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Prediction of Batting Abilities from the Selected Kinanthropometric Physical and Physiological Variables among Cricketers

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Abstract

The purpose of the study was to predict the batting abilities from the selected kinanthropometric, physical and physiological variables among cricketers. One hundred and fifty two male inter-collegiate cricket players were selected purposively as subjects from various colleges in and around Tiruchirappalli, Tamilnadu state, India and their age ranged between 18 and 25 years. Those Cricket players were taken as subjects who have represented their respective college teams. The subjects had past playing experience of at least three years in Cricket. A series of kinanthropometric measurements were carried out on each subject. These included standing height measured by stadiometer in centimeters, body weight measured by weighing machine in kilo grams. Three length measurements (cm) Biceps, triceps, and supraspinale measured by skinfold caliber measurements. The data were collected by following standard testing protocol of International Society for the Advancement of kinanthropometry. Physical variables were measured by the following tests. Flexibility was assessed by sit and reach test in centimeters, Balance assessed by stoke balance test in seconds, Muscular endurance assessed by modified sit ups in counts. Leg explosive strength assessed by standing vertical jump in centimeters, and Maximum strength assessed by 1 Rm test in numbers. Physiological variables were measured by following test, resting heart rate was assessed by Radial Pulse Method in Beats per minute. Respiratory rate was assessed by resting respiratory rate (Manual method) in breath per minutes. The batting ability was taken as the performance factor which was assessed by batting test. All testing was done two days before inter-collegiate competition by using scientifically approved equipment's and standardized test. Mean and standard deviations were calculated for each of the selected variables. The inter relationship among the selected kinanthropometric, physical, Physiological variables and batting ability were computed by using Regression analysis, and Structural equation method. All selected kinanthropometric, physical and Physiological variables that statistically correlated with batting ability were used to form respective linear predictive models (step-wise argument selection).

Keywords: Kinanthropometric, Physical, Physiological, Cricket.

Introduction

Cricket is a major international sport played in more than 97 countries. There is no exact record available which shows when and by whom this game was started in England. The game of Cricket has had its origin in England and it has developed from a crude game, which was played as early as 12th century. The game of Cricket is passing through an exciting period of change and development that is making coaches to re-evaluate the coaching methods, techniques and tactics. Sports performance is a complex mixture of genetics make –up and environmental influences like training etcetera. Performance in Cricket is determined by several factors namely skill, technique, tactics, fitness, training etc. Both physical and mental fitness play vital role in performance, (Sisodiya et al. 2005). Cricket is a field-based popular team game in most Commonwealth countries. In the past, it was played solely within a specific season (winter in Asian countries and summer in western countries). But the game has gained so much popularity in the last few decades that it is now played throughout the year. Cricketers are therefore exposed to more demanding schedules, with longer periods of training and practicing. The increased workload may be one of the contributing factors to the increased incidence of injuries (Davies et al., 2008). Reported that provincial and international cricketers had a tall, athletic built, with definite morphological differences existing between batsmen, bowlers and all-rounders. The batsmen tended to be shorter and lighter, although possessing greater relative fat mass than the bowlers. The bowlers were found to be tall, with long legs, broad shoulders and a small amount of fat in the thigh and shoulder regions.

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The all-rounders had larger girth measurements and less relative fat than the batsmen and bowlers. The other characteristics of the all-rounders were similar to those of the other two groups. Again, studying the physical fitness profile of South African university cricketers, Stretch & Buys (1991) reported that although the cricketers were superior to sedentary subjects in the aspect of physical fitness, with the exception of flexibility, no significant differences existed between the batsmen, bowlers, all-rounders and wicketkeepers. Furthermore, no significant differences existed between the provincial and non-provincial cricketers. (Stretch 1987).

