

SOME PREDICTIVE ANTHROPOMETRIC VARIABLES OF FAST BOWLING IN CRICKET

* Abhay Singh¹, Amit Kumar Singh², Hari shanker singh²

¹ Department of Physical Education, Sai Nath University, Ranchi, Jharkhad, India,

²Research Scholar, Sai Nath University, Ranchi , Jharkhad, India

*Address for correspondence: Dr. Abhay Singh, Assistant Professor, Department of Physical Education, Sai Nath University, Ranchi, Jharkhad, India ; Email ID: abhayacri@yahoo.com

ABSTRACT

The game of cricket requires considerable amount of physical fitness and mastery of skills. A key element of fast bowling is ball-release speed or peak bowling speed (V-peak). Ball-release speed in fast bowlers is influenced by various anthropometric factors. Certain anthropometric measurements are advantageous for a good performance in fast bowling in cricket like longer the arm length more the leverage which helps the bowler to bowl fast. In this study, the researcher has tried to find out the predictive anthropometric variables which contribute towards fast bowling in cricket. To achieve the purpose of the study, 45 male fast bowlers of inter-collegiate cricket teams in various colleges affiliated to University of Lucknow, Lucknow were randomly selected as subjects. 18 anthropometric variables namely: the height, weight, foreleg length, thigh length, leg length, upper arm length, forearm length, ponderal index, crural ratio, arm length, hand length, upper arm girth, forearm girth, wrist circumference, shoulder width, chest girth, thigh girth and calf girth were selected and their individual and multiple correlation with velocity of the ball were computed by using Pearson's Product Moment Method for Coefficient of Correlation and Multiple Correlation. Multiple regression equation was developed in order to predict the most contributory factors towards fast bowling performance for the anthropometric variables. Bowling performance of a fast bowler was found highly correlated to height (0.4241), Fore arm length (0.4573), Wrist Circumference (0.4753) and Shoulder width (0.4464), whereas it was found significantly correlated to Leg length (2983) and Ponderal index (0.2974).

Keywords: Fast bowling; Anthropometric variables; Correlation, regression.

INTRODUCTION

There are numerous factors which are responsible for the performance of a sportsman. The physique and body composition including the size, shape and form are known to play a significant role in this regard. The game of cricket requires considerable amount of physical fitness and mastery of skills. A key element of fast bowling is ball-release speed or peak bowling speed (V-peak). Ball-release speed in fast bowlers is influenced by various anthropometric factors.

Heyward (2006) included body weight, height, circumference, skin fold thickness and bony widths and lengths as major anthropometric measurements (Heyward, 2006:13). Certain anthropometric measurements are advantageous for a good performance in fast bowling in cricket like longer the arm length more the leverage which helps the bowler to bowl fast. Height is an important factor in fast bowling and this is evident from the fact that most of the great fast bowlers have an advantage of height. Although strength and power characteristics are purported to be

important factors influencing ball-release speed (Bloomfield, Ackland, and Elliott, 1994), the extent to which they explain variations in bowling speed between different fast bowlers is unclear.

REVIEW OF LITERATURE

Sharma (1983) found that fast bowlers were significantly taller than bats man. Mishra (1986) studied the relationship between flexibility, speed, and strength and body segment to bowling performance and found that shoulder, wrist, trunk, neck flexibility, speed, and arm length are reliable variables in predicting bowling performance in cricket. Results of the study conducted by Kumar and Gladykirubakar (2014) reveal that there was significant difference between the standing height, arm length, leg length, and body composition and there is no significant difference exist between the thigh girth of spin bowlers and medium pace bowlers in cricket.

DEFINITION OF TECHNICAL TERMS USED

Fast Bowling: Fast bowling in cricket involves the projection of ball with maximum velocity towards the opposite end of wicket at a distance of twenty-two yards (Fingleton, 1972:11).

