KINEMATICAL ANALYSIS OF THE UPPER EXTREMITY IN THREE DIFFERENT BADMINTON FOREHAND SERVICE

A.P. Singh[1] and V. B. Mishra[2]
[1,2]LNIPE. Gwalior
[1]agampratap99@gmail.com, [2]Vinitadivyansh@rediffmail.com

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ABSTRACT

"Sports biomechanics is a quantitative based study which deal with sports movement". The purpose of the study were to see whether there is any significance difference in in shoulder joint and elbow joint among short service, Flick service, and long service. For the study researcher randomly selected ten subject who were going through training at LNIPE Gwalior. All players were right handed. Video of different services were captured through Go pro hero camera. Camera was mounted in a tripod and movement were captured in sagittal plan. After the data collection all the data were digitized in Kinovea 0.8.27 software than it was analyzed through SPSS software where one way ANOVA was employed. Researchers could not find significance difference in elbow joint and shoulder joint hence it is recommended to conduct study by using three dimensional camera. it is justified that the reason of insignificance differences is may be due to the nature of the execution of all the three services were almost same.

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Keywords: Biomechanics, long service, flick service, short service, ANOVA.

Introduction

Badminton is a racquet sports played over net with a shuttle by two players or four players. Badminton is the one of the most popular racket sports in the world. Long service played powerfully upward so that shuttle travels very long and landed at back boundary line. Short service is played gently over the net and landed at front court. Flick service hits upward but slower than long service which landed at back boundary. "Biomechanics is the study of the structure and function of the mechanical aspects of biological systems, at any level from whole organisms to organs, cells and cells organelles, using the methods of mechanics". "Sports biomechanics is a quantitative based study which deals with sports movement". The purpose of the study was to find out whether there is any difference in angular kinematic among three different service of badminton. From previous study it was hypothesized

H$_1$: There is significance difference in shoulder joint among short service, flick service, and long service

H$_2$: There is significance difference in shoulder joint among short service, flick service, and long service.

Methods

Ten subjects were selected from badminton match practice group of Lakshmibai National Institute of physical education, Gwalior (M.P.). All the players were right handed who at least played inter university. Specific test were employed namely French short service test to measure the short service ability. Scot and fox serve test was used to measure the flick service ability. Poole long service test was used to measure the long service ability. Subjects were asked to do proper warming up before the test.

Materials

Camera was mounted on a tripod and kept in certain height. All the movement were captured in sagittal plane. Standard badminton court was used which is available at Lakshmibai national institute of physical education (M.P.). Standard badminton racket and shuttle were used. Video was analyzed through Kinovea 0.8.27 software. One way ANOVA was used as a statistical tool. SPSS software was used for statistical result.

Result

Table 1 Descriptive statistics for elbow joint and Shoulder joint

		N	Mean	Std. Deviation
Elbow Joint	**Long Service**	10	144.40	17.54
	Flick Service	10	148.20	15.54
	Short Service	10	143.80	19.56
Shoulder Joint	**Long Service**	10	45.60	19.95
	Flick Service	10	42.30	11.49
	Short Service	10	40.10	18.48

The table 1 gives different descriptive statistics of center of gravity and wrist joint. The mean and standard deviation of long service in elbow joint is 144.40 ± 17.54. The mean and standard deviation of flick service elbow joint is 148.20 ± 15.54. The mean and standard deviation of short service in elbow joint is 143.80 + 19.56.

The mean and standard deviation of long service in shoulder joint is 45.60 ± 19.95. The mean and standard deviation of flick service in shoulder joint is 42.30 ± 11.49. The mean and standard deviation of long service in shoulder joint is 40.10 ± 18.48.
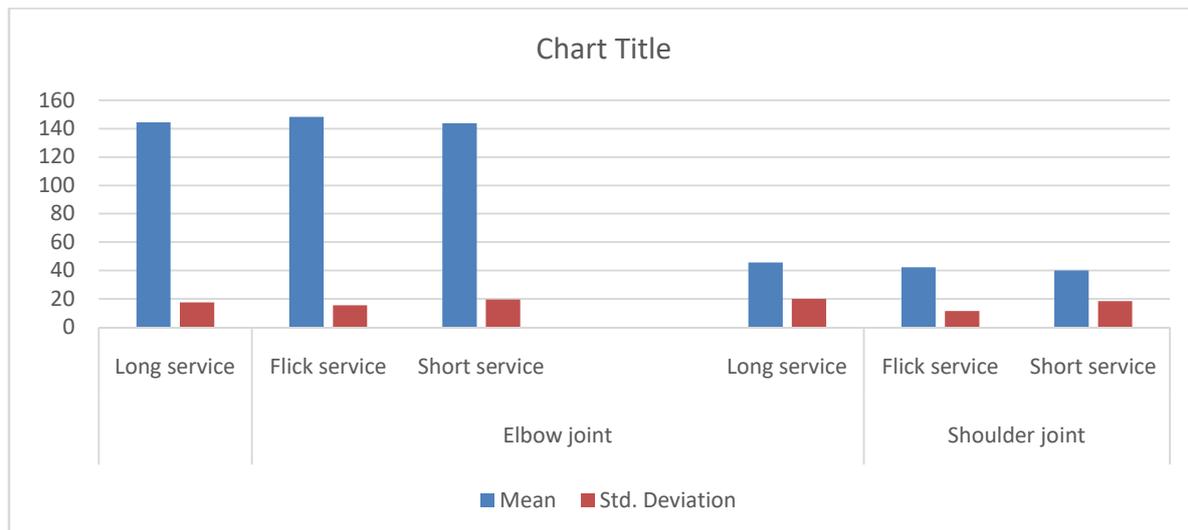

Figure 1 Mean score of badminton forehand service

Table 2 ANOVA table of elbow joint and shoulder joint

		Sum of Squares	df	Mean Square	F	Sig.
Elbow Joint	**Between Groups**	113.86	2	56.93	.183	0.83
	Within Groups	8389.60	27	310.72		
Shoulder Joint	**Between Groups**	153.26	2	76.63	.264	0.77
	Within Groups	7851.40	27	290.79		

In the table 2 elbow joint is insignificant as the p-value is 0.834 which is more than 0.05 hence researcher cannot reject the null hypothesis. It can be said that there is no difference among long service, short service, and flick service in elbow joint.

In shoulder table the p-value was found to be insignificance as the p-value is 0.77 which is more than 0.05 hence researcher cannot reject the null hypothesis. It can be said that there is no difference among long service, short service, and flick service in shoulder joint.

Discussion and finding

While ANOVA test was conducted in elbow joint and shoulder joint researcher could not find any significance difference in in long service, flick service, and short service. The p-value of elbow joint is 0.834 which is more than 0.05 hence researcher failed to reject the null hypothesis. The p-value of shoulder joint is 0.77 where researcher failed to reject the null hypothesis as the p-value is more than 0.05.the insignificance result is may be due to the nature and position of the service. In both the services the position is same and the technique of delivering service is also similar with each other.to do better investigation once require better equipment.it is recommended to conduct research through three dimensional analysis to understand the movement pattern of different joint. All the basic movement like flexion, extension in shoulder joint and elbow joint is more or less same while delivering long service, flick service, and short service. Same kind of study was carried out by Husain, I., & Bari, M.A. (2011) in "Kinematic analysis of forehand and backhand smash in badminton" (Husain & Bari, 2011)where they found significance result in shuttle velocity, contact height, racket angle, wrist angular velocity of shoulder joint and elbow joint. Researcher failed to get significance difference in flight angle, shoulder angle, elbow angle. This research will help the coaches, players to get the knowledge about badminton forehand service.

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