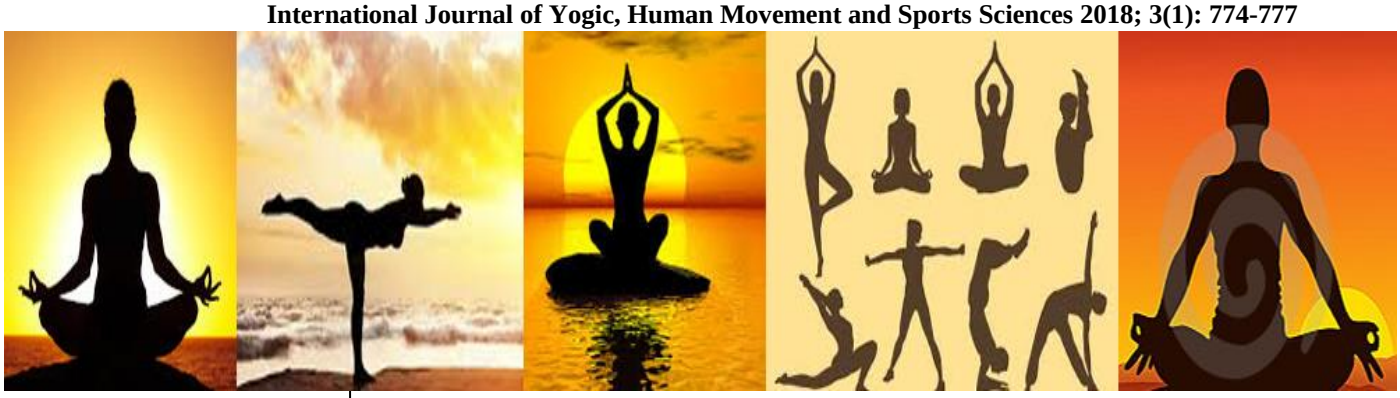
International Journal of Yogic, Human Movement and Sports Sciences 2018; 3(1): 774-777



ISSN: 2456-4419
Impact Factor: (RJIF): 5.18
Yoga 2018; 3(1): 774-777

www.theyogicjournal.com
Received: 17-11-2017
Accepted: 18-12-2017

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Prediction of power lifting performance on the basis of selected anthropometric variables

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Abstract
Purpose: The purpose of the study was to predict the Power lifting performance on the basis of selected anthropometric variables.
Methodology: The subjects of the study were randomly selected from Punjabi university patiala. The age of the subjects were from 18-26 years. Total 20 male inter-college medalist players were selected on the basis of the weight category (74 kg.). All the procedure was explained by the research scholar before the hand. There were 11 anthropometric variables for predicting the power lifting performance i.e. Age, Height, Weight, Right Arm Length, Left Arm Length, Waist Circumference, Hips Circumference, Left Leg Length, Right Leg Length, Left Thigh Circumference and Left Calf Circumference.
Statistical Analysis: In order to correlate the power lifting performance with the selected anthropometrical variables, Pearson's Product Moment Correlation and Multiple Correlation were employed. For predicting the power lifting performance, Regression Equation was made.
Result: On the basis of the analysis it was found that only Height, Right Arm Length, and Right Leg Length have significant relationship with the power lifting performance in 74 kg. weight category.
Conclusion: In the findings multiple correlation analysis yielded two model for predicting the power lifting performance in 74 kg. weight category. In the first model Height and in the second model Height and Left Arm Length were dominant. So it was concluded that from the Selected Anthropometric Variables, Height and Left Arm Length were the best predictors.

Keywords: Prediction, dead lift, bench press and squat

Introduction
It is well known fact that are no two bodies exactly alike in physical characteristics. In addition to along story of research studies that have attempted to classify body types, presently referred to as somatotyping, there has been interest in noting the personally associated either certain body type. At present, the sports competitions are highly competitive and challenging. Human being by nature competitive and ambitious for their excellence in all athletic performance. Every sports man and nations wants to show their supremacy by challenging other nations by showing dominance and supremacy in sporting performance in international competitions. Thus this challenge stimulates, inspires and motivates all the nations to sweat and strive to run faster, jump higher, throw faster and exhibit greater strength, endurance and skills in present competitive sports world. This only can be possible throw scientific, systematic and planned sports by finding out their potentialities

