# Academic Sports Scholars

# SELECTED ANTHROPOMETRIC VARIABLES AS PREDICTORS OF FAST BOWLING PERFORMANCE IN CRICKET

**Kunvar Singh**
**Research Scholar , Department of Physical Education, G.G.V. Bilaspur (C.G.)**

Co - Author Details :

**Ratnesh Singh**
**Associate Professor , Department of Physical Education, G.G.V. Bilaspur (C.G.)**

## ABSTRACT

Purpose:-The purpose of the study was to find out correlation between selected Independent Variables (Anthropometric variables) and Dependent Variable Bowling performanceand to study the joint contribution of Independent variables (height, weight, arm length, arm girth) in estimating Dependent Variable (bowling performance) and also establish regression equation for predicting Dependent Variable- bowling performance on the basis of anthropometric Variables (height, weight, arm length, arm girth).

**Methods:**Total of 25 Fast bowlerswere selected from different colleges of Bilaspur.  Age of the subjects ranged between 18 to 22 years. Under independent variables researcher has selected height, weight, arm length, arm girth. Under dependent variables bowling performance was assessed on the basis of subjective judgment of the experts.

**Statistical Technique:-**To find out correlation between Independent Variables (height, weight, arm length, arm girth) and Dependent Variable (Fast Bowling performance), Product Moment Method of correlation was used. To study the joint contribution of Independent Variables in estimating Dependent Variable, Multiple correlation method was used. Regression equation was established for predicting Dependent Variable on the basis of Independent Variables. Level of significance was set at 0.05.

**Findings and Conclusions:**The correlation (r) values of bowling performance with the height, weight,

arm length and arm girth are .797, .351, .643 and -.042 respectively. Multiple Relationship (R) fast bowling performance and selected anthropometric variables (height, weight, arm length and arm girth,) is R=0.827 and R square is 0.684, which shows that 68.4%of Fast bowling performance depends on these four anthropometric variables i.e. Height, weight, arm length and arm girth.

**KEYWORDS** :Cricket, Fast bowling performance, anthropometric variables.

## INTRODUCTION

Cricket is a field-based prevalent group amusement in most Commonwealth nations. Previously, it was played exclusively inside a particular season (winter in Asian nations and summer in western nations). In any case, the diversion has picked up such a great amount of prevalence in the most recent couple of decades that it is currently played consistently. Cricketers are in this manner presented to all the more requesting timetables, with longer times of preparing and honing. The expanded workload might be one of the contributing elements to the expanded frequency of wounds (Davies et al., 2008). [23]

Cricket is a most highly praised game which is played on the pitch of twenty two yard. Each team involves eleven players at the period of play. The players play with full effort to win the match. The players play the match with the assessment partnership by this reasons this is known as "Gentlemen's Game". The game of cricket is thought to have been played in the prearranged structure quite a long while back. Cricket was familiar with North America by the English settlements in the seventeenth century more than likely before it had even accomplished the north of England. In the eighteenth century, it started in various parts of the world. It was familiar with the West Indies by pioneers (Bowen, 1970)[5], and to India by British East India Company mariners in the essential portion of the century. It started in Australia around when the colonization began in 1788. After wards, New Zealand and South Africa followed in the mid nineteenth century (Altham, 1962)[1].

Anthropometric measurement plays hugeplace in fast bowling in cricket. Anthropometric measurement are important for an unrivaled execution in pace bowling in cricket like longer the sheltered separation progressively the impact which helps the bowler to bowl speedy. Tallness is a vital variable in pace shaking the rocking the bowling alley back street and this is clear from the way that a large portion of the colossal pace bowlers have good position of stature.

