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Effect on kinematics parameters of jump shot in handball

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Abstract

Introduction: The final effort of the handball game during the attack occurs in the form of throwing of different structure, which is performed to score the goal. In this context, several authors studied the usability and effectiveness of different options of shooting at the door. From the wide variety of techniques used for shooting the most common throw is a jump shot. It occurs in two versions - forward and above. This way of shooting combines moving actions of cyclic and non-cyclical type - running, jumping, throwing. The purpose of this study was to analyze the Kinematics Parameters (release height, release angle and ball release velocity) and to make a comparison of these parameters between national and inter-varsity level players.

Methodology: 5 National (20.29 ± 1.38 years, 179 ± 4.54 cm and 67 ± 10.34 kg) & 5 Inter-varsity (23.43 ± 2.57 years, 170.57 ± 3.15 cm and 62.13 ± 7.58 kg) level handball players were selected randomly as the subjects. Canon DSLR 1200d operating at 50Hz was used to record the movement. The identified clips were analyzed with the help of KINOVEA 0.8.24 motion analysis software.

Results: The result of study revealed that there was a significant difference (ball release height) on kinematics parameters of jump shot in handball between national and inter-varsity handball players. The mean ball release height, ball release angle and ball release velocity of the national and inter-varsity players were 265.98 ± 13.14 cm & 240.54 ± 10.64 cm ($t=3.363^*$), 17.6 ± 7.79° & 15 ± 8.86° ($t=.493$) and 20.38 ± 3.83 m/s & 18.82 ± 3.53 m/s ($t=.669$) respectively.

Conclusion: National players perform jump shot in handball with the higher effect on kinematics parameters as compare to Inter-varsity handball players. It may also be concluded that higher the performance level, higher will be the kinematics parameters for executing the jump shot in handball.

Keywords: video camera, national, inter-varsity, handball, jump shot

1. Introduction

The final effort of the handball game during the attack occurs in the form of throwing of different structure, which is performed to score the goal. In this context, several authors studied the usability and effectiveness of different options of shooting at the door. From the wide variety of techniques used for shooting the most common throw is a jump shot. It occurs in two versions - forward and above. This way of shooting combines moving actions of cyclic and non-cyclical type - running, jumping, throwing. Several investigators have studied the relationship between the velocity of movement of the upper limb and throwing on the spot or jump shot performance in handball. The analysis of jump shots, which are the most frequent handball elements directed towards realization, covered mostly individual analyses of the elite handball players (Hraski & Zvonarek, 1996; Zvonarek, Hraski & Vuleta 1997; Pori *et al.*, 2005; Wagner, Klos & Müller, 2006)^[12, 8, 13].

Notwithstanding, several studies suggest that jump height for throws may be considered one of the important parameters in team handball. A high jump offers a good position to throw over the block of the rival defender, and associated by playing positions. Especially, when players shoot from the back court position or have more time for a shot and when attempting to react to goalkeeper actions (McKinon *et al.* 2004; Ravier & Demouge, 2016; Wagner *et al.* 2014)^[4, 6]. The aim of the present study was to determine the effects on Kinematics Parameters of Jump Shot in Handball.

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2. Purpose of the study

To analyze the Kinematics Parameters (release height, release angle and ball release velocity) and effect on these parameters between National and Inter-Varsity level players Jump Shot in Handball.

3. Methodology

3.1 Selection of Subjects

The subjects selected for the present study were Ten Male Handball players 5 National (20.29 ± 1.38 years, 179 ± 4.54 cm and 67 ± 10.34 kg) & 5 Inter-varsity (23.43 ± 2.57years, 170.57 ±3.15cm and 62.13 ± 7.58kg) level handball players were selected randomly as the subjects. All subjects in the study were right handed Handball players. They were healthy and don't had any injury reported within the last year.

3.2 Tools and Equipment

One camera (Canon DSLR 1200D) with tripod, measuring tape, motion analysis software (Kinovea 0.8.24) and computer system etc. were used.

3.3 Procedure for Data Collection

The data was obtained during non-competition situation. One camera was used to collect the action of jump shot in handball. The camera was mounted on the firm tripod at the height of 1.3 meters from the ground and at a distance of 5 meters from the take off area (. Then the identified action of each subject were digitized and analyzed with the help of Kinovea 0.8.24 motion analysis software.

