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# A Study On Relationship Of Selected Kinematic Variables To The Performance Of Liberating Phase Out-Swing In Fast Bowling Of Inter-University Level Cricketers

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**ABSTRACT**

The main purpose the study was to determine the connection between specific kinematic variables and performance of Releasing phase in out-swing bowling. Twelve male right hand bowlers were purposively selected for the study of age ranged between 18-25 years from different university of Chhattisgarh . The data was gathered with assistance from Siliconcoach pro-07 motion analysis solution software. The method of Pearson's product moment correlation coefficient was used to extent The connection among chosen biomechanical factors with the performance of out-swing bowling in cricket. The significance level was established at 0.05 for the study. The results exposed the correlation of chosen angular kinematics parameters at liberating (releasing) phase and Out-Swing bowling performance.

**Key Words**: Biomechanics, kinematic analysis, Silicon Coach Motion Analysis, Out-Swing

## 1.1 Introduction

Cricket is among the most popular and historically significant of all ball games. There is no existing record that indicates when and by whom cricket was initiated in England. It is fundamentally an English sport. Historical documents suggest that it dates back to the 13th century. The game evolved in the 17th century, featuring underarm bowling, a curved bat, and a wicket measuring two feet in width and one foot in height, with a hole in the ground situated between the stumps. Cricket is a game of intricate movements combined with great speed and accuracy. Great teams are developed by the meshing of fundamentally sound players weaving clever patterns of attack and defense tactics. In cricket fast bowlers plays a dominant role in the game Several factors affect the capacity to bowl at high speeds (for instance, technique, physical fitness, psychological skills, and social influences). Fast bowling is a distinct specialization within the sport of cricket. Generally, fast bowlers constitute the majority of the "bowling attack" aimed at the opposing team. Each fast bowler possesses unique skill sets and capabilities. Some bowlers are celebrated for their

remarkable accuracy (such as Glenn McGrath and James Anderson), while others are known for their ability to bowl at exceptional speeds (like Brett Lee and Shoaib Akhtar). Regardless of these variations, the primary goal of the bowling attack is to restrict the runs scored by the batting team while successfully dismissing the opposing batters. In cricket, bowlers can restrict run scoring and claim wickets of opposition batters with swing bowling, a tactic used to make the ball deviate horizontally through the air as it travels towards the batter. Athletes use a bowling action that controls how the ball travels through the air, where the speed, seam orientation and spin imparted on the ball at release influences airflow around the ball to cause swing. Releasing the ball with an upright and angled seam and enough backspin to maintain this position is crucial to successfully create new ball conventional swing (Mehta, 1985). Swing bowling technique has only been investigated in regional fast bowlers with athletes using their forearm and hand orientation to create the desired seam angle and wrist flexion to impart backspin on the ball (Lindsay &Spratford, 2020).

### 1.2 The aim of the Study

The aim of the research was to investigate the correlation between specific kinematic variables and performance. Releasing phase in out-swing bowling

## 2. Methodology

### 2.1 Selection of Subjects

Total Twelve male right hand bowlers were selected of age ranged between 18-25 years from different university of Chhattisgarh through purposive sampling method for this study.

### 2.2 Selection of variables

The research was confined to the assessment of following kinematic variables of out-swing bowling technique in cricket: -

1. Linear kinematic variables: Height of the Center of Gravity at releasing (liberting) phase

2. Angular kinematic variables:

a. Ankle joint (left and right) b. Hip joint (left and right) c. Knee joint (left and right) d. Shoulder joint (left and right) e. Elbow joint (left and right) f. Wrist joint (left and right) g. Body Inclination (Trunk Inclination)

### 2.3 The Criterion Measures

Liberating (Releasing) phase of each player were recorded on point system basis. Two high-speed cameras, specifically the Casio EX-F1 model, were utilized for recording of performance. The data were collected from both the sagittal and frontal planes. Further out-Swing Bowling alienated into five segments; collect phase, back foot impact, delivery stride, releasing phase and follow through.Each consists of maximum 10 points. The center of gravity was also calculated at selected moments, by using segmentation method.