Anthropometry has a rich convention in games sciences. However, in various times, diverse terms were utilized like element anthropometry, sports anthropometry, biometry, physiological anthropometry, anthropometrical, kinfolk anthropometry and so forth by researchers to build up a few connections between the body structure and the specific capacities required for different errands (Koley, 2006).[14] Truth be told, it is settled that every individual is remarkable. The degree of human variability is enormous to the point that no two people can ever be precisely the same. There are two major reasons for this variety. One is the qualities acquired from guardians and the other is the unendingness of environment which follows up on people from support to grave. Accordingly, researchers have dependably been captivated by the wonder of human variety. In the populaces, the law of chance works in general and individuals when all is said in done tend to fall along a bend of ordinary conveyance on all characteristics (Koley and Sandhu, 2005).[13]

Mainly there are three department in cricket; batting, bowling and fielding. These are mainly basic skills in cricket.The aim of fast bowling is to bowl the cricket ball at high speed and to make it to bounce off the pitch in achangeablemanner or move to any side through the air, reason that create it complicated for the batsman to hit the ball accurately. Ball release speed in pace bowling is much

affectedby various anthropometric variables such as height, weight, arm length, arm girth and other variables.A fast bowler requires a lot of vitality and most fast bowlers are fit to bowl of 4-6 over's spell lackingrelax as per situation and requirement of the team. Ball releasevelocity in fast bowling is much strength by different biomechanical, anthropometric, physical wellness and method essentials(Stokill and Bartlett, 1992). [41]

## OBJECTIVE OF THE STUDY
• The purpose of the study was to find out correlation between selected Independent Variables (Anthropometric variables) and dependent Variable (Bowling performance)
• To study the joint contribution of Independent variables (height, weight, arm length, arm girth) in estimating Dependent Variable-bowling performance
• To establish regression equation for predicting Dependent Variable (bowling performance) on the basis of Independent Variables (height, weight, arm length, arm girth).

## HYPOTHESIS OF THE STUDY:-
• It was hypothesized there will be no significant relationship between selected Independent Variables (Anthropometric variables) and dependent variables (bowling performance).
• It was hypothesized there will be no joint contribution of Independent variables (height, weight, arm length, arm girth) in estimating Dependent Variable-bowling performance.

## METHODOLOGY
Total 25 Fast bowlers were selected from different colleges of Bilaspur district of Chhattisgarh. The average age of subjects was 19.92±1.52 years. Under independent variables researcher has selected height, weight, arm length, arm girth. Under dependent variables bowling performance was assessed on the basis of subjective judgment of the experts.

## SELECTION OF VARIABLES
Keeping the feasibility criterion in mind, the researcher selected the following variables for the present study:

## Independent variables:-
o Height
o Weight
o Arm length
o Arm girth

## Dependent variables:
Bowling performance

## Criterion Measures
• Age was recorded on the basis of High school mark sheet of the subjects.
• Height was measured by measuring tape in centimeters.
• Weight was measured by digital weighing machine.
• Arm length was measured by measuring tape recorded in cm.
• Arm girth was measured by measuring tape recorded in cm.

To measure the bowling performance offast bowlerswas measured by the subjective judgment of the experts. For each criteria maximum 10 marks was given by the expert and over all 50 marks were awarded for measuring the fast bowling performance. Fast bowling performance was measured by the seven experts on the basis of these five criteria like as

o Run up
o Loading and pre delivery strides
o  Line and Length
o Bounce of the ball
o Velocity of the ball

## Table -1
## Selected variables and their criterion measures with unit of measurement

| S.N. | Variables | Criterion measures | Unit of measures |
|------|-----------|--------------------|------------------|
| 1 | Height | Stadiometer | Centimeter |
| 2 | Weight | Electronic weighing machine | Kilogram |
| 3 | Arm length | Measuring tape | Centimeter |
| 4 | Arm girth | Measuring tape | Centimeter |
| 5 | Bowling performance | Subjective judgment by the experts | Numbers |

**Statistical Analysis:-** To find out correlation between Independent Variables (height, weight, arm length, arm girth) and Dependent Variable (Fast Bowling performance), descriptive statisticsand Product Moment Method of correlation was used. To study the joint contribution of Independent Variables in estimating Dependent Variable, Multiple correlation method was used. Regression equation was established for predicting Dependent Variable on the basis of Independent Variables.All statistics were calculated with SPSS 16.0. Level of significance was set at 0.05.