Anthropometric variables: Anthropometric variables are dimensions of the structure of the human body taken at specific sites to give measures of length, girth and width (Mathews, 1978:19). Anthropometric measurement plays an important role in fast bowling in cricket.

HYPOTHESES

1. Performance in fast bowling is influenced by selected anthropometric variables.
2. Anthropometric variables can be utilized in predicting performance in fast bowling.

METHODOLOGY

Selection of Subjects: To achieve the purpose of the study, 45 male fast bowlers of inter-collegiate cricket teams in various colleges affiliated to University of Lucknow, Lucknow were randomly selected as subjects. All the 45 fast bowlers were of fairly well-developed physique and all of them had been participating in cricket regularly for a number of years.

Selection of Variables

Dependent Variables: *Velocity of the ball* was considered as the dependent variable.

Independent Variables (Anthropometric Variables) 18 anthropometric variables namely : the height,

weight, foreleg length, thigh length, leg length, upper arm length, forearm length, Ponderal Index, Crural Ratio, arm length, hand length, upper arm girth, forearm girth, wrist circumference, shoulder width, chest girth, thigh girth and calf girth were selected.

Collection of Data

After establishing the reliability of the data, the data was collected by administering the standard procedure/tests for taking anthropometric measurements as well as fast bowling performance.

Statistical Techniques used for analysis of Data

In order to find out the relationship of anthropometric variables, to velocity of ball, Pearson's Product Moment Method for Coefficient of Correlation and Multiple Correlation were applied. Multiple regression equation was developed in order to predict the most contributory factors towards fast bowling performance for the anthropometric variables.

For testing the hypotheses the minimum level of confidence was set at 0.05.

RESULTS

The scores of each of the independent variables selected under anthropometric variables and dependent variable (fast bowling performance) were correlated using Pearson's Product Moment Method for finding out the relationship between them. The Coefficient of Correlation have been presented in Table 1.

Table No. 1: Correlation between Anthropometric Variables and Velocity of Ball

Anthropometric Variables	Coefficient of Correlation 'r' (N=45)
Height	0.4241**
Weight	0.1060
Foreleg Length	0.1089
Thigh Length	0.1807
Leg Length	0.2983*
Upper Arm Length	-0.1464
Fore Arm Length	0.4573**
Ponderal Index	0.2974**
Crural Ratio	-0.0075
Arm Length	-0.0841
Hand Length	0.0703
Upper Arm Girth	-0.1245
Fore Arm Girth	-0.0821
Wrist Circumference	0.4753**
Shoulder Width	0.4464**
Chest Girth	0.1404
Thigh Girth	0.1192
Calf Girth	-0.0169

Note : * = Significant at $df=43$ and $p=0.05$ ($r>0.294$); ** Significant at $df=43$ and $p=0.01$ ($r>0.380$)

Table 1 reveals that bowling performance of a fast bowler is highly correlated to height (0.4241), fore arm length (0.4573), Wrist Circumference (0.4753) and Shoulder width (0.4464), whereas it is significantly correlated to Leg length (2983) and Ponderal index (0.2974).

This table also indicates that other anthropometric variables namely weight (0.106),

Foreleg Length (0.1089), Thigh Length (0.1807), Upper arm length (0.1464), Crural ratio (0.1807), Arm Length (0.0841), Hand length (0.0703), Upper Arm Girth (0.1245), Fore Arm Girth (-0.082), Chest girth (0.1404), Thigh girth (0.119) and Calf girth (0.0169) are not found significantly correlated to bowling performance of respondents.