The Iron game power lifting does not have any authentic and chronologically recorded history. In one form or other it has enjoyed a prestigious status. The deadlift is the oldest, having been a pet lift of professional strongman Herman Goerner of South Africa in the 1920s. It was used as an assistance exercise in the intervening years before Bob Peeples of the United States matched Goerner's level in the 1950s. Squatting was first popularised by Italy's Marquis Alfred Pallavicini and then more famously performed by pro strongman-wrestlers Milo Steinborn and Bert Assirati in the 1930s and 1940s. After Steinborn the weightlifting world would have to wait for the arrival of Canada's Doug Hepburn and the USA's Paul Anderson in the 1950s before 600lb (272.5kg) squats were again performed. The bench press was a little-known exercise until the late 1940s. It was probably helped a bit by its use in rehabbing soldiers injured in World War II. Again, it took off in the 1950s with superb performances by Hepburn and Marvin Eder.

Anthropometry measurement of body include such descriptive information as height, weight and surface area, while measure of body per potion describes the relation between height and weight and among length, width and circumference of various body segment. It has been found that top athletes in some sports tend to have proportions that bio-mechanically aid the particular required. Anthropometry is French mathematical, quelled coined the term "Anthropometry" (anthrop means man and 'merry' means measurement). In ancient India and Egypt, the earliest anthropometry were undertaken to find one part of the body which predict or become a common measurement of all other body part. Foe ex-the length of the middle figure was considered a common measure body proportion in Egypt. This the proportional body was consider to have five figure length up to knee, ten figure length up to public arch etc.

Hippocrates was the first Greek expert in test and measurement who introduce a of body classification in which the human being were divided in two body types. Phthisis dominated by horizontal dimension. Hippocrates studied human physical types for medical purposes while Greek sculptors were doing so for their interest in physical perfection. Rostand, a French man, development a classification method of dividing all human in three physical types namely digestive, musculature and cerebral which becomes forerunners of Sheldon's there somatotype components (endomorph, mesomorph and ectomorph).

Sports performance is a multi dimensional product of athlete's capacities and their interaction with athletic environment. Being multidimensional suggest that variety of factors are involved in actually attaining performance goals. But among all performance factor, Anthropometry characteristics are pre-requisite for all the athletes/sports persons. However, importance of various Anthropometry characteristics varies with the different sports. Keeping in mind, the significant contribution of Anthropometry variables in the playing ability of a number of sport, an attempt is going make to identify the importance of Anthropometry characteristics/ variables to predict the performance of power lifter. Good prediction is one of the key skills necessary to be a successful competitive Pokémon player. Prediction is the only tool a player has at his or her disposal to overcome a poor team match-up; hence, it is important to be able to predict effectively. The ability to predict your opponent is one of the main stumbling blocks for new players and the leap to overcome it can be a great one. Hopefully, for those struggling with prediction, this article can be a starting point for you to become a successful predictor in the future.

Objectives of the Study

The main objective of the study was to find out the relationship of each selected anthropometric variables with the power lifting performance for 74 kg. Weight category and to draw out (Establish) a regression equation to predict the power lifting performance on the basis of selected anthropometric variables for 74 kg. Weight category.

Material and Methods

20 Inter-college medalist players (Male) of power lifting belonging from the Punjabi university patiala, Punjab were constitute as the population for this study. The samples were selected by using purposive random sampling technique from the Population. The age of the subjects were ranged 18 to 26 years. 11 Anthropometric Variables were selected for this study, suggest by Kansal, 2008 [6]. i.e Age, Height, Weight, Left Arm length, Right Arm length, Waist Circumference, Hips Circumference, Left Leg length, Right Leg length, Left Thigh Circumference and Left Calf Circumference. The data was collected during the evening sessions. Coaches were requested to direct their players to serve as a subject for the study. Necessary instructions were given before administration of the tests to the subjects.

