RESEARCH HUB – International Multidisciplinary Research Journal (RHIMRJ)

Relationship of Selected kinematic Variables with the Performance of Gathering phase in In-Swing bowling

Mirza Fahim Beg

Assistant Professor, Department of Physical Education, Shri Agrasen P.G. College Mauranipur U.P.

Abstract:

***Aim**: To assess the relationship between selected kinematic variables with the performance of in Gathering phase in in-swing bowling. **Material and Methods**: Twelve randomly selected male students aged 19-28 years from Ranji Trophy from U.P Team, Players of Combine University Camp and the players of Under 22 national Cricket volunteered to participate in the study. The data was collected by the help of Siliconcoach pro-07 motion analysis solution software. . To analyze data, descriptive statistics was used. Further to examine the relationship of selected kinematic variables with performance of Gathering phase in In-swing bowling, Pearson's Product Correlation Moment was used. To test the hypothesis the level of significance was set at 0.05. The above statistical technique was analyzed by using SPSS version 15. **Results**: The results have shown the values of coefficients of correlation of selected angular kinematics variables at gather phases in In-Swing Performance Knee joint (Left), Hip Joint (Left) & Elbow Joint (Left) in In-Swing. **Conclusion**: Knee joint (Left), Hip Joint (Left) & Elbow Joint (Left) have positive contribution on the performance of in-swing bowling at gather phase. This might be attributed to the fact that every good bowler tried to generate maximum force by coiling the body segments towards the centre of gravity so left knee joint (front), left hip joint (front) and left elbow joint were played important role.*

***Key words:** biomechanics, Siliconcoach motion analysis, In-swing*

Introduction

Biomechanics is a specific field which evaluates the motion of a living organism and the actions of forces on that organism. We can look at biomechanics as a combination of several different areas of study. This would include anatomy and physiology, kinematics (the study of motion without regard to its causes), kinesiology (the study of human movement) and kinetics (the study of forces acting on a system).

Biomechanics is closely related to engineering, because it often uses traditional engineering sciences to analyze biological systems. Some simple applications of Newtonian mechanics and/or materials sciences can supply correct approximations to the mechanics of many biological systems. Applied mechanics, most notably mechanical engineering disciplines such as continuum mechanics, mechanism analysis, structural analysis, kinematics and dynamics play prominent roles in the study of biomechanics.

Cricket, though, being played in limited countries has vast popularity. It has come out of the close domain of the "gentleman" and become the sport of the common man's interest. But because of its national acceptance of limited countries it could not be flourished to the maximum potency, though the advancement in techniques and in nature of the game has been tremendous. Apart from all these development steps have not been taken to make it more scientific by constructing the test and validating them by preparing the norms. Any part of educational discipline without some form of evaluation procedure is like a ship in the sea without a chart or compass

Objectives

The purpose of this study was found out the relationship of performance between selected kinematic variables and gather phase in In-swing bowling.

Methods

Twelve male cricket players aged between 19 to 28 years were selected for the purpose of this study. These subjects participated in the Ranji Trophy from U.P Team, Players of Combine University Camp and the players of Under 22 national Cricket Championship were selected as subjects for this study.

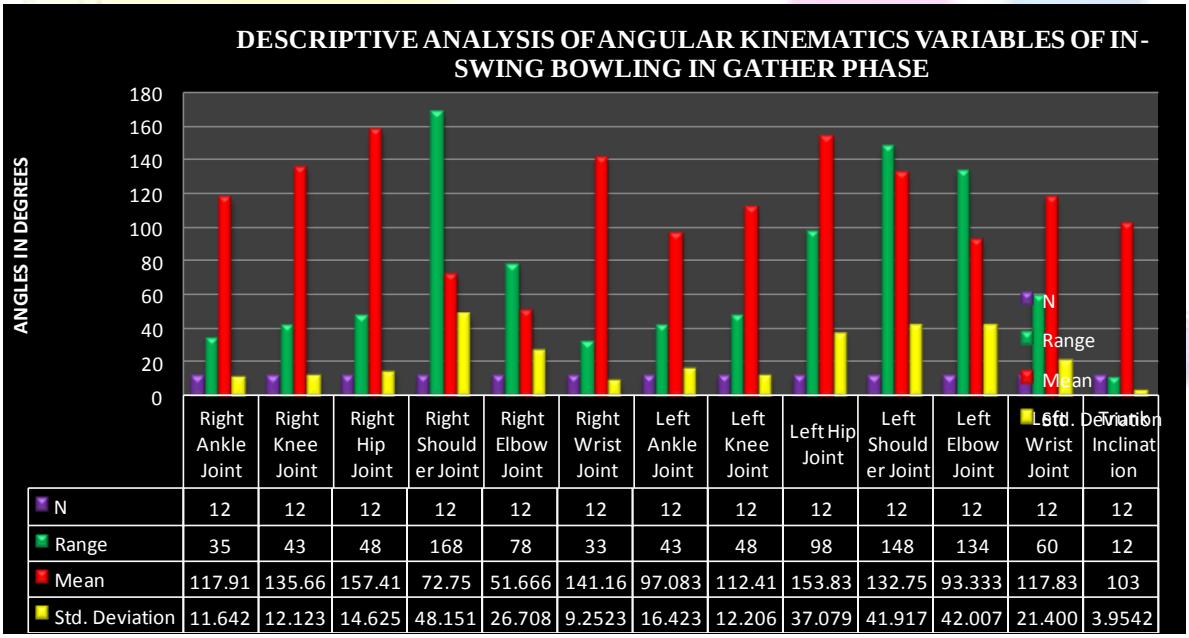
The performance of gather phase in in-swing bowling of each selected subject was taken as the criterion measure for the purpose of the present study. The skills performance of subjects was evaluated by subjective judgment by a panel of three judges,

