Mechanical Analysis of Flight Time of Jump Shot High in Handball

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Abstract

The purpose of the study was to do Mechanical Analysis of flight time of Jump Shot High in Handball. The total of five (N=5) national level male handball players from LNIPE NERC Guwahati were selected whose average age, weight, height were [mean was 18.4±.84 years, 65±6.45 kg and 175.8±4.60 cm respectively]. Linear kinematic variable of jump shot i.e. Time of execution (time taken during complete movements) was selected for the study and was recorded in nearest second. Digital photography with the use of standard Nikon D3100 was employed in order to register the technique of jump shot in sagittal plane. The stick figures of selected phases of the skill at 3 different positions (positions 2,3,&4) were developed by using joint point method. S.P.S.S – 22 was used for the statistical analysis and Repeated measure ANOVA was used as a comparative statistics at 0.05 level of significance. The finding showed linear kinematic variable i.e. total time taken did not show any significant difference in all the three positions (2, 3, 4) in all phases of skill.

KEYWORDS: biomechanics, angular kinematics, flight time, jump shot high

INTRODUCTION

Kinematic analyses of elements of specific sport-related motor behaviour (technique) ensure important information, representing the basis for an in-depth and precise knowledge of their actual structure Only on the basis of such findings can we precisely describe the technique of executing the elements and connect it to tactics. In this way, we can also more easily construct didactic procedures in teaching and training.

All activities in team handball are performed in specific conditions, with the presence of players of the opposing team and while observing playing regulations. Their selection and execution therefore depend mostly on the situations in the match. Even if a player can execute the individual elements sometimes in a non-typical way, certain kinematic parameters do exist for most elements that show a greater or lesser efficiency of the element's execution.

The development of computer technology, kinematics methods, expert knowledge and the associated artificial intelligence have enabled a completely new approach of studying the successfulness of athletes on the basis of expert modelling (Jošt, Dežman, & Pustovrh, 1995). The main aim in this contribution is to analyse a kinematic model of the jump shot, one of the most important elements of the specific handball- -related motor behaviour, and evaluate it with an expert modelling method.

METHODOLOGY

Selection of subjects: The total of five (N=5) national level male handball players belonging LNIPE NERC Guwahati were purposely selected. Their average age, weight, height were [mean was 18.4±.84 years, 65±6.45 kg and 175.8±4.60 cm respectively].

Selection of variables: linear kinematic variable of jump shot i.e. Time of execution (time taken during complete movements).

Criterion measures: The performance of execution of jump shot of each selected subject was taken as the criterion measure for the purpose of present study. The Time of execution was recorded in nearest second.

Filming Protocol:

Digital photography was employed in order to register the technique of jump shot. The subjects were filmed only in sagittal plane. The camera that was used for this study was a standard Nikon D3100 (with motor drive). The video camera was mounted on the tripod stand at the height of 1.14 mts. from the ground. The distance of the camera from the center of filming zone is kept at distance of from position no 2 is 5.71mts, from position no 3 is 6.87mts and from position no 4 is 7.73mts. The frequency of the camera was 60 frames/second. Only single moments of techniques of jump shot was selected for the analysis i.e.

- Jump shot – execution of throw.

The throwing technique of jump shot of different subjects was filmed at Lakshmibai National Institute of Physical education, Guwahati. The photographic sequences were taken under controlled conditions. The subjects performed the skill three times and the best trail was used for the analysis.

Procedure for collection of data: The skill i.e. Jump Shot is performed by the same subjects from 3 different positions (positions 2,3,&4) videography was used in the study. The stick figures of selected phases of the skill were developed by using joint point method. The performance of each subject at release phase of jump shot high was collected on the basis of three trail given.

Statistical procedure: The latest version of S.P.S.S – 22 was used for the statistical analysis, mean & standard deviations were used as a descriptive statistics and as the all subjects were tested in three different positions to find out the difference among the positions in selected linear kinematic variable i.e. Time of execution. Repeated measure ANOVA was used as a comparative statistics at 0.05 level of significance the relationship was tested at 0.05.

