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RELATIONSHIP OF SELECTED KINEMATIC VARIABLES WITH THE PERFORMANCE OF DOUBLE HANDEDBACKHAND IN TENNIS

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Abstract

The aim of this study was to biomechanically analyze the double handed back hand drive in tennis and to find out the relationship between selected kinematic variables with the performance of double handed backhand drive. A total of 5 male university level subjects were selected (aged 20.54 ± 2.11) from tennis match practice group of Lakshmibai National Institute of Physical Education by using consecutive sampling. The results of the study reveals that the relationship of angular kinematic variable(angle at left shoulder joint, angle at left elbow joint, angle at left hip joint, angle at left knee joint.) and Linear kinematic variable (height of center of mass at moment contact) was found to be insignificant at the moment contact. The relationship was not significant as the P – value was more than .05. The reason for such result could be that the player performance i.e. the double handed backhand drive was measured through Hewitt tennis test. In Hewitt tennis test, the subject required to place the ball in specified area so the player might have been more concerned and focus on the placement of ball in the specified area to achieve good score whereas the actual situation demands the placement of ball according to the opponent's position.

Keywords: Kinematic, Tennis, Double handed backhand drive

Introduction:

Biomechanics is the study of forces and their effects on living systems, whereas exercise and sports biomechanics is the study of forces and their effects on humans in exercise and sport (Smith 2010).Biomechanists have examined tennis-specific issues

in basically three areas: performance, physical stress, and the design of equipment. Performance has been described for many reasons, one being a better understanding of how it occurs. To examine performance from the standpoints of efficiency and effectiveness seems extremely worthwhile. This is especially true when considering how performance models can be generated to study efficiency from the aspects of performing at a high level with less energy so the athlete conserves more energy for later in the competition, or efficiency from the standpoint of performing with less stress on muscles or joints (Groppel, 1986).

When playing, a tennis player, depending on the adopted tactics and actions taken by the opponent, might use a variety of tennis strokes. One of the most basic tennis strokes is the backhand, which can be performed in two ways: as a one-handed or two-handed stroke (Stępień, Bober & Zawadzki, 2011). Double handed backhand is one of the "bread and butter shots" of the game, in particular the mainstay of a rally played from the back of the court. Success in tennis is greatly affected by the technique a player uses and biomechanics plays an integral role in stroke production. All strokes have a fundamental mechanical structure, and sports injuries primarily have a mechanical cause. Player development based on scientific evidence allows an individualizedapproach to be structured, with due consideration to the key mechanical features of each skill, while also fostering flair and permitting the physical characteristics of a player to be considered. An understanding of biomechanics from a sports medicine perspective is also important if player development is to occur with minimal risk of injury. By obtaining an understanding of the biomechanics involved in each tennis stroke, it will help the coaches and the players to know the correct pattern of movement

The purpose of this study was to biomechanically analyze the double handed back hand drive in tennis and to find out the relationship between selected kinematic variables with the performance of double handed backhand drive.

METHODOLOGY

Ethical Approval: All the subjects were given a thorough explanation of the procedure and a written informed consent was obtained before participating in the study.

Selection of Subject: A total of 5 right handed male university level subjects were selected from tennis match practice group of Lakshmibai National Institute of Physical Education by using

consecutive sampling. The age of the subjects was ranged from 18 to 28 years and all were regular tennis players with good level of skill. The purpose of the research was explained to the subjects and they weremotivated to put their best during each attempt.

Criterion Measures and Reliability of Data

The performance of double handed backhand drive of each selected subject was taken as the criterion measure for the present study. The performance was recorded on the basis of execution of the skill; this was evaluated by Hewitt Double Handed Backhand Drive Test, and the sum total of ten trials was taken as score.The reliability was ensured by establishing the instrument's reliability of test and tester's competency. The instruments namely, the camera, steel tape, geometric were standard instruments available in the research laboratory of L.N.I.P.E. The reliability of data for the selected biomechanical variables was established by the test-retest method. The photography was done by the professional photographer. The other tests were conducted under the guidance and presence of the experts in specified area available in the institute. So, the data collection for the present study was considered reliable.