Criterion Measures For Power Lifting Performance

The power lifting performance of each selected subject was as the criterion for this study. for evaluating the power lifting performance (Dead lift, Bench press and squat) of a subject, there was a penal of three experts. Average of the scores of three experts, were considered as the final performance of the subject. The three trails were given to the each selected subject and best one was taken for this study. Personal score cards were made by the research scholar. In the score cards all the information were mentioned like:-Name of the subject, Body weight of the subject, Weight category, and performance. The Maximum weight lifted by the each selected subject was recorded as his performance. Dead lift performance, Bench press plus squat performance was considered as final score of a subject. In order to correlate the power lifting performance with the selected anthropometrical variables Pearson's Product Moment Correlation and Multiple Correlation were employed. For predicting the power lifting performance, Regression Equation was made.

Analysis of Data and Results of the Study

The data was collected on twenty male Power lifters of 77 kg. weight category by using standard tests and tools. For the analysis purpose, Pearson's Product Moment Correlation, Partial Correlation, Multiple Correlation and Regression statistics were applied and the following findings were drawn:

Findings

The findings with regard to the present study have been presented in two sections. Different sections of the present study have been presented in Table- 1.

Table 1: Sections of the study

Section	Title of the Section
One	To determine the relationship of Selected Anthropometrical Variables with the Power Lifting Performance of 74 kg. weight category, the collected data was analyzed by using the correlation matrix (Pearson Product Moment Correlation).
Two	For Predicting the Power lifting performance on the basis of selected anthropometric variables for 74 kg. weight category, Step wise regression analysis was used.

The level of significance was set at.05 levels.

Section One

To determine the relationship of selected anthropometrical variables with the performance of power lifting, the collected data was analyzed by using the correlation matrix (Pearson Product Moment Correlation) and result pertaining to that has been presented in table -2.

Table 2: Relationship of Anthropometrical Variables with the Power Lifting Performance in 74 kg weight category (N=20)

Anthropometrical Variables	Power Lifting Performance
Age	0.435
Height(Cm)	0.896*
Weight (Kg.)	0.119
Right Arm length	0.88*
Left Arm length	0.714
Right Leg length	0.878*
Left Leg length	0.651
Waist Circumference.	0.133
Hips Circumference	-0.410
Left Thigh Circumference.	-0.457
Left Calf Circumference	-0.643

*Significant at 0.05 levels, Coefficient of correlation required to be significant for 3 d.f. is 0.878

Table-2, revealed that in case of Height, Right Arm length, Right Leg length in Power lifting, obtained value is greater than tabulated value therefore it has shown significant relationship with the performance of Power lifting. In case of Age, Waist Circumference, Left Calf Circumference, Weight, Arm length (Left), Hips circumference, Left thigh circumference, arm length (Left & Right) and leg length (Left) have shown insignificant relationships with the performance of power lifting in 74 kg weight category.

Section Two

To determine the Regression equation of Selected Anthropometrical Variables with the Performance of power Lifting in 74 kg. Weight category the collected data was analyzed by using Linear Regression (Method = Step wise) SPSS version = 17 and data pertaining to that have been presented in table - 3 to Table - 5.

Table 3.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.896[a]	.803	.737	6.10612
2	.994[b]	.987	.975	1.89003
a. Predictors: (Constant), Height in centimeter				
b. Predictors: (Constant), Height in centimeter, Left Arm Length in cm				

Two regression models have been presented in table 3. In the IInd model, the value of R^2 is.987, which is maximum and therefore, IInd model was used to develop the regression equation. It can be seen from the table 3 that in the IInd model two independent variables viz. Height and Left Arm Length have been identified and therefore the regression equation was developed based on these two variables only. Since R^2 value for this model is.987, therefore these two independent variables explained 98.7% variation in performance of Power lifter. Thus this model is appropriate to develop the regression equation.

Table 4: (Anova)

Model		Sum of Squares	D.f	Mean Square	F	Sig.
1	Regression	454.946	1	454.946	12.202	.040[a]
	Residual	111.854	3	37.285		
	Total	566.800	4			
2	Regression	559.656	2	279.828	78.335	.013[b]
	Residual	7.144	2	3.572		
	Total	566.800	4			
a. Predictors: (Constant), Height in centimetre						
b. Predictors: (Constant), Height in centimetre, Left Arm Length in cm						
c. Dependent Variable: Power Lifting Performance in kg						

Table -4, shows that in ANOVA test the null hypothesis that there is no linear relationship between the predictor and the Dependent Variable. For the Model II when two predictor Height and Left Arm Length were entered, the significance level associated with observed value of F(12.202) & F(78.33) is 0.04 and.013 respectively level of significance. Thus the null hypothesis can be rejected and we may conclude that there is a significant linear relationship between the set of independent variable (IVs) and dependent variable (DVs).