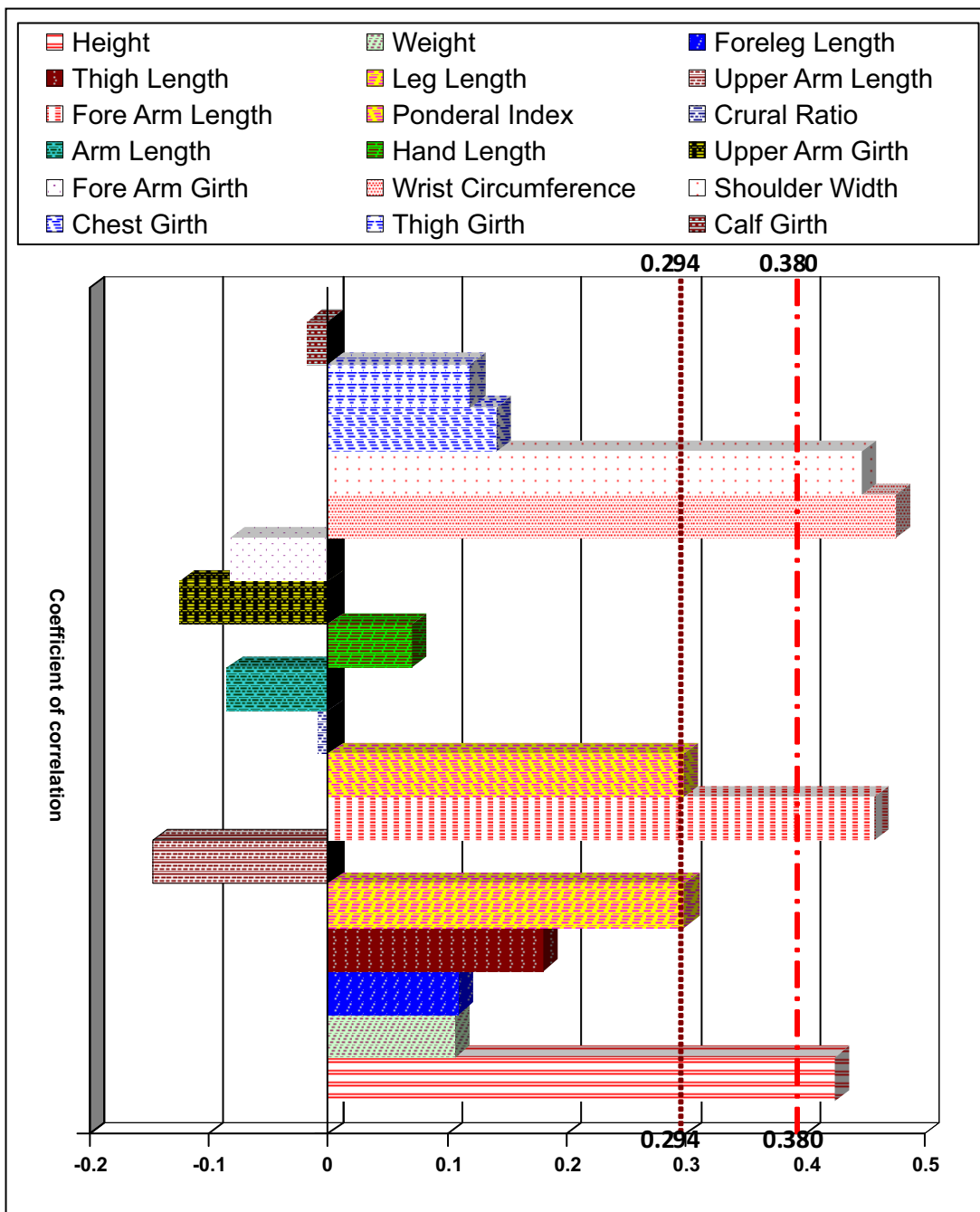


Fig 1 : Relationship Between Anthropometric Variables and Velocity of Ball Combined Contribution of Significant Anthropometric Variables to Fast Bowling Performance

Table No. 2 : Correlation Matrix of Significant Anthropometric Variables to Fast Bowling Performance

	Height	Leg Length	Fore Arm Length	Ponderal Index	wrist circumference	Shoulder Width	Velocity of Ball
Hight	1						
Leg Length	0.2852	1					
Forearm Length	0.2579	0.2622	1				
Ponderal Index	0.7161	0.2152	0.3660	1			
Wrist Circumference	0.2213	0.2297	0.4674	0.2511	1		
Shoulder Width	0.2133	0.2124	0.4225	0.2427	0.3140	1	
Vilocity of Ball	0.4241	0.2983	0.4573	0.2974	0.4753	0.4464	1

Table 2 presents the inter-correlation between Significant Anthropometric, variables of Velocity of ball delivered. This table shows that all significant Anthropometric variables of fast bowling performance are also significantly inter correlated to each other.