  ISSN: 2349-7637 (Online)

For the Kinematic analysis gather phase in In-swing Bowling in cricket High speed videography technique was employed. The two Casio Exilim EX-F1 high speed cameras used for this purpose. Performance of subjects was recorded in control and favorable conditions. The data were recorded from both planes i.e. Sagittal plane and frontal plane. Further In-Swing Bowling divided into one phases such as gather phase. The center of gravity was calculated at selected moments, by using segmentation method. The Pearson's product moment correlations, were calculated between selected kinematic variables and performance of the subjects in In-Swing Bowling performance. The biomechanical variables were consisted of selected angular kinematic variables i.e. the measurements of angles at various joints of ankle joints (Right & Left), knee joints(Right & Left), hip joints (Right & Left), Shoulder joints (Right & Left), elbow joints (Right & Left), wrist joints (Right & Left), and Trunk inclination. The other biomechanical variables were the linear kinematic i.e. the Height of release at Gathering phases of In-swing bowling.

Fig-1: In-Swing Bowling Gather Phase

Table - 1
Descriptive Analysis of in-swing at Gathering phase in In-swing Bowling



	Right Ankle Joint	Right Knee Joint	Right Hip Joint	Right Shoulder Joint	Right Elbow Joint	Right Wrist Joint	Left Ankle Joint	Left Knee Joint	Left Hip Joint	Left Shoulder Joint	Left Elbow Joint	Left Wrist Joint	Trunk Inclination
N	12	12	12	12	12	12	12	12	12	12	12	12	12
Range	35	43	48	168	78	33	43	48	98	148	134	60	12
Mean	117.91	135.66	157.41	72.75	51.666	141.16	97.083	112.41	153.83	132.75	93.333	117.83	103
Std. Deviation	11.642	12.123	14.625	48.151	26.708	9.2523	16.423	12.206	37.079	41.917	42.007	21.400	3.9542

Table-1 reveals the descriptive analysis of in-swing at Gathering phase in Bowling, the angle of right ankle joint, right knee joint, right hip joint, right shoulder joint, right elbow joint, right wrist joints, left ankle joint, left knee joint, left hip joint, left shoulder joint, left elbow joint, left wrist joints and trunk Inclination mean and SD values were 117.92 ± 11.64; 135.67 ± 12.12; 157.42 ± 14.62; 72.75 ± 48.15; 51.67 ± 26.71, 141.17 ± 9.25; 97.08 ± 16.42; 112.42 ± 12.21; 153.83 ± 37.08; 132.75 ± 41.92, 93.33 ± 42.00; 117.83 ± 21.40 and 103.00 ± 3.95 respectively. The minimum and maximum values of the angle were 100 & 135,

125 & 168, 128 & 176, 15 & 183, 6 & 84, 122 & 155, 74 & 117, 82 & 130, 100 & 198, 40 & 188, 27 & 161, 94 & 154 and 97 & 109 respectively.

