Analysis of jump shot performance among 14-15 year old male basketball player

Emel Çetin\textsuperscript{a} *, Sedat Muratlı\textsuperscript{b}

\textsuperscript{a}Akdeniz University, School of Physical Education and Sports, Antalya, Turkey
\textsuperscript{b}Halic University, School of Physical Education and Sports, Istanbul, Turkey

Abstract

The purpose of the study was to analyses jump shot performances of the players in different positions among 14-15 year old male basketball players. 9 basketball players (age: 14.87±0.35 year; height: 180.0±0.07 cm; weight: 70.22±11.95 kg) participated in this study. Before jump shot, the lowest and highest value of center of gravity was determined in guard (0.81 cm) and forwards (0.99 cm) players, respectively. The lowest value of knee angle and the highest value of ball release angle was determined in center players (θ_{knee}: 119.93 °, α_{ball}: 39.33°). Total jump shot performance duration was record 0.51 sn in center players, 0.46 sn in guard players and 0.38 sn in striker players.

1. Introduction

The worldwide popularity of basketball is unquestionable, especially among the young. Basketball is a dynamic team sport which involves a pattern of intermittent dynamic and skilled movement activities. There are complex demands that require a combination of individual skills, team plays, tactics, and motivational aspects. During a basketball game we can see variety of movements such as running, dribbling, shuffling, and jumping. These movements are directional, multidirectional, intense and short-lasting (Jakovljevic et al., 2011).

Basketball is an anaerobic and high intensity exercise. Because of the high intensity and anaerobic property of basketball, one has to perform the players’ best performance within the short period of the game. These performance include shooting action, jump shooting and defense (Tsai et all, 2006).

Shooting is the basic way to get score in basketball and for this reason it is the most frequently used technical action (Hay, 1985). The jump shot is distinguished as the most important of all the shooting actions (Hess, 1980). Miller (1996) has discussed the relationship between basketball shooting kinematics distance and playing position.

The purpose of the jump shot is to make the defenders job more difficult allowing the offensive player to elevate above the defender in an attempt to get a clear shot off. By elevating off of the ground it allows the shooter to create space between his or her defender. The jump shot is a shot that can be taken in transition as well as one on one off
the dribble in any situation. Due to the fast pace movement of the game the jump shot proves to be very effective in scoring.

Evolution of the rules and tactics of the game of basketball has resulted in three basic playing positions: Centre, forward and guard. Players in all three positions are expected to contribute to a team’s scoring. Basketball literature generally advocates similar shooting mechanics and does not differentiate between playing position. Players who play close to the basket, where the required release speed is comparatively small, are taught to shoot in the manner as those playing further from the basket, where the required release speed is greater. It is therefore possible that those players who shoot almost exclusively from long or short distance have adapted their techniques to take account of this, and that those who regularly shoot from a range of distances will demonstrate a more consistent pattern of change in kinetic variables with changes in distance (Miller and Bartlett, 1996).

The objective of the study was to establish some kinematic parameters in of the playing position (guards, forwards and centers).

2. Material and methods

2.1. Subjects

The 9 young male basketball players (age: 15.13±.035 years; height: 1.80±0.07 m; weight: 70.22±11.95 kg) participated in the study. They were assigned to one of three groups (guards, n= 2; forwards, n= 4; centers, n= 3). All players were right-handed.

2.2. Data collection

The subjects’ height, weight, total leg length, total arm length and vertical jump height were measured before examination (Özer, 2001). Each player’s two jump shot performances were measured. A two-minute break was given between each trial of jump shot.

Jump shot performances were recorded video camera (50 Hz). Camera was placed in a matter that it could cover a jump shot performance. Reflective signs were used to identify the following anatomical landmarks (hip, knee, ankle, shoulder, elbow and wrist). Some kinematic parameters (knee angle, elbow angle, ball release angle, ball release time and center of gravity (CG) before jump shot were calculated in Videopoint 2.0 movement analyzing program.

3. Tables

Subject characteristics of the experimental group are shown in Table 1.

<table>
<thead>
<tr>
<th>n=9</th>
<th>M±SD</th>
<th>MAX</th>
<th>MIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td>14.87±0.35</td>
<td>15.00</td>
<td>14.00</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>180.00±0.07</td>
<td>191.00</td>
<td>166.00</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>70.22±11.95</td>
<td>90.00</td>
<td>58.00</td>
</tr>
<tr>
<td>Training age (year)</td>
<td>4.44±1.87</td>
<td>7.00</td>
<td>2.00</td>
</tr>
</tbody>
</table>

Some kinematic parameters of the athletes in jump shot performance are shown in Table 2.
The minimum height of CG was 0.94±0.08 cm before the jump. At this time, knee angle was determined 120.66±5.33 °. After jump, ball release angle was found 36.28±6.02 ° and jump shot duration was determined 0.44±0.08 sec.

Some of the kinematic parameters of athletes according to their position are shown in Table 3.

<table>
<thead>
<tr>
<th>CG&lt;sub&gt;min&lt;/sub&gt; (cm)</th>
<th>θ&lt;sub&gt;knee&lt;/sub&gt;(°)</th>
<th>α&lt;sub&gt;ball&lt;/sub&gt;(°)</th>
<th>t&lt;sub&gt;ball&lt;/sub&gt;(sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.94±0.08</td>
<td>120.66±5.33</td>
<td>36.28±6.02</td>
<td>0.44±0.08</td>
</tr>
</tbody>
</table>

Considering the kinematic variables of the athletes according to their position, the lowest values CG<sub>min</sub> of player that plays as guards (0.81 cm), the highest values CG<sub>min</sub> of player that plays as forwards (0.99 cm) were determined. In knee angle (θ<sub>knee</sub>) instant of the CG<sub>min</sub> similar values were obtained all athletes (Centers=119.93°, Guards=120.55°, Forwards=121.28°). The highest values ball release angle (α<sub>ball</sub>) of player that plays as centers (39.33°) and the lowest values ball release angle of player that plays as guards (31.15°) were determined. Forward players were carried out jump shot performance at the shortest time (0.38 sec).

4. Discussion and conclusion

The aim of the study was to establish some kinematic parameters in of the major position (guards, forwards and centers). The kinematic variables of the athletes according to their position, the lowest values CG<sub>min</sub> of player that plays as guards (0.81 cm), the highest values CG<sub>min</sub> of player that plays as forwards (0.99 cm) were determined. In knee angle (θ<sub>knee</sub>) instant of the CG<sub>min</sub> similar values were obtained all athletes (Centers=119.93°, Guards=120.55°, Forwards=121.28°). Guard’s players performed better jump and faster performance (total shooting duration: from CG<sub>min</sub> to ball release).

The highest values ball release angle (α<sub>ball</sub>) of player that plays as centers (39.33°) and the lowest values ball release angle of player that plays as forwards (31.15°) were determined. Ball release angle values (44.70°) are similar to centers athletes values in our study (Rojas et al., 2000). Ball release angle were determined 44.00° jump shot performance in basketball (Kollath, 1996). Ball release angle of center players were determined near the optimum angle.

Knee angle (instant of CG<sub>min</sub>) was determined 107.01° during jump shot performance in professional basketball players (Rojas et al, 2000). At this study, knee angle values to be greater (centers:119.93°, guards:120.55°, forwards:121.28°) caused by training age or experience.

References


