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Significance of different variables for fast bowlers in cricket

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Abstract
Ball-release speed is supposed to be the key element for fast-bowling. It is also said that higher the length of the arm faster will be the bowling speed. The bowling speed of a fast bowler also depends on how much does he/she do the physical exercises and running as a good-run is also beneficial for speed in bowling.
For the current research work, 45 College-level fast bowlers were asked about the factors which influenced their bowling speed. The current article highlights various factors which are responsible for influencing the speed of a fast bowler.

Keywords: bowler, cricket, speed

Introduction
Cricket is very popular game in India. India has produced a lot of fast bowlers like Kapil Dev, Zaheer Khan, Venktesh Prasad etc. There are many factors which affect the accuracy and speed of fast bowlers. The factors such as body shape, arm length and height etc. are the key points to succeed as fast bowler. The game of Cricket demands a good physical fitness and stamina so as to play for the whole day as test cricket demands for five days presence and the duration of one-day international match is about six to eight hours. So a Cricket player needs to be highly fit so as to perform better.

It is observed that a fast bowler having smooth run-up can generate good pace and even can do variation in the bowling speed using his/her abilities. To survive in the competitive field of Cricket, a fast bowler has to prevent his/her body from injuries. It is observed that the fast bowlers suffered from injuries can't have long career or has to be in and off from the International matches. For example, an Indian fast bowler, Ashish Nehra, who suffered from a lot of injuries throughout his career and could not make a permanent place in Indian Cricket team.

Gym activities can also enhance the speed of a fast bowler. As gym activities improves the physical fitness of the player and a bowler can make extra effort to bowl with more pace. The other factor which is supposed to be ideal for a fast bowler is the strength in shoulder. As more strengthen the shoulders, more will be the pace and a fast bowler can also increase the pace with powerful shoulders.

There are many anthropometric variables which were used in the current research work. Some of these variables are height, weight, thigh length, hand length, shoulder width, chest girth and carf girth etc. The correlation of these variables was performed with the ball speed and was observed that these variables certainly influence the speed of the ball and can improve the bowler.

Bowling action is also a very crucial factor for the fast bowlers as the bowling action can do wonders in the bowling speed. It is observed that the bowlers with smooth bowling action can generate the pace easily as compared to that with complex bowling action.

Height and length of leg also contribute in the bowling speed of a bowler. It is observed that the height of fast bowlers is higher than that of batsmen and bowler with higher height can generate the more pace while bowling.

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Hypotheses of the study

The hypotheses for the current research work are as follows:

1. Anthropometric variables can influence the performance of a fast bowler.
2. Anthropometric variables can predict the performance of a fast bowler.

Methodology

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 welldeveloped 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.

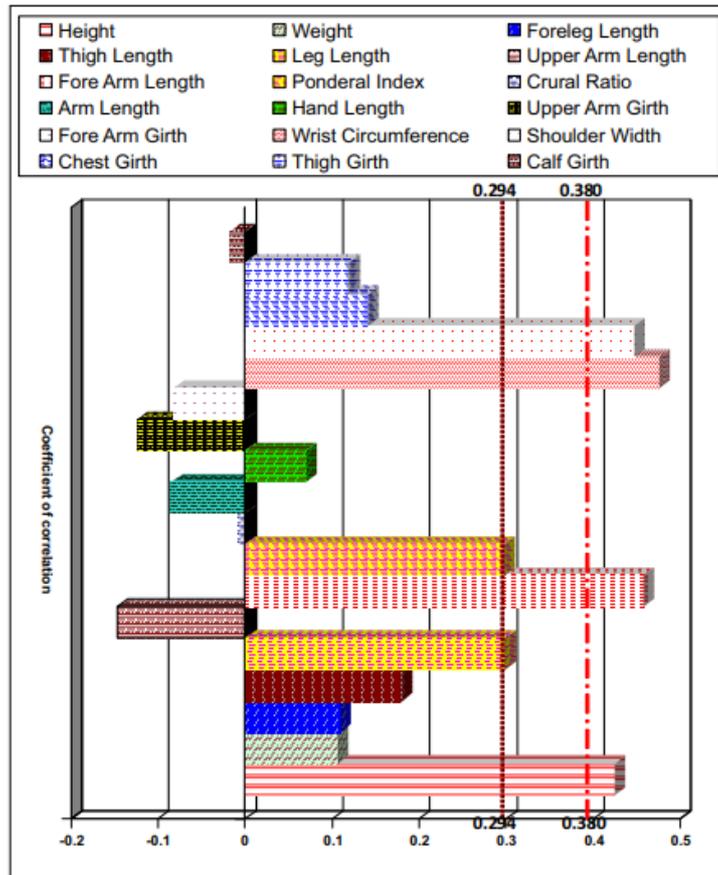**Table 1:** Correlation between Anthropometric Variables and Velocity of Ball

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

= 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 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 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.

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.

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