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DEVELOPING A REGRESSION MODEL FOR PREDICTING THE BATSMEN'S PERFORMANCE IN CRICKET ON ANTHROPOMETRIC PARAMETERS

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ABSTRACT: **-** This research aimed to ascertain the connection between anthropometric characteristics and cricket batting performance. Using random sampling, a total of 25 male participants were chosen from the cricket academy, practice game, and camp in Haryana. The participants were all frequent gamers with high skills, ranging in age between17-28 (9.16 ±1.37). In this study, the following variables were measured: age, height, body weight, full arm length, hand length, whole leg length, chest girth, abdomen girth, hip girth, humerus bicondylar diameter, wrist diameter, thigh skinfold, calf skinfold, BMI, and fat %. The Pearson correlation approach, stepwise multiple regression, and descriptive statistics were all employed for analysis in this study. The significance level was set at 0.05. The findings of this study showed that the only anthropometric characteristics that accurately predicted cricket batting performance were player age, chest skinfold, and thigh skinfold.

Key words: regression, anthropometry, batting performance, cricket.

Introduction: Cricket is the most popular sport in the world, making it almost as popular as football. This is because the game has a certain charm that appeals to people on a deeper level. Cricket is no longer seen as a foreign sport in emerging and poor nations; it has essentially become a domestic sport. In a country such as India although cricket isn't a national sport, it has gained widespread popularity throughout the years and is well-liked by people of all ages and communities. According to the appropriate environment and climatic circumstances of that particular place, The Game was played throughout the year through distinct seasons. A few decades ago, the game, for instance, was played across Asiatic nations in the winter and over European countries in the summer. Today, the game is played all year long, giving the least importance to the season and location. As a result, the sport

started to host more games throughout the year, which forced the players to participate in more consistent practices and training. The game's popularity increased as a result of the constant exposure, and as a result of this popularity, the game began to attract more players by holding more matches at lesser levels in addition to international competitions. With all these merits confirmed, cricket is today a sport that can be enjoyed by spectators and players, since there are more and better chances. (Singh, 1988). Anthropometric and physical traits have the prospective placement or desirable requirements in excellence in many games and sports. There are many other aspects that contribute to a sportsman's performance. These anthropometric measurements and morphological traits are crucial for predicting an athlete's performance (Reco-Sanz, 1998; Wilmore &Costill, 1999; Keogh, 1999). According to Heyward (2006), body mass index, height, circumference, thickness of skin folds, and widths of bones being the principal anthropometric measures, and Heyward (2006).

The present study aimed to find out the relationship between Anthropometric variables with the batting performance in cricket. Moreover, to develop reference equations of selected anthropometric variables and batting performance in cricket.

Procedure and Methodology: The purpose of the study was to determine the relationship between Anthropometric variables with the batting performance in cricket. A total of 25 male subjects were selected from cricket camp, practice match and cricket academy in Haryana by using random sampling. The age of the subjects was ranged from 17 to 28 years and all were regular players with good level of skill. The 19 predictor (independent) variables such as Age, height, weight, full arm length, hand length, full leg length, chest circumference, abdominal circumference, hip circumference, humorousBicondylour, wrist diameter, biceps skinfold, triceps skinfold, chest skinfold, thigh skinfold, calf skinfold, BMI and Fat percentage were selected. Height, leg length, arm length, hand length, chest circumference, abdominal circumference, hip circumference were measured by measuring tape, humorousBicondylour and wrist diameter were measured by sliding calliper, weight were measured by weighing machine and skinfold sites were measured by skinfold calliper.

Batting Performance (Dependent variable)three experienced cricket coaches evaluated the playing prowess of the chosen cricket batsmen, and their evaluations served as the performance parameter. The investigator gave the assessment guidelines. The chosen players' playing abilities will be evaluated by each coach on a 10-point scale for each topic. The sum

of the coaches' evaluations for each topic will be divided by 3 to get the subject's individual score. The coaches' performance evaluations were closely connected with one another.