### 2.4 Collection of Data

Method of the subjects on Releasing phase in out-swing bowling was collected on the basis of the judge evaluation. The final scores achieved by each participant were determined by the averages of three judges on the chosen trial.

## 3.Analysis of Data

Descriptive statistics; Means and Standard Deviation were computed. The Pearson product-moment correlation coefficient method was employed to examine the relationships among the chosen kinematic variables during the releasing phase of out-swing bowling using SPSS. The significance level was set at 0.05 for the testing of the hypotheses.

**Table-1**

**Coefficient of Correlation Between Out-Swing Bowling Performance And Angular Kinematics Variables At Releasing Phase**

| S.No. | Variables correlated | Coefficient of Correlation |
|---|---|---|
| **1.** | Angle of the right ankle joint | .131 |
| **2.** | Angle of the left ankle joint | .140 |
| **3.** | Angle of the Right knee joint | -.160 |
| **4.** | Angle of the Left knee joint | .100 |
| **5.** | Angle of the Right hip joint | .509 |
| **6.** | Angle of the Left hip joint | -.711* |
| **7.** | Angle of the Right Shoulder joint | .609* |
| **8.** | Angle of the Left Shoulder joint | ..218 |
| **9.** | Angle of the Right Elbow joint | .585* |
| **10.** | Angle of the left Elbow Joint | -.140 |
| **11.** | Angle of the Right Wrist Joint | -.611* |
| **12.** | Angle of the Left Wrist Joint | .229 |
| **13.** | Body inclination | -.509 |

Table-1,showing the Coefficient of Correlation between out-swing bowling performance and angular kinematics variables at releasing phase.

**Table-2**

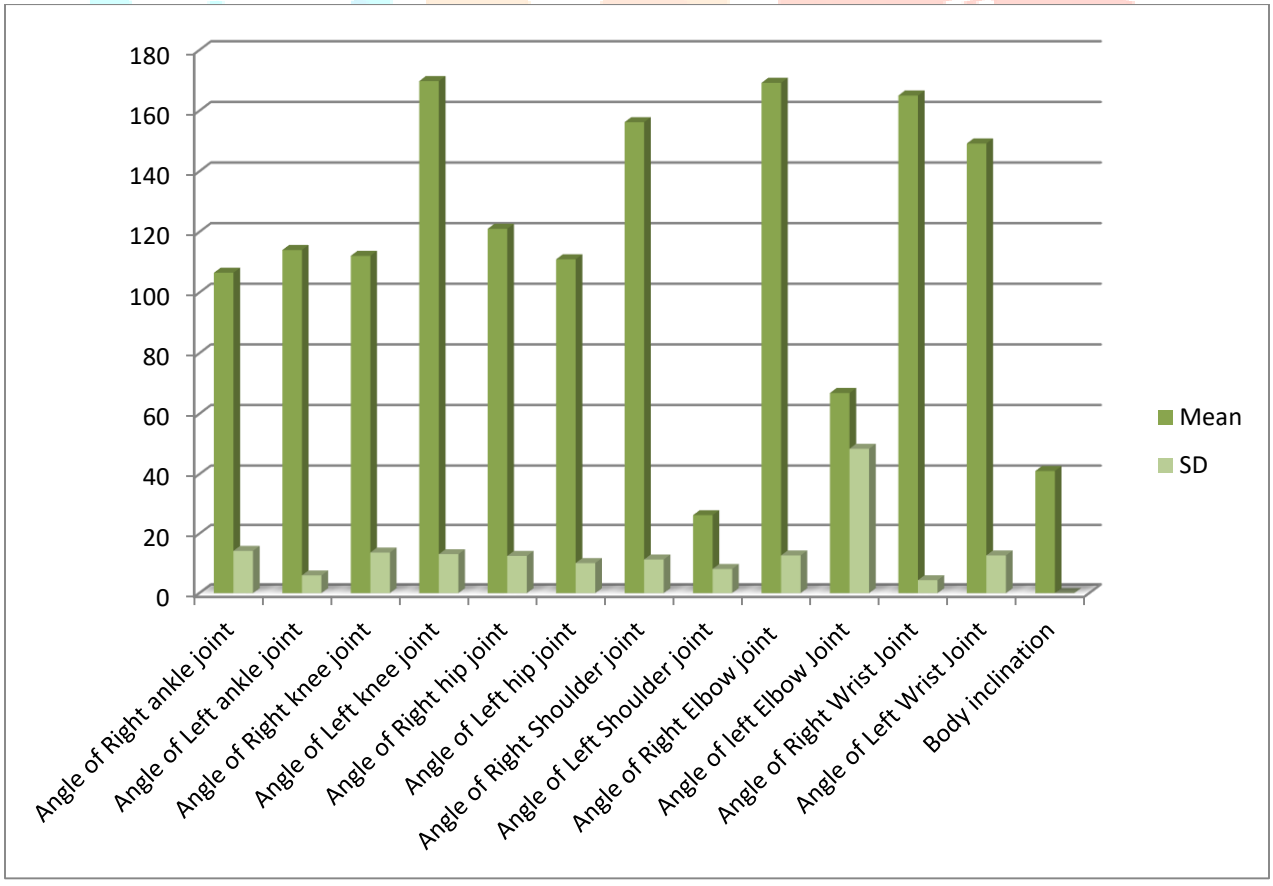
**Descriptive Analysis of Angular Kinematics Variables of Out- Swing Bowling In Releasing Phase**