## RESULT AND FINDINGS OF THE STUDY

The mean and standard deviation of anthropometrics variables is(height-179.62 and 2.35, weight-75.11 and 5.456, arm length-66.01 and 1.830, arm girth-24.86 and 1.396)bowling performance-41.20 and 3.905. The correlation value of bowling performance with the height, weight,arm length and arm girth is .797, .351, 643 and .042.
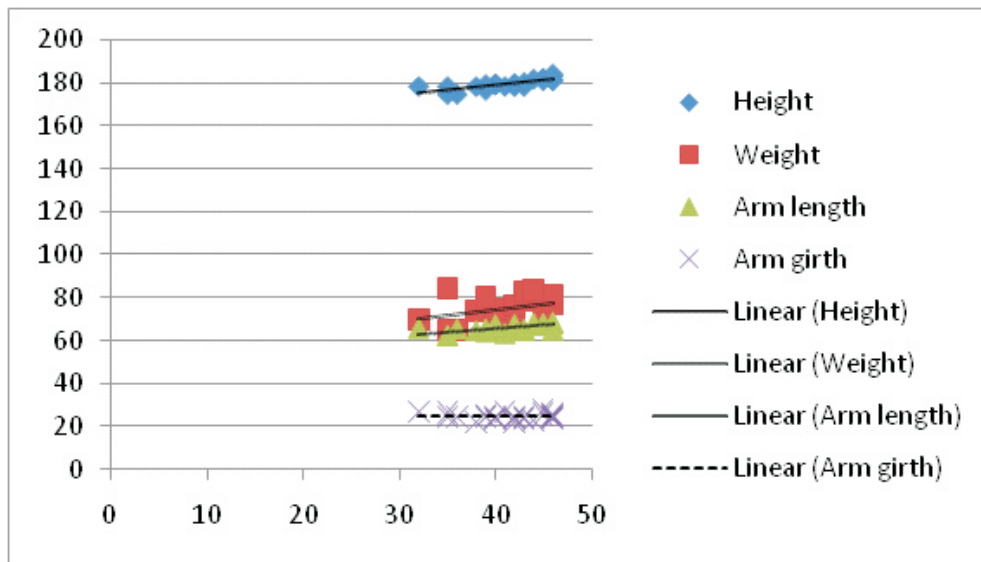
## Table- 2
## Descriptive Statisticsof Dependent Variable (fast bowling Performance) and Independent Variables (Anthropometric variables)

| Variables | N | M | SD |
|-----------|---|---|-----|
| HEIGHT | 25 | 179.62 | 2.350 |
| WEIGHT | 25 | 75.116 | 5.456 |
| ARM  LENGTH | 25 | 66.014 | 1.830 |
| ARM GIRTH | 25 | 24.864 | 1.396 |
| BOWLING PERFORMANCE | 25 | 41.200 | 3.905 |

**Table- 2: Correlation between Dependent Variable (fast bowling Performance) and Independent Variables (Anthropometric variables)**

| S.N. | NAME OF INDEPENDENT VARIABLES | CORRELATION COEFFICIENT | Sig. |
|---|---|---|---|
| 1 | HEIGHT | .797[*] | .000 |
| 2 | WEIGHT | .351[*] | .042 |
| 3 | ARM  LENGTH | .643[*] | .000 |
| 4 | ARM GIRTH | -.042 | .421 |

**Graphical representation of relationship of selected anthropometric variables with the fast bowling performance**



**Table -4**

**Joint contribution of Independent Variables (Height, weight, arm length and arm girth) in predicting Dependent Variable (Fast bowling Performance)**

| MODEL | R | $R^2$ | Adjusted $R^2$ | Std. of the estimate |
|---|---|---|---|---|
| 1 | .827 | .684 | .621 | 2.403 |

**Table-5: ANOVA table**

| Model | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Regression | 250.507 | 4 | 62.627 | | |
| Residual | 115.493 | 20 | 5.775 | 10.845 | .000 |
| Total | 366.000 | 24 | | | |