Statistical Analysis: Means and standard deviations will be used as descriptive statistics to characterize the characteristics of the data. To determine the link between the variables, the product-moment correlation coefficient will be produced. The quantitative method of regression analysis will also be utilized to assess performance in order to explain the variance in the criterion variable. The threshold for significance will be fixed at 0.05.

Statistical methods like mean, standard deviation, and the regression analysis method will be used by SPSS software to classify the data and provide the desired results.

Table No. 1 Descriptive statistics of anthropometrics variables with the batting performance in cricket

S.No.	Variables	N	Mean	S. D.
1.	Batting Performance	50	8.40	0.95
2.	Age	50	19.16	1.37
3.	Height	50	175.84	4.48
4.	Weight	50	68.96	5.86
5.	Full Arm Length	50	80.82	5.19
6.	Hand Length	50	19.22	1.71
7.	Full leg length	50	96.04	5.44
8.	Chest circumference	50	97.49	7.30
9.	Abdomen circumference	50	82.71	7.62
10.	Hip circumference	50	92.82	8.38
11.	HumerusBicondylardiameter	50	7.55	0.55
12.	WristDiameter	50	6.13	0.44
13.	Biceps	50	7.91	1.46
14.	Triceps	50	12.88	3.59
15.	Chest	50	14.00	1.80
16.	Calf	50	11.60	2.65
17.	Thigh	50	11.41	1.91
18.	Fat Percentage	50	14.72	5.06
19.	BMI	50	22.52	2.01

RESULTS AND DISCUSSIO: Table no. 1 indicates the descriptive analysis for selected anthropometric variables of national-level male cricket batsmen. The mean and standard deviation of Age is 19.16 ± 1.37, Height is 175.84 ± 4.48, weight is 68.96 ± 5.86, full arm

length is 80.82 ± 5.19, hand length is 19.22 ± 1.71, full leg is 96.04 ±5.44, chest circumference is 97.49 ± 7.30, abdomen circumference is 82.71 ±

7.62, hip circumference is 92.82 ± 8.38, humorous Bicondylardiameter is 7.55 ± .55, wrist diameter is 6.13 ±0 .44, biceps skinfold is 7.91 ± 1.46, triceps skinfold is 12.88 ± 3.59, chest skinfold is 14.00 ± 1.88, calf skinfold is 11.60 ± 2.65, thigh skinfold is 11.41 ± 1.91, fat percentage is 14.72 ± 5.06, BMI is 22.52 ± 2.01 andBatting performance is 8.40 ± 0.95. The Mean and S.D. difference has been

Shown picturesquely in figure1.