DATA ANALYSIS & INTERPRETATION

The results of the repeated measure ANOVA which were obtained in order to ascertain the kinematics difference in selected linear kinematics variables i.e. Total time from take-off to release of ball is given below.

The descriptive statistics of time of flight while performing the same skill on three different positions is presented below:

Table 1

Descriptive Statistics of time of flight on three different positions

Positions	N	Mean	SD
Position 2	**5**	.49	.07
Position 3	**5**	.58	.02
Position 4	**5**	.55	.04

Table 1 represents the mean and standard deviation as a descriptive statistics of time of flight while jump shot from all three different positions which indicates that the mean value of position 3 and position 4 has comparatively high than the position 2. The results are also graphically represented in figure 1

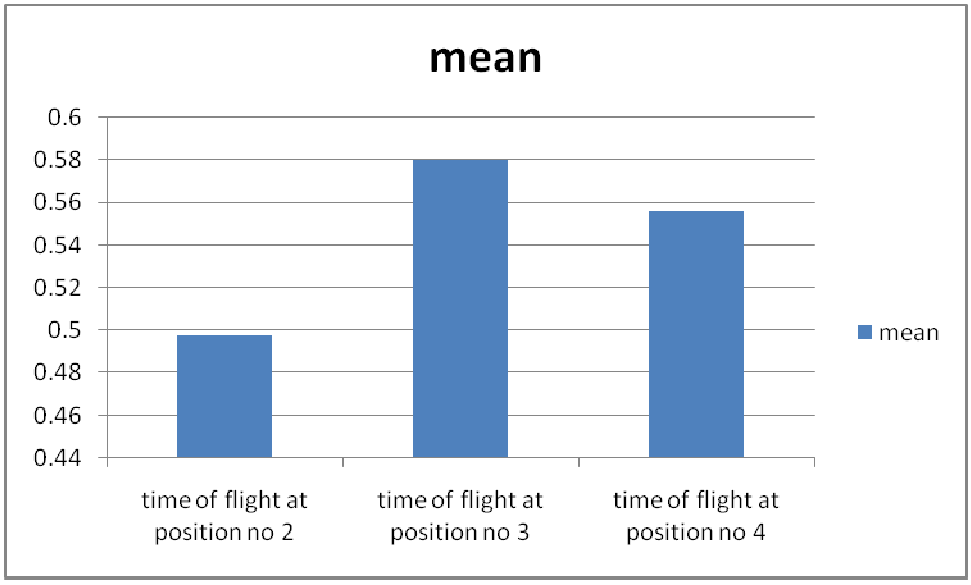

Fig.1 Graphical Representation time of flight on three different position

Table 2
Position Wise Comparison of jump shot high of the Skill

Source		Type III Sum of Squares	Df	Mean Square	F	p-value	Partial Eta Squared
Apparatus	Sphericity Assumed	.018	2	.009	4.049	.061	.503
Error(Apparatus)	Sphericity Assumed	.018	8	.002			

*** p-value > 0.05 is significant.**

The results of the one-way repeated-measures ANOVA in table 2 showed that there was no significant difference in main effect ($p > .05$) while performing same skill on three different positions. [$F(2,8) = 4.049$, $p = .061$].

The Partial Eta Square is also reported in the above table to find out the total strength of the main effect (Effect Size) was showed small in magnitude ($\eta p^2 = .503$).

DISCUSSIONS OF FINDINGS

The finding showed linear kinematic variable i.e. total time taken did not show any significant difference in all the three positions (2, 3, 4) in all phases of skill. The main reason of insignificant results in their sports was that the performance of any games and sports depending upon the multidimensional factors such as physical factors, physiological factors, psychological factors and so many other factors.

In handball not only linear and angular kinematic variables play vital role but there are many other factors responsible for performance such as strength, speed, agility, command on skill, motivation, level of player, and so many.

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