Mayanglambam Sangita Devi[1] , Dr. Y. Santikumar Singh[2]

Biomechanical Analysis Of The Badminton Smash

Mayanglambam Sangita Devi[1] , Dr. Y. Santikumar Singh[2]

[1]Research Scholar, [2]Assistant Professor
Department of Physical Education and Sports Science, Manipur University, Canchipur
[1]sangitanilk@gmail.com , [2]santikumar12340@gmail.com

Abstract

The purpose of this study was to biomechanically analysis of the smash in badminton. In this study, we were interested in analyzing the correlation between the angle of right elbow joint and the center of mass at the point of contact with the shuttle. Ten male badminton players with the age group of under 15 who have participated in the National Level Competition were selected as the study of subjects. The data were collected with the help of GoPro Hero 8 motion of smash. Pearson Correlation was used as a statistical tool, and the level of significance was set at 0.05 levels. The result of the study shows that the angle of right elbow joint was significantly correlated with the center of mass while executing the smash in badminton.

Keywords*: Biomechanical analysis, smash, Badminton, GoPro Hero 8.

1. INTRODUCTION:

Biomechanics is most helpful in improving performance in sports or activities where techniques are the dominant factor rather than the physical structure or physiological capacity. Since biomechanics is essentially the science of movement technique, biomechanics is the main contributor to one of the most important skills of kinesiology professionals, the qualitative analysis of human movement (Knudson & Morrison 2002).

Smash is a very popular technique in badminton games. It may contribute to the winning of a point whenever performed effectively. Accordingly, players strive for an effective smash to accumulate points, besides the deceiving skill technique that frequently occurs in the games.

Objectives of the study

The purpose of this study was to compare the correlation between the angle of right elbow joint and the center of mass in the smash.

2. METHODOLOGY:

For the research investigation, a randomly selected total (N=10) subjects were from the group of under 15 Badminton Players who have at least participated in the National Level Badminton Competition. Only male right-handed players were selected. A random sampling technique was deployed.

Materials

Standard Badminton Court, plastic shuttlecock, standard Racket were used. Collected the data by using GoPro Hero Camera. The camera height was 1.05 meters, and the camera was kept 3.20 meters away from the performing area during the point of contact phase. After extracting data from the camera, put in Kinovea 0.8.15 software which developed a stick figure. Pearson Correlation was used as a statistical tool.

Procedure of collection of data:

Videography was used in this study. GoPro hero 8 high-speed camera were used, which have a frequency from 60 to 240 frames per second (f/s). The camera was mounted on the tripod stand at height of 1.05mts. from the ground. The video camera was placed perpendicularly at the sideline of the badminton court, the sagittal plane at a distance of 3.20mts. The subjects performed the skilled three times, and the best trial was used for the analysis. The data was analyzed by Kinovea 0.8.15 motion analysis software.

Statistical Technique:

The statistical analysis of data pertaining to the study was collected on 10 male badminton players of under-15. Data were analyzed by IBM SPSS Statistical Package (V-20) using Pearson's Correlation and the level of significance was set at 0.05.

3. FINDING AND RESULTS:

The result was made on the basis of the finding of the present study. The researcher reached the result of this empirical investigation which is presented by the respective, Table-1, Table-2, and figure-1. Correlation Coefficients were used to find out the significant correlation between the selected angle of the right elbow joint and the center of mass at a level of 0.05. During smash, mean and standard deviation of the right elbow joint is 167.9000 ± 12.44053, the center of mass is 98.2380 ± 6.11063 (see Table 1). The Pearson product-moment correlation of the angle of right elbow joint and center of mass of smash is 0.807 with p-value .005 (see Table-2).

Table 1. Descriptive Statistic of the angle of the right elbow joint and center of mass of smash.

Descriptive Statistics

	Mean	Std. Deviation	N
Right Elbow Joint	167.9000	12.44053	10
Center of Mass	98.2380	6.11063	10

Table 2. Correlation Matrix of the angle of right elbow joint and center of mass

Correlations

		Right Elbow Joint	Center of Mass
Right Elbow Joint	Pearson Correlation	1	.807[**]
	Sig. (2-tailed)		.005
	N	10	10
Center of Mass	Pearson Correlation	.807[**]	1
	Sig. (2-tailed)	.005	
	N	10	10