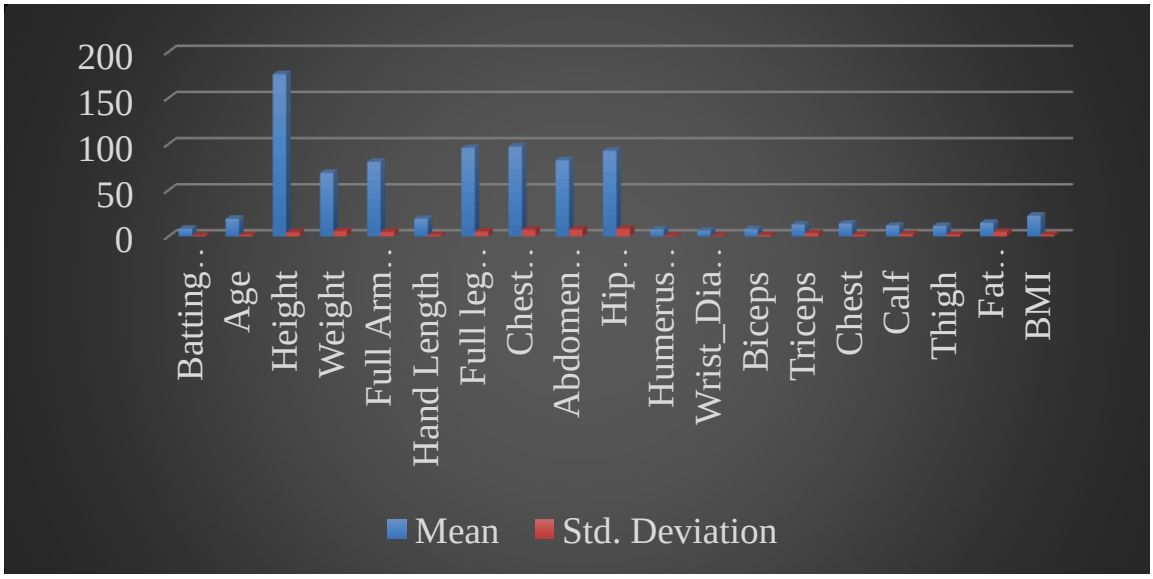

Fig.1 Mean and S.D. difference of descriptive statistics.

Table no. 2Pearson product moment correlation coefficient between the selected Anthropometric variables and the performance of the cricket batsmen.

Variables	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18
B. P	.55**	.23	.14	.20	.06	.31	.11	.43*	.19	.09	.41*	.35	.21	.50**	.20	.50*	.41*	.10
X1		.03	.04	.23	.16	.17	.01	.22	.02	.20	.37	.31	.05	.25	.25	.15	.26	.31
X2			.34	.46*	.48*	.29	.24	.31	.52	.14	.10	.02	.53	.24	.05	.21	.00	.12
X3				.29	.14	.31	.43	.37	.45	.33	.05	.32	.51	.06	.43	.25	.17	.18
X4					.79	.75	.36	.46	.37	.42	.51	.11	.25	.07	.34	.08	.20	.09
X5						.47	.32	.34	.26	.40	.43	.09	.20	.08	.37	.10	.10	.04
X6							.28	.36	.24	.46	.56	.37	.05	.14	.07	.13	.14	.31
X7								.65	.67	.081	.00	.47	.48	.27	.14	.08	.52	.00
X8									.79	.20	.16	.55	.51	.24	.10	.21	.88	.00
X9										.02	.09	.42	.73	.00	.12	.29	.63	.03
X10											.56	.28	.35	.40	.44	.25	.14	.19
X11												.07	.19	.24	.38	.01	.13	.32
X12													.18	.46	.15	.10	.52	.17
X13														.03	.13	.53	.45	.06
X14															.18	.07	.34	.05
X15																.00	.09	.21
X16																	.24	.06
X17																		.04

X1-Age
X2-height
X3-weight
X4-full arm length
X5-hand length
X6-full leg length
X7-chest circumference
X8-abdomen circumference
X9-hip circumference
X10-humerus bicondylar
X11-wrist diameter
X12-biceps skinfold
X13-triceps skinfold
X14-chest skinfold
X15-calf skinfold
X16-thigh skinfold
X17-fat percentage
X18- BMI
B.P- Batting Performance

The batting performance of the chosen cricket batters is correlated with the anthropometric characteristics, as per Table No. 2. Only six variables are found to be significantly correlated. Age, wrist diameter, chest skinfold, thigh skinfold, and fat % are found to be significantly associated with one another and with all other anthropometric variables. The correlation coefficients for age (r=0.55; p=0.004), Abdomen circumference (r= 0.43; p= 0.030) wrist diameter (r=0.41; p=0.038), chest (r=0.50; p=0.010), thigh (r=0.50; p=0.011), and fat

percentage (r=0.41; p=0.039) demonstrate a linear and significant link between the aforementioned factors and performance. The performance is determined to be unaffected by none of the other factors, though.The correlation of batting performance and selected anthropometric variables has been shown picturesquely in figure 2.