Methodology

The purpose of the study was to predict the batting abilities from the selected kinanthropometric, physical and physiological variables among cricketers. One hundred and fifty two male inter-collegiate cricket players were selected purposively as subjects from various colleges in and around Tiruchirappalli, Tamilnadu state, India and their age ranged between 18 and 25 years. Those Cricket players were taken as subjects who have represented their respective college teams. The subjects had past playing experience of at least three years in Cricket. A series of kinanthropometric measurements were carried out on each subject. These included standing height measured by stadiometer in centimeters, body weight measured by weighing machine in kilo grams. Three length measurements (cm) Biceps, triceps, and supraspinale measured by skinfold caliber measurements. The data were collected by following standard testing protocol of International Society for the Advancement of kinanthropometry. Physical variables were measured by the following tests. Flexibility was assessed by sit and reach test in centimeters, Balance assessed by stoke balance test in seconds, Muscular endurance assessed by modified sit ups in counts. Leg explosive strength assessed by standing vertical jump in centimeters, and Maximum strength assessed by 1 Rm test in numbers. Physiological variables were measured by following test, resting heart rate was assessed by Radial Pulse Method in Beats per minute. Respiratory rate was assessed by resting respiratory rate (Manual method) in breath per minutes. The batting ability was taken as the performance factor which was assessed by batting test. All testing was done two days before inter-collegiate competition by using scientifically approved equipment's and standardized test. Mean and standard deviations were calculated for each of the selected variables. The inter relationship among the selected kinanthropometric, physical, Physiological variables and batting ability were computed by using Regression analysis, and Structural equation method. All selected kinanthropometric, physical and Physiological variables that statistically correlated with batting ability were used to form respective linear predictive models (step-wise argument selection).

Analysis of the Data

The data of each of the independent variables selected under kinanthropometric physical and physiological variables and batting ability were analysed and presented below.

Results

Table I. Descriptive Statistics of College Level Cricket Players

S. No	Variables	Mean	SD	N
1	Batting ability	23.8487	±4.83059	152
2	Height	73.4934	±6.03960	152
3	Weight	173.2829	±5.21640	152
4	Biceps	5.2757	±1.06696	152
5	Triceps	11.3711	±2.40880	152
6	Supraspinale	12.9612	±4.83782	152
7	Flexibility	31.3289	±7.09517	152
8	Balance	170.0461	±18.76567	152
9	Muscular endurance	28.86118	±4.42756	152
10	Leg explosive power	33.6441	±4.96985	152
11	Maximum strength	42.8882	±4.44175	152
12	Resting heart rate	67.1158	±6.03629	152
13	Respiratory rate	26.7697	±3.29855	152

Table I showed the descriptive statistics – mean and standard deviations of kinanthropometric, physical and physiological variables among batting abilities of cricket players. The inter relationship between selected kinanthropometric, physical and physiological variables among batting ability was computed using Pearson product moment correlation was presented in the Table II.

Table II. Inter relationship of selected kinanthropometric, physical, physiological variables and batting ability of cricket players

Variables	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}
C.R	.029	.042	.939	.911	.047	.664	.687	.677	.457	.286	.910	.247
X_1		.830	.055	.039	.005	.073	.224	.011	.116	.047	.102	.047
X_2			.066	.062	.076	.203	.179	.013	.026	.073	.073	.002
X_3				.851	.010	.603	.668	.632	.398	.204	.863	.202
X_4					.049	.617	.606	.632	.347	.307	.813	.272
X_5						.050	.159	.059	.093	.138	.076	.023
X_6							.426	.642	.410	.210	.507	.078
X_7								.509	.214	.096	.687	.126
X_8									.430	.282	.617	.016
X_9										.194	.375	.051
X_{10}											.197	.308
X_{11}												.290

***Significant at 0.05 level of confidence**

C.R	Batting ability	X_7	Balance
X_1	Height	X_8	Muscular endurance
X_2	Weight	X_9	Leg explosive power
X_3	Biceps	X_{10}	Maximum strength
X_4	Triceps	X_{11}	Resting heart rate
X_5	Supraspinale	X_{12}	Respiratory rate
X_6	Flexibility		