Table- 2
Relationship of Selected kinematic Variables with the Performance of Gathering phase in In-Swing

Independent Variables	Correlation coefficient
Ankle Joint (Right)	.500
Knee joint (Right)	.219
Hip joint (Right)	-.443
Shoulder joint (Right)	.431
Elbow joint (Right)	.074
Wrist joint(Right)	-.282
Ankle joint (Left)	.176
Knee joint (Left)	.734*
Hip joint (Left)	.656*
Shoulder joint (Left)	-.427
Elbow joint (Left)	-.630*
Wrist joint (Left)	.480
Body Inclination	-.078

*** Significant at .05 level**
r.05 (10) = .576

The results have shown the values of coefficients of correlation of selected angular kinematics variables at gather phases in In-Swing Performance Knee joint (Left), Hip Joint (Left) & Elbow Joint (Left) in In-Swing.

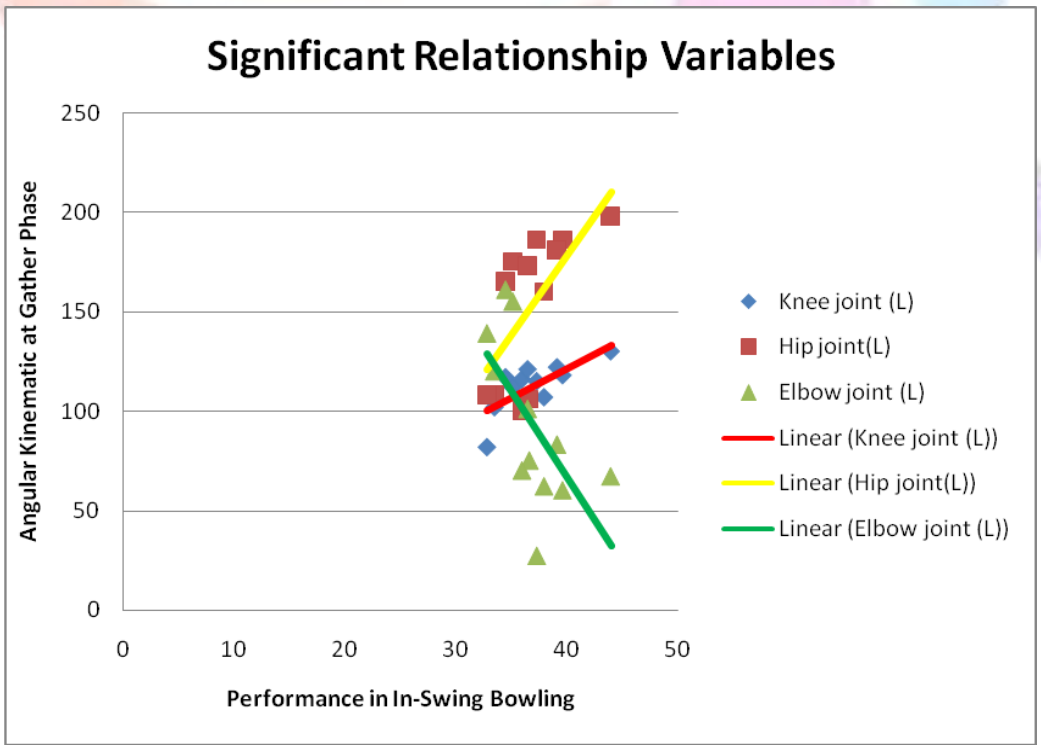


Fig-2: Significant Relationship variables at Gather Phase In-Swing Bowling

Table- 3
Relationship of Selected Linear kinematic Variables with the Performance of Gathering phase in In-Swing Bowling

Independent Variables	Releasing phase
Height Of Release	.654*

*** Significant at .05 level**
r.05 (10) = .576

The results have shown the values of coefficients of correlation of height of release in In-Swing bowling performance were found insignificant. The results have shown the values of coefficients of correlation of Velocity of ball in In-Swing bowling performance were found significant. Coefficients of correlation of C.G and performance in In-Swing bowling performance were found insignificant

.

Discussion of Findings

The statistical analysis data reveals that in Gather phase of In-swing bowling left knee joint (front) 112.41 ± 12.21^{o}, left hip joint (front) $153.83^{o} \pm 37.08$ and left elbow joint $93.33^{o} \pm 42.01$ was found significant. This might be attributed to the fact that every good bowler tried to generate maximum force by coiling the body segments towards the centre of gravity so left knee joint (front), left hip joint (front) and left elbow joint were played important role.

Hip joint (right) $157.41^{o} \pm 14.62^{o}$ was found significant along with above mentioned angular kinematic variables in out- swing bowling performance due to the fact that bowler delivered a ball slightly away from head to give angle to swing.