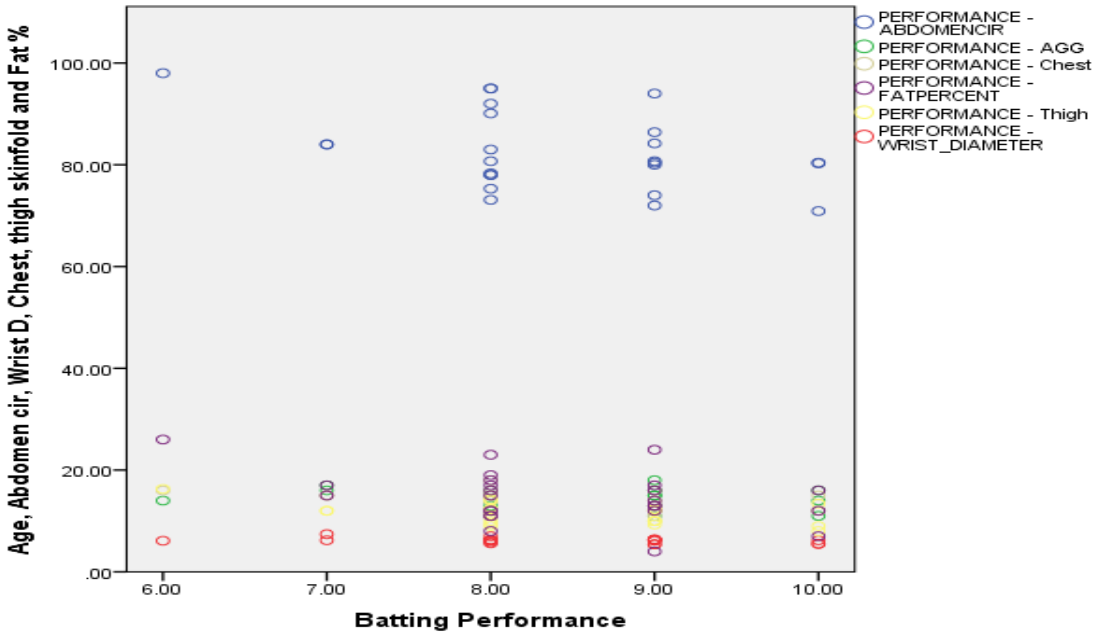

Fig. No. 2

Fig. 2 Scatter diagram of a correlation between batting performance and selected anthropometric variables i.e., Age, Abdomen circumference, wrist diameter, chest skinfold, thigh skinfold, and fat percentage.

Correlations are a very useful research tool, but they do not tell anything about the predictive power or real relationships between the variables. Even in this situation, a positive correlation does not imply that performance will get better as the value of the predicted variable increases. It will fall within a specific range and not exceed a predetermined limit. Regression analysis created a prediction model that best fit the available data in order to predict the value of dependent variables of one or even more independent variables. Given there are numerous predicted variables in this study, the researcher applied multiple regression. After confirming all the presumptions, the researcher opted to do a multiple regression analysis with the remaining variables to see whether a model could be created.

Table 3 Regression Analysis of Predictive Equation of Batting performance of cricket Players

Model	R- Value	R Square	Adjusted R2	Std. Error of Estimate
1	0.551[a]	0.303	0.273	0.81629
2	0.694[b]	0.481	0.434	0.72012
3	0.783[c]	0.613	0.557	0.63692

a. Predictors: (Constant), Age.

b. Predictors: (Constant), Age, Thigh.

c. Predictors: (Constant), Age, Thigh, Chest.

Of the 18 anthropometric variables considered as independent variables, entered into the equation through stepwise multiple regression to find out the best predictor of cricket performance as a major dependent variable, following results were obtained. Out of the 18 variables entered into the equation Three variables best predicted the cricket performance, i.e., age, thigh skinfold and chest skinfold, age as a predictor for the cricket performance had a correlation coefficient of 0.551 with squared r value of 0.303. The total variance explained by this variable was 27.3%. The second variable to enter into the equation was thigh skinfold with combined correlation of 0.694 and squared r value of 0.481. The total variance explained by these two variables was 43.4 %. The third variable enter the equation was chest skinfold with combined correlation of 0.783 and squared r value of 0.613. The total variance explained by these three variables to performance was 55.7%. However, rest of the variables failed to predict the cricket performance of the cricketers as far as anthropometric measurements are considered.