Result & Discussion

The mean value of selected angular and linear kinematics variables and their relationship with dependent variables are presented separately in table-2 & table-3.

Table 1: Descriptive Statistics of Selected Kinematic Variables

	Mean	Std. Deviation
Performance	4.8000	.44721
Center Of Mass	118.1320	8.95780
Knee Joint	121.0000	36.02777
Hip Joint	171.6000	4.56070
Shoulder Joint	39.8000	17.19593
Elbow Joint	143.0000	34.82815

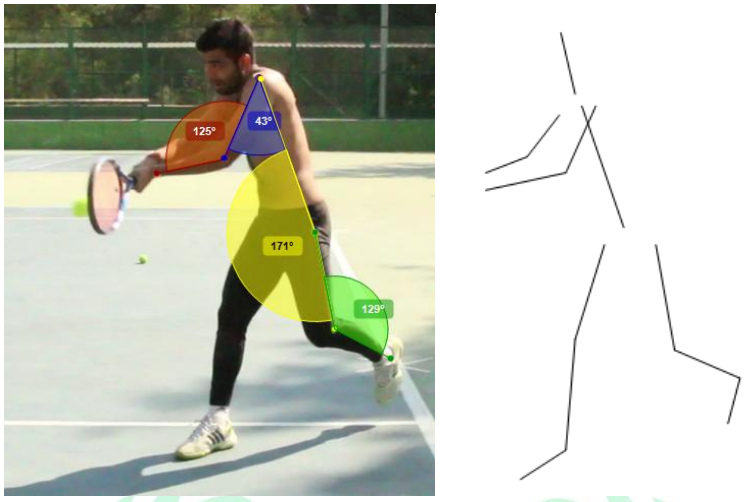

Figure-1 Angles and Stick figure of Moment contact during double handed backhand drive

Table 2: Relationship of Selected Angular Kinematic Variables at the Movement Contact to the Double Handed Backhand Drive Performance

S.No	Variables	Moment Contact
1	Left shoulder joint	-.624
2	Left elbow joint	-.658
3	Left hip joint	-.784
4	Left knee joint	-.512

*Significant, $r_{.05}(3) = .878$

Table3: Relationship of Selected Linear Kinematic Variables with the Performance of the Subject in Double Handed Backhand Drive in Tennis

S.No	Variables Correlated	Correlation Coefficient
1	Height if center of mass at the moment Contact.	-.846

*Significant, $r_{.05}(3) = .878$

Discussion

As shown table–2 & table–3 the relationship was found to be insignificant at the moment contact the relationship is not significant as the calculated value was less than tabulated value $r_{.05}(3) = .878$. The reason for such result could be that the player performance i.e. the double handed backhand drive was measured through Hewitt tennis test. As in this study research scholar had ascertained the relationship, individually at selected joints of left sides, there might be not significant relationship when we study there cumulative or the relationship between upper body joints and lower body joints with the performance of the subjects in double handed backhand drive.

Conclusion

Based on the analysis and within the limitations of present study, it was concluded that all selected kinematic variables had insignificant relationship with the performance of subject in double handed backhand drive in tennis. The conclusion for such result could be that the player performance i.e. the double handed backhand drive was measured through Hewitt tennis test. In the said test, the subject required to place the ball in specified area so the player might have been more concerned and focus on the placement of the ball in the specified area to achieve good score whereas the actual situation demands the placement of ball according to the opponent's position. The other reason could be that for the purpose of the study the subjects were required to hit the moment contact from within restricted area which might have affected the angles at other joints also and the performance as well. Other selected kinematic variables do not show any significant relationship with the performance of double handed backhand drive in tennis. This may be due to the different pattern adopted by the players during the course of double handed backhand drive, which may not be technically correct.

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