Left knee joint (front) $112.41^{o} \pm 12.20^{o}$, left hip joint (front) was significantly involved in coiling phase. "***What goes up must come down!"*** The higher the bound, the greater the force that was exerted on the body during landing. This could lead to a number of problems. Momentum was lost due to

(1) The bowling hand and ball starting in front of the body.

(2) The bowling arm began to rise high above the bowler's head

(3) The ball and arm were moving backwards whilst the body moved forwards.

In-Swing bowling and Out-Swing bowling was the sum of these three things 1) Grip, 2) Action, 3) Climate (John Harmer 2002) and On the other hand, there existed an insignificant relationship between *In-Swing & out-swing Bowling Performance and* rest of the angular Kinematic variables and height of centre of gravity. This could be due to the fact that most of these variables might have contributed in the In-swing bowling and Out-swing bowling performance, however the individual contribution variables were insignificant.

This stage separates the run-up from delivery stride and began with a jump off the left foot and was completed as the bowler landed on the right or back foot. During this phase with the shoulder pointing down the wicket, the right foot passed in front of the left with the right foot turning to land parallel to the bowling crease. The study showed that this stride was longer than the normal stride (Bartlett et al., 1996). This was caused by the apparent necessity to decelerate in the final stride and was probably associated with the need to 'gather' for the final thrust (Davis and Blanksby 1976).

Discussion of Hypothesis

The hypothesis stated earlier that there would be no significance relationship between selected kinematic variables and the performance in In-Swing bowling were partially accepted and partially rejected

Conclusion

1. Knee joint (Left), Hip Joint (Left) & Elbow Joint (Left) and height of release have positive contribution on the performance of in-swing bowling at gather phase.
2. The other selected kinematic variables such as Ankle joint (Right), Knee joint (Right), Hip joint (Right), Shoulder joint (Right), Elbow joint (Right), Wrist joint (Right), Ankle Joint (Left), Shoulder joint (Left), Wrist joint (Left) & Body Inclination. do not have significant relationship with the performance of In-Swing bowling at gather phase.

ISSN: 2349-7637 (Online)

Reference

1. Albora E.S., **Cricket** (London : Thompson Press Ltd., 1970).
2. Bradman, **The Art of Cricket**.
3. Clarke H. David and Clarke Harrison H., **Research Processes in Physical Education, Recreation and Health** (Englewood Cliffs, N.J. :Prentice Hall Inc., 1970).
4. G. Hay James and Reid Gavin J., **The Anatomical and Mechanical Base of Human Motion** (Englewood Cliffs, N.J.:Prentice Hall Inc., 1982).
5. Harter R.A. and Bates B.T., "Kinetic and Temporal Characteristics of Judo Hip Throws", **Biomechanics in Sports**, 2nd ed. (California: Academic publishers. 195).
6. Hughes Simon, **"The Analyst's Guide To Test Cricket**" Macmillan Publisher London 2001.
7. Lillee K. Dennis., **"Art of Fast Bowling"** Casting Publication vol III, 1999.
8. Mathur N.L., **The Encyclopedia of Indian Cricket** (Udaipur : Rajhans Prakashan, 1967).
9. Peebles Ian, **Straight From Shoulders**, (London : Hitchinson & Co. Publication, 1968)
10. Eric, Carlson Roy, "Analysis of the Forward Pass." **Completed Research in Health, Physical Education and Recreation** 5 (1963):85.
11. Finch, Alfored E. "Relationship of Segmental to Total Body Momentum in the Standing Long Jump." **Completed Research in Health, Physical Education and Recreation** 79 (1978):258.
12. Garman, Lorraine K. "A Conematographical and Mechanical Analysis of the Push Pass in Field Hockey." **Completed Research in Health, Physical Education and Recreation** 79 (1978):172.
13. Miller, Doris I. and Nelson, Richard C. **Biomechanics of Sports.** Philadelphia: Lea and Febiger, 1973.
14. Rash, Philip J. and Burke, Roger K. **Kinesiology and Applied Anatomy**. Philadelphia: Lea and Febiger, 1978.
15. Seaton, Doneash et al., **Basic Book of Sports.** Englewood Cliffs, N.J.: Prentice Hall Inc., 1958.
16. Sharma, S.R. and Gautam, G.P. **Sports Policy of India**. Delhi: Friends Publication, 2000.
17. Singh, Hardayal. **Science of Sports Training.** New Delhi: D.V.S. Publication, 1997.
18. Snyder, Eldon E. and Sprlitzer, Elmer. **Social Aspects of Sports.**

ISSN: 2349-7637 (Online)