Table No. 4 ANOVA [a]

Model		Sum of Squares	df	Mean square	F- Value	Sig.
1	Regression	6.675	1	6.675	10.017	0.004[b]
	Residual	15.325	23	0.666		
	Total	22.000	24			
2	Regression	10.591	2	5.296	10.212	0.001[c]
	Residual	11.409	22	0.519		
	Total	22.000	24			
3	Regression	13.481	3	4.494	11.077	0.000[d]
	Residual	8.519	21	0.406		
	Total	22.000	24			

The results of regression ANOVA clearly indicated that the predicted model with F values of 10.017, 10.212 and 11.077 respectively and with the significance level of 0.004, 0.001 and 0. In other words, the predicted model had high F value.

Table No. 5Coefficients

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t-value**	**Sig.**
		B	**SE**	**Beta**		
1	(Constant)	1.050	2.328		0.451	0.656
	AGE	0.384	0.121	0.551	3.165	0.004
2	(Constant)	4.342	2.377		1.826	0.081
	AGE	0.339	0.108	0.486	3.131	0.005
	Thigh	-0.213	0.077	-0.427	-2.748	0.012
3	(Constant)	8.268	2.566		3.222	0.004
	AGE	0.275	0.099	0.394	2.783	0.011
	Thigh	-0.205	0.069	-0.411	-2.989	0.007
	Chest	-0.199	0.075	-0.375	-2.669	0.014

The beta value obtained for age as predicted variable is found to be 0.551, 0.486, and 0.394 in first, second and third steps respectively. The beta value obtained for thigh is. -0.427 and -0.411 at second and third step. The beta value obtained for chest skinfold is -0.375 at third step. The t values obtained for constant and predicted variable ranged from -2.669 to 0.451 and the significance levels varied from 0 .014 to 0.656.

Equation created: -Using regression coefficients (B) of the model shown in the table 5, the regression equation was developed which is as follows:

Batting Performance = 1.050 + 0.275(X1) -0.205 (X14) - 0.199 (X16)

Here, X1- Age, X14- Thigh, X16- Chest

Finding

The study's findings are corroborated by a study done by Harish, P. M. (2015) to investigate the association between anthropometric factors and basketballer ability. The study's conclusion reveals a correlation between the chosen anthropometric factors and basketballer ability.

Singh, T. N., Nain, B., Reeta, Salam, C., & Singh, S. (2012) conducted a study on a comparative study of anthropometric variables between residential and non-residential school students of Chandigarh and the results show that there wasa significant difference found in

anthropometric variables (body weight, height, calf circumference, and thigh circumference, etc.

The finding of the study also supported by Nagar, L., Meena, D.S., and Singh, B. (2012) conducted a study to examine the Correlation of Selected Anthropometric and Physical Fitness Variables to Basketball performance. And the finding of the study shows that anthropometric variables are responsible for batting performance in cricket.

Conclusion

Age, Chest skinfold, and thigh skinfold were found to be the only variables that is included in the regression model for the present study but it does not mean that the other variables are not contributing at all. They might influence the performance in some other way but are not selected for the present model. These three variables explain 55.7% of the variation in the batting performance which means the regression model is good enough to generalize. But still in another way it can be concluded that these three variablesare the factors that may influence batting performance.

Some other following conclusions have been also drawn –

1. Significant relationship found in selected anthropometric variables (Age- r=0.55; p<0.05, Abdomen circumference- r= 0.43; p<0.05, wrist diameter- r=0 .41; p<0.05, chest skinfold- r= 0.50; p<0.05, thigh skinfold- r=0 .50; p< 0.05 and fat percentage- r=0.41; p<0 .05) in relation to batting performance in cricket.
2. Insignificant relationship found in height (r=0.23), weight (r=0.14), full arm length (r=0.20), hand length (r=0.06), full leg length (r=0.31), chest circumference (r=0.11), hip circumference(r=0.19), humorous Bicondoloyer (r=0.09), biceps skinfold (r=0.35), triceps skinfold (r=0.21), calf skinfold (r=0.20), and BMI (r= 0.10) in relation to batting performance in cricket.
3. In the creation of the regression model only three variables were included in the regression model for the present study i.e., Age, Chest skinfold, and thigh skinfold and they explain 55.7% of the variation in the batting performance in cricket.

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