3.4. Statistical Analysis

To compute mean difference between National and Inter-Varsity handball players in compare to selected kinematic parameters mean, standard deviation and independent t-test was used (Statistical Package for the Social Sciences, version 17.0, SPSS Inc, Chicago, IL, USA). Significant level was set at 0.05 levels.

4. Result and discussion

10 handball Jump Shot performances were analyzed. There was significant differences between Ball Release Height 265.98±13.14cm & 240.54±10.64cm (t=3.363*) of National and Inter-varsity level handball players for performing the jump shot. The maximum body's centre of gravity height among the observed handball players amounts from 139.06 cm till 145.84 cm moves CG in a horizontal plane (Pori, Bon & Sibila 2005) [8].

The result of study revealed that there no significant difference on kinematics parameters of jump shot in handball between National and Inter-Varsity handball players. The mean ball release angle and ball release velocity of the national and inter-varsity players were, 17.6±7.79⁰ & 15±8.86⁰ (t=.493) and 20.38±3.83m/s & 18.82±3.53m/s (t=.669) respectively.

The throw of the ball is being performed at the flight phase. The experts (Pori, Bon & Sibila 2005) [8] consider the throw phase excellent if: the elbow is positioned high at the head level, the particular muscle groups in the kinetic chain of the throw performance are adequately activated and if the very performance is explosive.

Table 1

Group	Ball Release Height(Cm)		Ball Release Angle(⁰)		Ball Release Velocity (M/S)	
	National	Inter-Varsity	National	Inter-Varsity	National	Inter-Varsity
Mean	265.98	240.54	17.6	15	20.38	18.82
Sd	13.14	10.64	7.79	8.86	3.83	3.53
T	3.363*		.493		.669	

*Required value for being significant at 8 df and at 0.05 level is 2.306.