Table 5.

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-299.115	151.154		-1.979	.142
	Height in centimeter	3.173	.908	.896	3.493	.040
2	(Constant)	-280.711	46.910		-5.984	.027
	Height in centimeter	2.040	.350	.576	5.823	.028
	Left arm Length in cm	2.941	.543	.536	5.414	.032

Table-5, shows that the value of the coefficient in the regression equation and measures the probability that a linear relationship exists between each predictor variables and the Dependent Variable. In this table 'B' is the slope of the line. 'SE B' is the standard error of 'B'. 'Beta' is the standardized regression coefficient. 'Sig' is the significance level for the test of the null hypothesis that the value of a coefficient is zero in the population.

In model - II, the significance value for Calf Circumference and Weight is less than.028 and.032. Therefore, the null hypothesis that there will be no linear relationship between this predictor and Power lifting performance can be rejected.

The resulting regression equation is

Power Lifting Performance = -280.71+2.04 (Height) +2.941 (Left Arm Length)

The equation estimates that for the sample 98.7% of the variation in Dependent Variable (Power Lifting Performance) is explained by Independent Variables (Height and Left Arm Length).

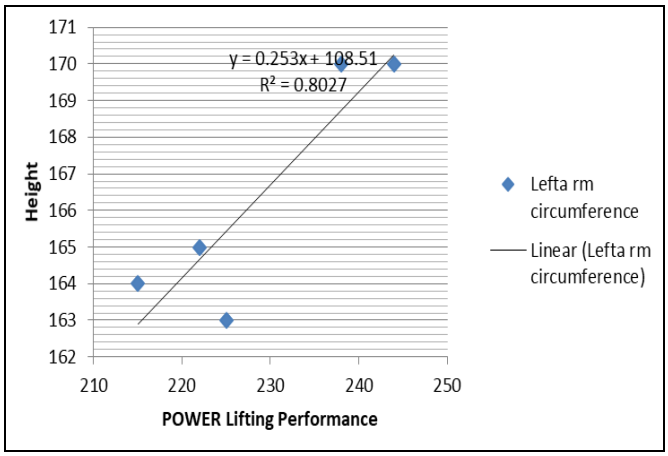

Fig 1: Regression Equation Between Height and Power Lifting Performance

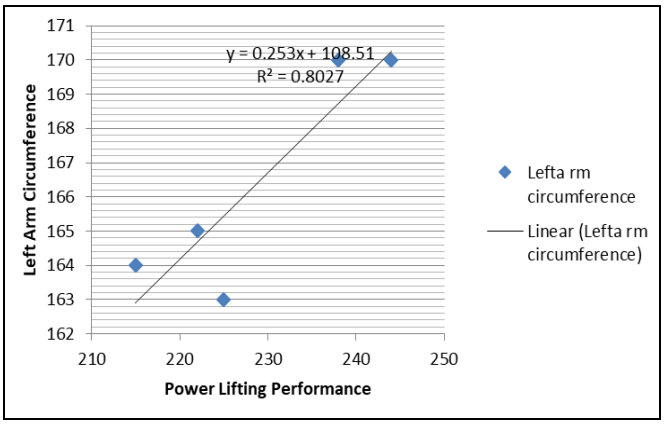

Fig 2: Regression Equation Between Left Arm Length and Power Lifting Performance

Results

On the basis of the analysis it was found that only Height, Right Arm Length, and Right Leg Length have significant relationship with the Power lifting performance in 74 kg. weight category.

Conclusions

In the findings multiple correlation analysis yielded two model for predicting the Power lifting performance in 74 kg. Weight category. In the first model Height and in the second model Height and Left Arm Length were dominant. So it was concluded that from the Selected Anthropometric Variables, Height and Left Arm Length were the best predictors.

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