two teams of five players each. The objective is to shoot a ball through a hoop 18 inches (46 cm) in diameter and 10 feet (3.048 m) high that is mounted to a backboard at each end of the court. The game was invented in 1891 by Dr. James Naismith, who would be the first basketball coach of the Kansas Jayhawks, one of the most successful programs in the game's history. The basketball game began in India in 1930 when the game first took place. In 1934, New Delhi held the first Indian National Men's Championship. In 1950 was established the Indian Basketball Federation (BFI), which controls games in India. Biomechanics is a term formed by combining the words bio meaning "life" or "man" and mechanics refers to the physics branch that addresses movement and motion causes. In sport biomechanics, mechanical laws are applied to human movement in order for athletic performance to be better understood and sports injury to be reduced. The basketball game has many individual techniques for displaying skill like - ball-handling, shooting, passing, dribbling, dunking, shot-blocking, lay-ups and rebounding. A basketball layup is a two-point shot attempt that comes from below, places the ball up close to the basketball, and uses one hand to bounce it out of the backboard and into the basketball. There is merely any growth in the field of biomechanics research about basketball, by which the players will raise their skills and the coaches will upgrade their training process. The purpose of the study was to biomechanically analyse the kinematical parameters in basketball layup shot from different field positions of the two point field goal area. For the purpose of the study five healthy national level male and female basketball players (N=10) with no severe previous injury were taken as the

subjects for the study respectively from West Bengal, India. All of them were represented national level championship and they were active participants during the time of data collection. The age group of the subjects was ranged from 15 to 21 years. Three cameras with tripod stand- Two Nikon D3300-60fps,18-55mm (Camera1 and 2), and Nikon D5100-25fps, 18-55mm (Camera 3) were used to record the basketball lay-up shot from different zones of the two point field goal area. A motion analysis software Kinovea-0.8.24, was used to analyze the recorded movements. A stadiometer was used to measure the height of the subjects in cm. A steel tape was used to measure the leg length, arm length and two hand distance of the subjects. A weighing machine was used to measure the body weight in kg. Other necessary equipments like standard inflated basketballs, well equipped basketball court, measuring tape, nails etc. were used. The two point field goal area of basketball court was divided into six equal zones. The subjects were asked to perform three valid lay-up shots and after every attempt, the ball was supplied to them for the next attempt. For the sole purpose of analysis, only the best lay-up shot was taken among the three. The performance of each subject was assessed as specified in the criterion measure. The subjects performed three lay-up shots from each zone (these are A, B, C, D, E & F). The collected data were calculated by using ANOVA to compare between groups, and level of significance was set at 0.05 level. In cases where "F" ratios were significant, a Least Significant Difference (LSD) post hoc test was used to determine which variable differentiates across the different zones of the two point field goal area of the basketball court. According to the results of the study it was found that, there were significant difference exists in approach speed, two and half step length and take-off velocity for female basketball players and in the speed of ball release for male basketball players and there were no significant differences subsists in two and half step length, approach speed, take-off velocity (vertical and horizontal), take-off angle, the height of ball release, angle of ball release, segmental joint angular velocity at release: - a) ankle joint. b) knee joint. c) elbow joint. d) wrist joint. e) shoulder joint, duration of the total flight and lowering of CG for male basketball players and in take-off angle, the height of ball release, angle of ball release, segmental joint angular velocity at release: - a) ankle joint. b) knee joint. c) elbow joint. d) wrist joint. e) shoulder joint, duration of the total flight, and lowering of CG for female basketball players.

Keywords: biomechanics, basketball, lay-up shot, kinematic, anova.