**Table-6**
**Regression coefficient of selected variables in predicting Dependent variable (Fast bowling performance)**

| Model | Unstandardizedcoefficient | | Standardized Coefficient | t | Sig. | 95% confidence interval for b | | Coefficient statistics | |
|---|---|---|---|---|---|---|---|---|---|
| | B | Std. error | Beta | | | Lower bound | Upper bound | Tolerance | VIF |
| 1-Constent | -184.930 | 40.761 | | -4.537 | .000 | -269.957 | -99.904 | | |
| Height | 1.139 | .334 | .686 | 3.409 | .003 | .442 | 1.836 | .390 | 2.565 |
| Weight | -.014 | .116 | -.019 | -.117 | .908 | -.255 | .228 | .602 | 1.660 |
| Arm length | .464 | .367 | .218 | 1.264 | .221 | -.302 | 1.230 | .533 | 1.877 |
| Arm girth | -.326 | .396 | -.117 | -.824 | .420 | -1.152 | .500 | .787 | 1.271 |

**Table-7**
**Residuals Statistics**

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Predicted Value | 25 | 33.775 | 46.515 | 41.200 | 3.230 |
| Residual | 25 | -7.245 | 3.331 | .000 | 2.193 |
| Std. Predicted Value | 25 | -2.298 | 1.645 | .000 | 1.000 |
| Std. Residual | 25 | -3.015 | 1.386 | .000 | .913 |

## DISCUSSION OF FINDINGS

The correlation value of fast bowling performance with the anthropometric variables height, weight, arm length and arm girth is .797*, .351*, .643* and - .042.that shows the significance relationship between selected anthropometric variables (height, weight, arm length) with fast bowling performance, and no significance relationship found with arm girth. To predict the bowling performance Regression equation value R=0.827 and R square is 0.684, which shows that 68.4% of Fast bowling is acquired by these four anthropometric variables i.e. height, weight, arm length and arm girth.Fast bowling performance depends on the anthropometric variables of the fast bowlers and this is the fact that bounce of the ball isdirectly proportional to the releasing bowler's height.Taller the fast bowlers greater will be the velocity and bounce of the ball. Longer arm length works as lever that provides the speed and bounce of the ball of fast bowlers.Weight of the body and arm girth might have

positively influenced the performance in fast bowling because the greater mass of the body playsimportant role in increasing the movement object resulting better performance.Greater body weight (lean body mass) and arm girth provides more momentum and quality that is vital for the fast bowling in cricket.

Researcher also conducted some studies in previous time that also supported the results of the present study.

• Singh, K., & Singh, R. (2015) have also conducted a study "Relationship of selected anthropometric variables with the throwing distance of cricket ball in cricket." They found there is significance relationship between anthropometrics variables and throwing distance of cricket players.

• Singh, K., &Singh, R. (2015) haveinvestigated "Relationship of selected anthropometric variables with the velocity of ball in pace bowling in cricket." The results indicate there is significance relationship between anthropometric variables (height, arm length) with the velocity of the ball of the pace bowlers in Cricket and no significance relationship in body weight and arm girth with the velocity of ball.

## CONCLUSIONS

On the basis of result and findings these following conclusions can be drawn:

+ Significant relationship was found between fast bowling performance and height (r = -.797, p < .05).
+ Significant relationship was found between fast bowling performance and weight(r = -.351, p < .05).
+ Significant relationship was found between fast bowling performance and Arm length (r = -.643, p <.05).
+ Insignificant relationship was found between fast bowling performance and arm girth (r = -.042, p >.05).
+ Multiple Relationship (R) fast bowling performance and selected anthropometric variables(height, weight, arm length and arm girth,) is R=0.827 and R square is 0.684, which shows that 68.4%of Fast bowling performance is obtained by these four anthropometric variables i.e. Height, weight, arm length and arm girth.