| Variables | **Mean** | Standard Deviation |
|---|---|---|
| **Angle of the Right ankle joint** | 106.56 | 14.22 |
| **Angle of Left ankle joint** | 114.06 | 5.96 |
| **Angle of the Right knee joint** | 112.13 | 13.65 |
| **Angle of Left knee joint** | 169.79 | 13.10 |
| **Angle of the Right hip joint** | 121.06 | 12.51 |
| **Angle of the Left hip joint** | 111 | 10.11 |
| **Angle of the Right Shoulder joint** | 156.23 | 11.31 |
| **Angle of the Left Shoulder joint** | 26.23 | 30.05 |
| **Angle of the Right Elbow joint** | 169.22 | 8.12 |
| **Angle of the left Elbow Joint** | 66.89 | 48.48 |
| **Angle of the Right Wrist Joint** | 165.02 | 4.35 |
| **Angle of the Left Wrist Joint** | 149.2 | 12.69 |
| **Body inclination** | 41.1 | .6.21 |

Table-2, showing the average and standard deviation of angular kinematics variables of out- swing bowling in releasing phase.

**Figur-1**

**Comparison of Means & Standard Deviation of Angular Kinematics Variables of Out- Swing Bowling in Releasing Phase.**



### 3.1 Result & Discussion

Findings of the study clearly indicated that there exists a significant relationship between Out-Swing Bowling performance and Shoulder joint (Right) 156.23 ± 11.31, Elbow joint (Right) 169.22 ±8.12, Wristjoint (Right) 165.02 ± 4.350 and Hip joint (Left) 111 ± 10.11.

Results undoubtedly indicated significant relationship between Out-Swing Bowling Performance and Shoulder joint (Right), Elbow joint (Right), Wrist joint (Right) & Hip joint (Left) as the correlation coefficient values were found higher than the tabulated value. at .05 level of significance. On the other hand, there exists an insignificant relationship between Out-Swing Bowling Performance and RightAnkle joint , RightKnee joint , RightHip joint , Left Ankle Joint, Left Knee joint , Left Shoulder joint, Left Elbow joint, Left Wrist joint& Body Inclination the coefficient values were found fewer than the tabulated value at 0.05 level of significance..

On the other hand, there exists an insignificant relationship between Out-swing Bowling performance and rest of the angular kinematics variables. This could be due to the fact that most of these variables might have underwrote in the Out-swing bowling performance; though the individual involvement was insignificant.

### 4. Conclusions

The Shoulder joint (Right), Elbow joint (Right), Wrist joint (Right) & Hip joint (Left) has positive effect on the performance of Out-Swing bowling at releasing phase. On the other hand the other selected angular kinematics variables did not have significant relationship with Out-Swing bowling at releasing phase.

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