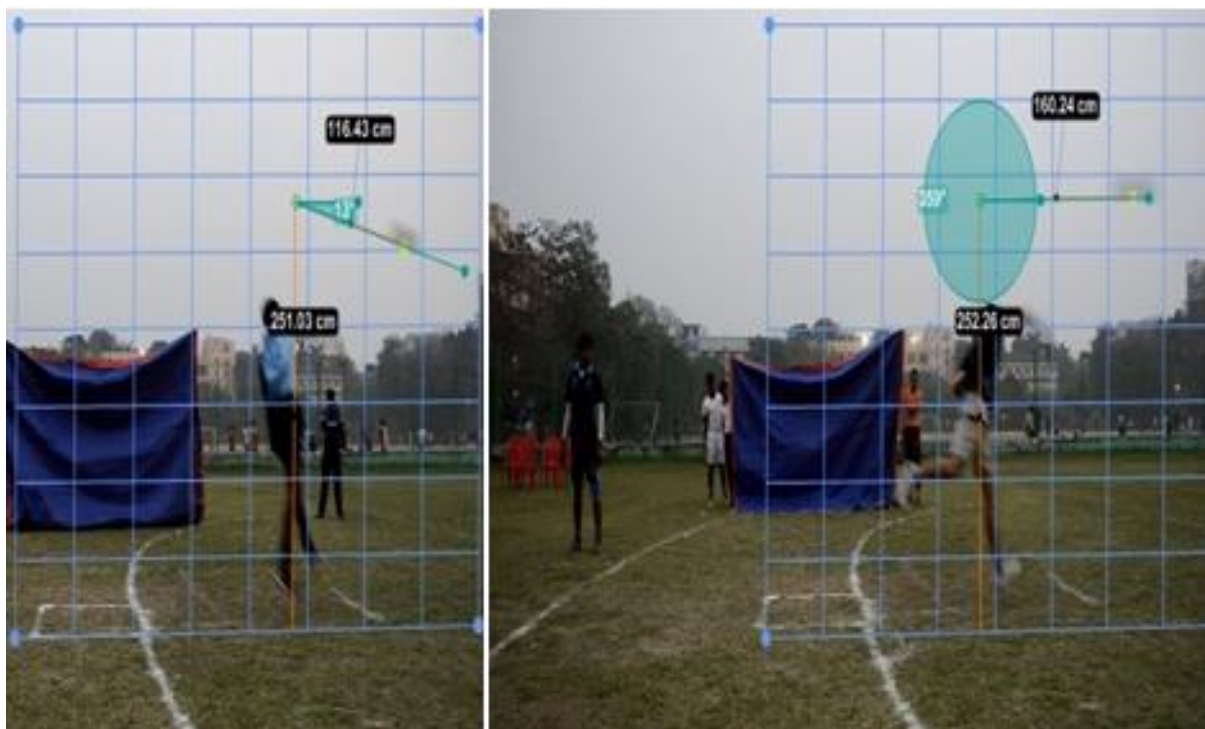


Fig 1: Video-graphical Analysis on Jump Shot Action.

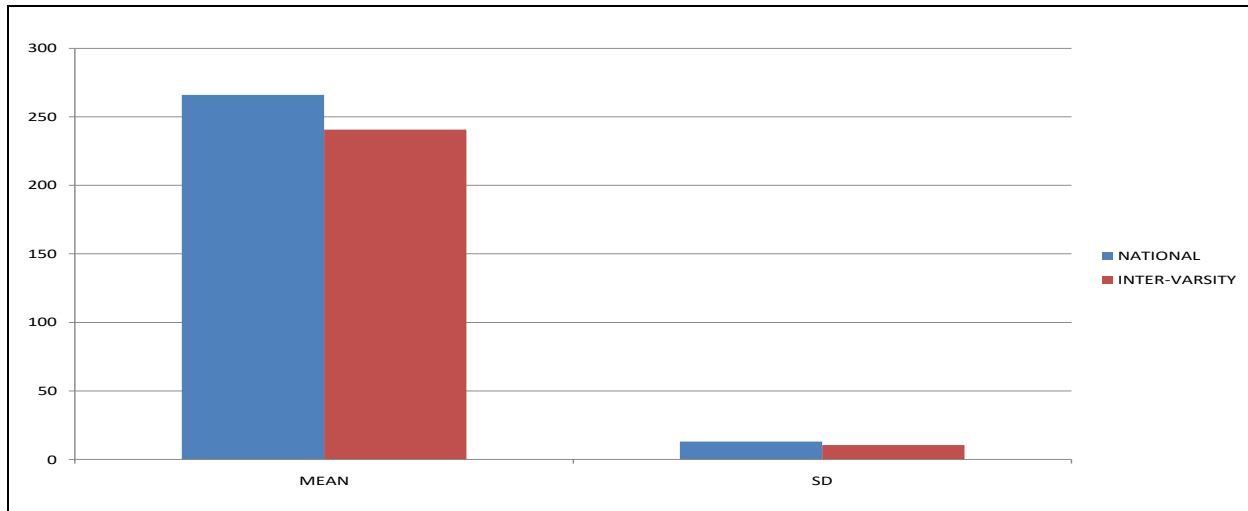


Fig 2: Graphical Presentation of Comparison between National & Inter-Varsity Level Players Ball Release Height (CM)