## TESTING THE HYPOTHESIS

+ Initially it was hypothesized  that there will be no significant relationship between selected anthropometric variables (height, weight andarm length) with Bowling performance of fast bowlers in cricket, is not accepted.
+ It was hypothesized that there would be no significant relationship between arm girthwith bowling performance of pace bowlers in cricket, is accepted at 0.05 level.
+ It was also hypothesized that there will be no joint contribution of selected anthropometric variables to predict the fast bowling performance is not accepted at 0.05 levels.This is clear that 68.4% anthropometric variables (Height, weight, arm length and arm girth) deciding the performance of fast bowling.

## REFERENCES

**Books**

1.Altham, H. S. (1962). A History of Cricket, Vol. 1, George Allen & Unwin.

2.Barrow and Mc, Gee. (1962).A Practical Approach to Measurement in Physical Education, p.112J.G.P. Williams, Sports Medicine.London: Edward Arnold Ltd., (1).

3.Barrow M. Harold and Rosemary McGee. (1971). A Practical Approach to Measurement in Physical Education.Philadelphia : Lea and Febiger, (123).

4.Barrow, H.M., and McGee, R. (1984). A Practical Approach to Measurement. Philadelphia: Lee and Fibinger.

5.Bowen, R. (1970). Cricket: A History of its Growth and Development. Eyre &Spottiswoode.

6.Clarke H. Harison.,& David H. Clarke.  Application of Measurement to Physical Education, Sixth Edition. Prentice Hall, Inc. Eagalwood Cliff, New Jersey, (123).

7.H. HarisonClarke,& David H. Clarke.  Application of Measurement to Physical Education, Sixth Edition. Prentice Hall, Inc. Eagalwood Cliff, New Jersey. (123).

8.Hay, J.G. (1978). The Biomechanics of Sports Techniques. Englewood Cliff, N.J: Prentice Hall Inc.

9.J.G.P, Williams. (1962). Sports Medicine.London: Edward Arnold Ltd.,(1).

10.Jack F. (1972), Fingleton cricket London: Alan and monbroy publication.

11.Johnson, B.L.and Nelson, J.K. (1982). Practical Measurement for Evaluation in Physical Education. Delhi: Sujeet Publication.

12.Kansal, D.K. (1996). Test and Measurement in sports and Physical Education. New Delhi: D.V.S.Publication.

13.Koley, S. & Sandhu, Js. (2005). An Introduction to Kinanthropometry. New Delhi: Friends Publications.

14.Koley, S. (2006). New Horizons in Kinanthropometry. New Delhi: Friends Publications.

15.Kumar, A.(1999). DPH Sports series Cricket. New Delhi: Discovery publishing house.

16.Mathew, D.K. (1973).Measurement in Physical Education. Philadelphia London: W.B.Saunders Company.

## Journals

17.Brechue, W.F., Mayhew, J.L. & Piper, F.C. (2010). Characteristics of sprint performance in college football players. Journal of Strength and Conditioning Research, 24(5), 1169- 1178.

18.Campos, F. A. D. et al. (2009). Anthropometric profile and motor performance of junior badminton players. Brazilian Journal Biomotricity, 3(2), 146-151.

19.Clarke David H. and Clarke H. Harrison. (1964). Application of Measurement to Health and    Physical American Medical College Association & American Association of Health Physical Education and Recreation. Exercise and Fitness, Journal of Health, Physical Education and Recreation, (35), 44.

20.Clarke H. Harison, David H. Clarke.  Application of Measurement to Physical Education, Prentice Hall, Inc. Eagalwood Cliff, New Jersey, (6), 123.

21.Cronin, J.B. & Hansen, K.T. (2005). Strength and power predictors of sports speed. Journal of Strength and Conditioning Research, 19(2), 349-357.

22.Davies R, Du-Randt R, Venter D, Stretch R. (2008). Cricket: Nature and incidence of fast-bowling injuries at elite, junior level and associated risk factors. South African Journal of Sports Medicine. 20 (4):115-118.

23.Davis, K. W., Hackett, Thomas, Keirns, Mike, Sabick, Michelle, B., &Torry, M. R. (2008). A Biomechanical Analysis of Youth Pitching Mechanics. Journal of Pediatric Orthopedics, Vol. 28- Issue 4:452-459.