**. Correlation is significant at the 0.01 level (2-tailed).

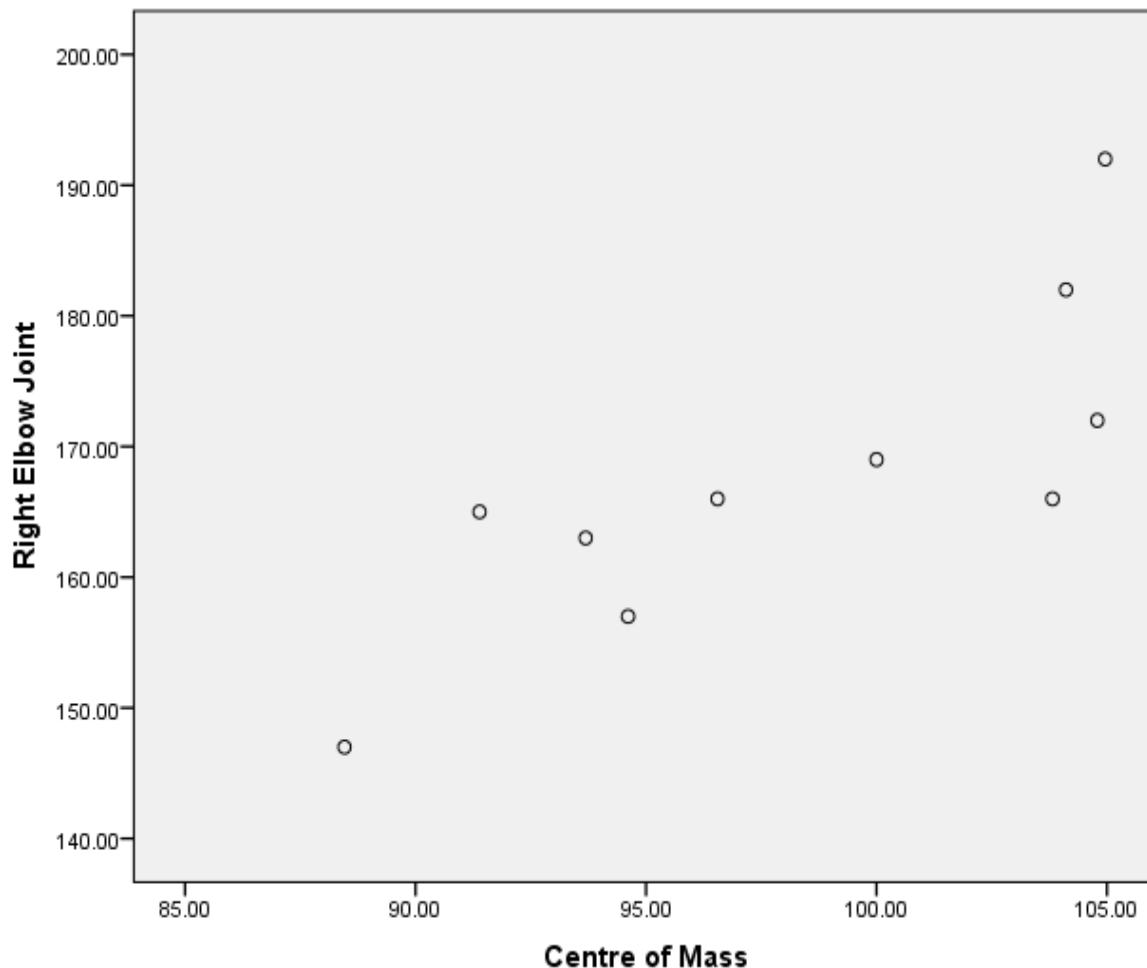Mayanglambam Sangita Devi[1] , Dr. Y. Santikumar Singh[2]

Figure 1. Graphical representation of the correlation between the angle of right elbow joint and center of mass of smash.

4. DISCUSSION AND CONCLUSION:

As per the findings, the result of the study shows that the angle of right elbow joint was significantly correlated with the center of mass while executing the smash in badminton. It may be because of the better body balance and body control of the players while performing the skill.

The result of the study may help badminton coaches, personal trainers, and badminton player to understand the relationship between the angle of right elbow joint and center of mass use while executing smash in badminton.

REFERENCES

a.   **Kersting, U. G., Bulthuis, R., Lysdal, F. G., & Madsen, C. M. (2018).** Center of mass displacement during the badminton-specific speed test. *ISBS Proceedings Archive*, *36*(1), 718.

b.   **Tsai et al (1998).** Biomechanical   analysis of different in the   badminton smash and jump   smash between Taiwan elite and   collegiate players. In Proceedings   of the XVlth International   Symposium on Biomechanics in   Sports,   259-262.   Konstanz.   Germany.

c. **Teu.**, "Using dual Euler angles for the analysis of arm movement during badminton smash." 4(1), 2014:171-178

d. **Winter, D.A. (1990).** Biomechanics and Motor Control of Human Movement (2nd Ed). New York: Wiley, 103-139.

e. **Salim, H.N Lim, M.Y Baharuddin,** Motion Analysis of Arm Movement During Badminton Smash, In Proceeding IEEE Conference on Biomedical Engineering and Sciences, (Malaysia November 30 -December 2, 2010).

f. **Phomsoupha, M., & Laffaye, G**. (2015). Shuttlecock velocity during a smash stroke, Computer Methods in Biomechanics and Biomedical, 17(1), 140-143.

g. **Kurdson, D.,** "Fundamental of Biomechanics." United Kingdom: Plenum Publisher. (2003) pp.6