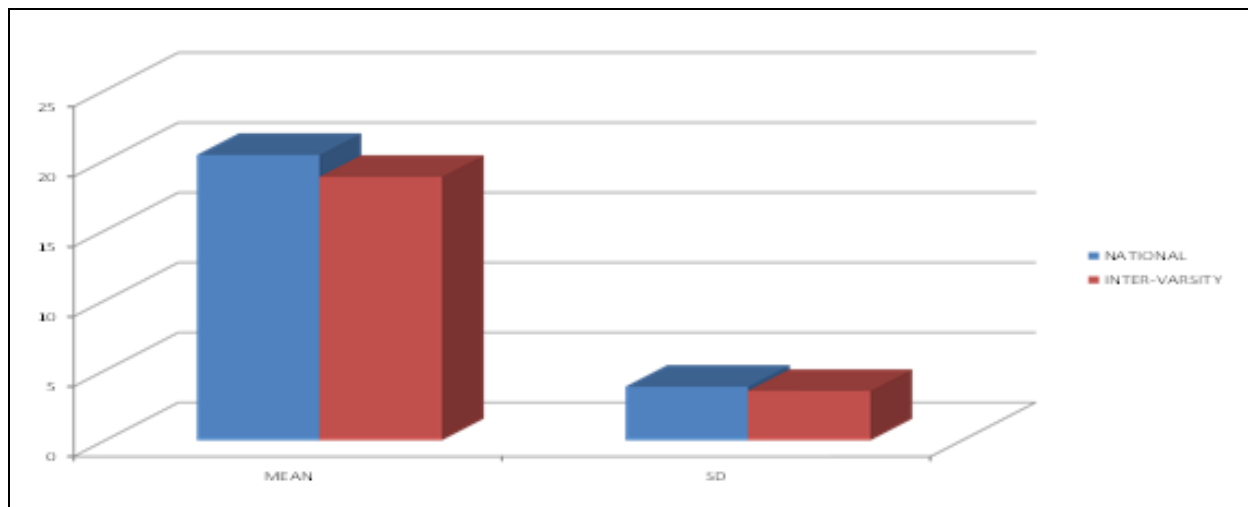


Fig. 3: Graphical Presentation of Comparison between National & Inter-Varsity Level Players Ball Release Angle ($^{\circ}$)

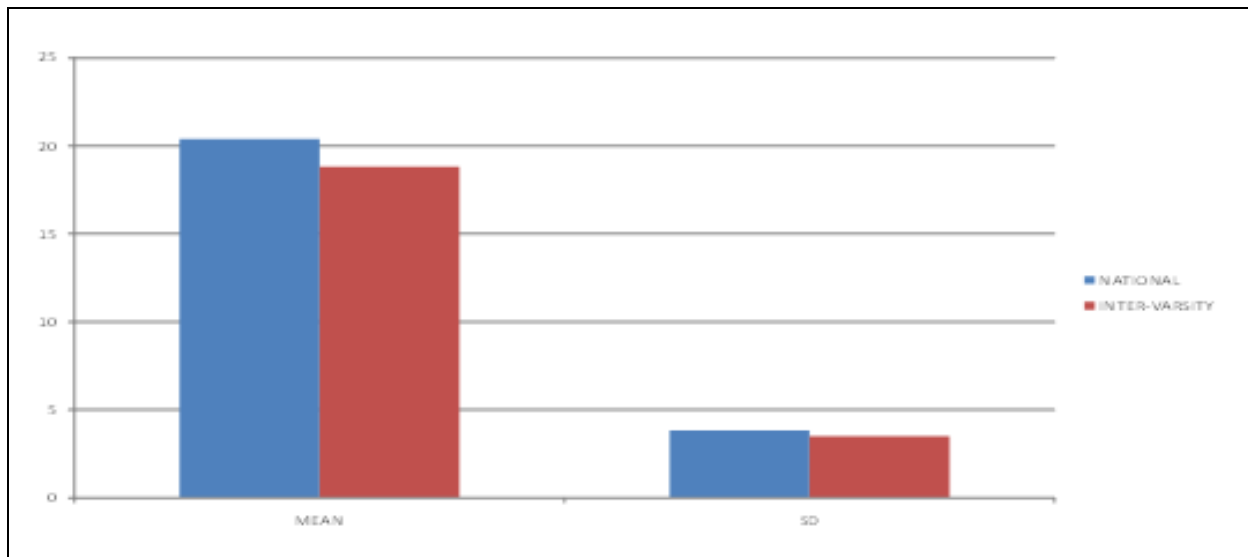


Fig 4: Graphical Presentation of Comparison between National & Inter-Varsity Level Players Ball Release Velocity (M/S)

5. Conclusions

On the basis of result obtained from this empirical study the following conclusions were draw:

1. National players perform jump shot in handball with the greater effect on kinematics parameters as compare to Inter-varsity handball players.
2. Effect of Ball release height of the National players are

significantly greater than university level players during perform jump shot in handball.

In future, it might be more adequate to examine the criteria for evaluating the successfulness of the jump shot performance in an actual playing situation, and then to determine how much it deviates from the correct technical performance (model comparison).

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