Table II shows that the there was a correlation exists between the offensive skill ability of batting with Biceps (X_3), Triceps (X_4), Resting heart rate (X_{11}), Leg explosive power (X_9), Flexibility(X_6) and Maximum strength (X_{13}). In each variables separately. The result shows that selected kinanthropometric ,physical and physiological variables such as biceps(r=0.94), triceps (r=0.91), resting heart rate (r=0.29), leg explosive power (r=0.46), flexibility (r=0.66) and maximum strength (r=0.27) were significantly correlated with the offensive skill of hand reach ability the required 'r' value of 0.16 was found at 0.05 level of confidence.

Table III. Step-wise multiple regression between batting ability and independent variables of cricket players

Model	**Variables**	**R**	**R change**	**Adjusted R Square**	**Std. Error of the Estimate**
1	Biceps	.939(a)	.882	.881	1.66768
2	Triceps	.963(b)	.927	.926	1.31221
3	Resting heart rate	.973(c)	.947	.946	1.12296
4	Leg explosive power	.976(d)	.953	.952	1.05962
5	Flexibility	.977(e)	.955	.953	1.04343
6	Maximum strength	.978(f)	.956	.954	1.03116

From Table III, it was found that the multiple correlations co-efficient for predictors, such as Biceps (0.939), Triceps (0.963), Resting heart rate (0.973), Leg explosive power (0. 977), flexibility(0.977) and muscular strength(0.978) was 0.978 which produce highest multiple correlations with batting ability. 'R' square values show that the percentage of contribution of predictors to the batting ability.

Table IV. Regression analysis of prediction equation of cricket players

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	1.422	.685	
	Biceps	4.251	.127	.939
2	(Constant)	.415	.549	

	Biceps	2.685	.191	.593
	Triceps	.815	.084	.407
3	(Constant)	-9.046	1.354	
	Biceps	1.865	.197	.412
	Triceps	.648	.076	.323
	Resting Heart Rate	.234	.031	.292
4	(Constant)	-10.679	1.331	
	Biceps	1.749	.188	.386
	Triceps	.649	.071	.324
	Resting Heart Rate	.225	.030	.282
	Leg Explosive Power	.083	.019	.086
5	(Constant)	-10.516	1.313	
	Biceps	1.718	.185	.379
	Triceps	.612	.072	.305
	Resting Heart Rate	.219	.029	.274
	Leg Explosive Power	.073	.019	.075
	Flexibility	.038	.016	.056
6	(Constant)	-12.109	1.499	
	Biceps	1.755	.184	.388
	Triceps	.573	.074	.286
	Resting Heart Rate	.222	.029	.278
	Leg Explosive Power	.068	.019	.070
	Flexibility	.037	.016	.054
	Maximum Strength	.043	.020	.039

From the Table IV, the following regression equations were derived skill of batting ability of Cricket players. Regression Equation in obtained scores form = CR.

Batting ability (CR) = 1.422+1.755 (X_3) +0.573 (X_4) +0. 222 (X_{11}) + 0 .068 (X_9) + 0. 037 (X_6) - 0.043 (X_{10})

The regression equation for the batting ability includes Biceps, Triceps, Resting heart rate, Leg explosive power, Flexibility and Maximum strength. The kinanthropometric variables Biceps and Triceps were found to be significantly correlated with batting ability. Among the physical variables, leg explosive power, Flexibility and maximum strength was found to be the best predictor for batting ability. Among the physiological variables, Resting heart rate was found to be the best predictor for batting ability. These findings are in accordance with the findings of (Devaraju & Kalidasan (2012).

Conclusions

1. The result revealed that correlation exists between the batting ability with Biceps, Triceps, Resting heart rate, Leg explosive power, Flexibility and Maximum strength.
2. The results also revealed that Biceps, Triceps, Resting heart rate, Leg explosive power, Flexibility and Maximum strength become the common characteristics which can predict the batting ability among cricket players.

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