24.Davis, K., Rossi, S., Langdon, J., & McMillan, J. (2012). The Relationship between Jumping and Sprinting Performance in Collegiate Ultimate Athletes. Journal of Coaching Education, 5(2), 24-92.

25.Edward Wayne Wenling(1963). The Relationship of Forearm Muscle Strength to Bat Swing Velocity, Completed Research in Health, Physical Education and Recreation (5) 40.

26.Harold M. Barrow and McGee, R. (1971). A Practical Approach to Measurement in Physical Education.(Philadelphia : Lea and Febiger), p.123.

27.Koley, S., Yadav, M. K., &Sandhu J. S. (2009). Estimation of hand grip strength and its association with some anthropometric traits in cricketers of Amritsar Punjab, India. Internet Journal of Biological Anthropology. 3,1.

28.Linthorne, N. P., Guzman, M. S., and Bridgett, L. A. (2005). Optimum take-off angle in the long jump. Journal of Sports Sciences, 23, 703-712, 359-372.

29.McCurdy, K.W., Walker, J.L., Langford, G.A., Kutz, M.R, Guerrero, J.M. & McMillan, J. (2010). The relationship between kinematic determinants of jump and sprint performance in division I women soccer players. Journal of Strength and Conditioning Research, 24(12), 3200-3208.

30.Meena, T. R., & Mishra, M.K.(2015). Prediction of Gymnastic Performance on the Basis of Selected Physical Fitness Components. Academic Sports Scholar, 4 (6), 1-7.

31.Milanese, C. Bortolami, O. Bertucco, M. Verlato, G. and Zancanaro, C. (2010), Anthropometry and Motor fitness in children aged 6-12 years, Jurnal of Human Sporta and Exercise, l.5(2), 265-279.

32.Mishra, M. K. and Thakur, J. S. (2015). An Estimation of Kho-Kho Performance on the Basis of Selected Physical Fitness Parameters. International Journal of Sports Sciences and Fitness, 5(2), 235-250.

33.Pandey, A. K., & Sardar, S. (2015). A study of speed ability among football and hockey male players of Bilaspur Chhattisgarh. Vol. 1 (11),pp694-696.

34.Reid W. Randall. (1978).The Relationship of Lowers Limb Flexibility, Strength and Anthropometric Measure to Skating Speed in Versity Hockey Players. Research in Health, Physical Education and Recreation.vol.20 ,pp. 144.

35.Seiler, S., Taylor, M., Diana, R., Layes, J., Newton, P. & Brown, B. (1990). Assessing anaerobic power in collegiate football players. Journal of Applied Sport Science Research, 4(1), 9- 15.

36.Sharma, H. O. & Subramanian, R. (2014). Speed and Agility as determinants of Long Jump Performance. Academic Sports Scholar, 3(9), 49-52.

37.Singh V.K. & Singh R. (2014). Physical, Physiological, Psychological and Anthropometric Variables as Predictors for Speed of Sub-Junior Athletes. Academic Sports Scholar, 3 (8), 1-4.

38.Singh, K., & Singh, R. (2015). Relationship of selected anthropometric variables with the throwing distance of cricket ball in cricket. Academic Sports Scholars.vol.4 (8).

39.Singh, K., & Singh, R. (2015). Relationship of selected anthropometric variables with the velocity of ball in pace bowling in cricket. International Journal of Applied Research. Vol.1 (10), pp. 613-616.

40.Singh, R., & Singh, K. (2016). Difference between batsman and fast bowlers in relation to grip strength, back strength, leg strength and flexibility in cricket. International Journal of Advanced Research and Development. Vol.1 (3),pp. 97-99.

41.Stockill, N. P., & Bartlett, R. M. (1992). A three dimensional cinematographical analysis of the techniques of international and English country cricket fast-bowlers. In R. Rodano, G. Ferrigno, and G. C. Santambrogio (Eds.), Proceedings of the10th Symposium of the International Society of Biomechanics in Sports (pp. 52 – 55). Milan: Edi-Ermes.