Table No. 3 : Multiple Correlation between Significant Anthropometric Variables and Fast Bowling Performance

Indicator	Value
Multiple R	0.7192
R Square	0.5172
Adjusted R Square	0.4695
Standard Error	3.2190
Observations	45

Table 3 reveals that the combined contribution of height, leg length, Forearm Length, Ponderal index, shoulder width and wrist circumference was significant at 0.05 level as the computed value of 0.7192 for multiple correlation was much more than the value of 0.339 required for the multiple correlation coefficient to be significant at 0.05 level with 43 degrees of freedom.

Therefore, it can be observed that Height, Leg Length, Forearm Length, Ponderal Index, Wrist Circumference, Shoulder Width, Arm and Shoulder Strength and Leg Strength are the six important variables which contribute towards fast bowling performance.

The Regression Equation developed for prediction

of velocity of ball on the basis of anthropometric variables has been given as follows:

$$X_y = 42.623 X_H + 0.300 X_{LL} + 0.452 X_{FL} + 0.357 X_{PI} + 1.009 X_{WC} + 0.55 X_{SW} + 3.251$$

Where,

- X_H = Hight
- X_{LL} = Leg Length
- X_{FL} = Forearm Length
- X_{PI} = Ponderal Index
- X_{WC} = Wrist Circumference
- X_{SW} = Shoulder Width

The findings of regression equation revealed that Height, Leg Length, Forearm Length, Ponderal Index, Wrist Circumference and Shoulder Width play a significant role towards fast bowling performance.

DISCUSSION

The findings of the present study are in agreement with the findings of Bagchi (1990), Sharma (1983), Kumar and Gladkyrubakar (2014). Therefore, the hypothesis stated earlier with respect to height, leg strength, shoulder width, leg length, ponderal index and wrist circumference is accepted. The significant relationship between Ponderal Index and velocity of the ball may also be due to the same reason as mentioned above because height plays an important role in the computation of Ponderal Index. A significant relationship between shoulder width and velocity of the ball may be due to the fact that main force is applied through shoulders. Greater shoulder width may mean well developed shoulder which may assist an individual to bowl fast.

Height and leg length contribute significantly towards bowling performance because a player may be able to generate greater force due to longer limbs. Usually it is seen that fast bowlers have a greater height than that of the batsman or spinners. Even the research points out that fast bowlers who are between the heights six feet and two inches to six feet six inches can have greater bounce and effective line in order to achieve excellent performance as a fast bowler. Further, it has been pointed out that the height of a bowler is directly proportional to the point of release as it may help in accuracy as well as adequate bounce.

CONCLUSIONS

Based on the findings of the study, the following conclusions are drawn:

1. Height, leg length and Ponderal Index contributed to fast bowling performance.
2. Shoulder width and Wrist Circumference contributed significantly to fast bowling performance.
3. Height, Leg Length, Forearm Length, Ponderal Index, Wrist Circumference and Shoulder Width contributed significantly to fast bowling performance.

RECOMMENDATIONS

In the light of the conclusions drawn, the following recommendations have been made:

1. The selected anthropometric variables which limit

the performance in fast bowling may be taken into consideration by the physical education teacher and coaches while selecting potential fast bowlers.

2. While preparing training programme for fast bowlers, the physical education teachers and coaches should give due emphasis to the selected anthropometric, variables which contributed significantly to fast bowling performance.

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