

SELECTED ANTHROPOMETRIC CHARACTERISTICS AS THE PREDICTORS OF PERFORMANCE IN BOXING

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Abstract

The study aimed to assess the selected anthropometric characteristics as the predictors of performance in boxing. Seventy (N=70) male boxing players were selected as the subject of the study. The age of the subjects ranged between 17 to 25 years. Out of seventy, forty one (N= 41) were state level boxing players and twenty nine (N=29) were having participation in the Nationals and International games. The height range was 152cm to 192cm and weight was 45kg to 98 kg, body fat % 9.22 to 31.55, arm length 70cm to 90cm, forearm length 42cm to 58cm, leg length 90cm to 116cm.

Selected anthropometric components were selected for the study. Descriptive statistics (mean and standard deviation) and multiple regression step wise was applied for data analysis and the performance of the boxing players was assessed by score sheet provided by the three panel of judges of Sports Authority of India. Differences were considered significant at 0.05 level.

Key Words : Height, Weight, Anthropometry, boxing players,.

INTRODUCTION

Sports in the present day has become extremely competitive, previous records are being broken whenever there is competition. It is not mere participation or few days practice that brings an individual's victory, but the continuous hard work of training right from childhood, strong genetic makeup and various anthropometric variables may influence success in sports. Today's sports person faces some unique challenges. The standards are higher, the competition is tougher, and the stakes are greater attention in these days. Coaches, physical educationists and sports scientists have always expressed a great need to know more about those anthropometry variables, which are helpful in improving the motor skill of the players. Today's world is a world of competition, the rivalry to reach top and excel each other is so much, that every aspect that contributes for the excellence is carefully looked in it, One of such aspects is the selection of the right person for the right event in sport and games to give best performance and bring laurels to the country.

Boxing is one of the Olympic Games and one of the oldest game of the world. Boxing is one of the complex combat game in which two players fight with each other with their fist to score point during their bout. On the basis of the point the winner is declared. This is a high intensity game in which two boxers fight with each other to score and to win the competition. This individual combat sport requires a high standard of preparation in order to complete three (03) minutes rounds of competitive play and also to achieve success. In this game movement patterns are characterised as intermittent & change continuously in response to different offensive and defensive situations. In modern sports, successful performance in boxing is determined by number of factors. For optimum performance at elite level, variety of areas must be addressed. Further, boxing is the game where size, shape and body composition play an important role in providing distinct advantage in the game of boxing. These include the skill level, flexibility, endurance and most importantly the specific anthropometric measurements which play a vital role in this game. In the present study an attempt has been made to evaluate the anthropometric characteristics as the predictors of performance in boxing.

METHODS AND MATERIAL

A total of seventy (N = 70) boxing players were selected as the subjects, out of seventy subjects, 41 participated in state and other tournaments, and remaining 29 were having the experience to participate at national and international level. The age ranged of the subjects was between 17 to 25 years. All the subjects were selected from the Indira Gandhi Indoor Stadium, New Delhi and Sports Authority of India excellence centre (SAI centre of excellence Bhalgarh Sonipat) the desired data was collected in the morning and evening session.

The procedure is explained below:

Anthropometric Measurements and measuring units

S. No.	Variables	Equipment Used	Measuring Unit	(N)
I.	Body Weight	Omron (HBF 375) Electronic weighing machine	In Kg	70
II.	Height	Lufkin Measuring Tape (Steel)	Cm	70
III.	BMI	Omron (HBF 375) Electronic weighing machine	Scores	70
IV.	Arm length	Lufkin Measuring Tape (Steel)	Cm	70
V.	Forearm length	Lufkin Measuring Tape (Steel)	Cm	70
VI.	Leg length	Lufkin Measuring Tape (Steel)	Cm	70
VII.	Body fat %	Omron (HBF 375) Electronic weighing machine	Scores	70
VIII.	Performance	Score card	Points	70

Research Design

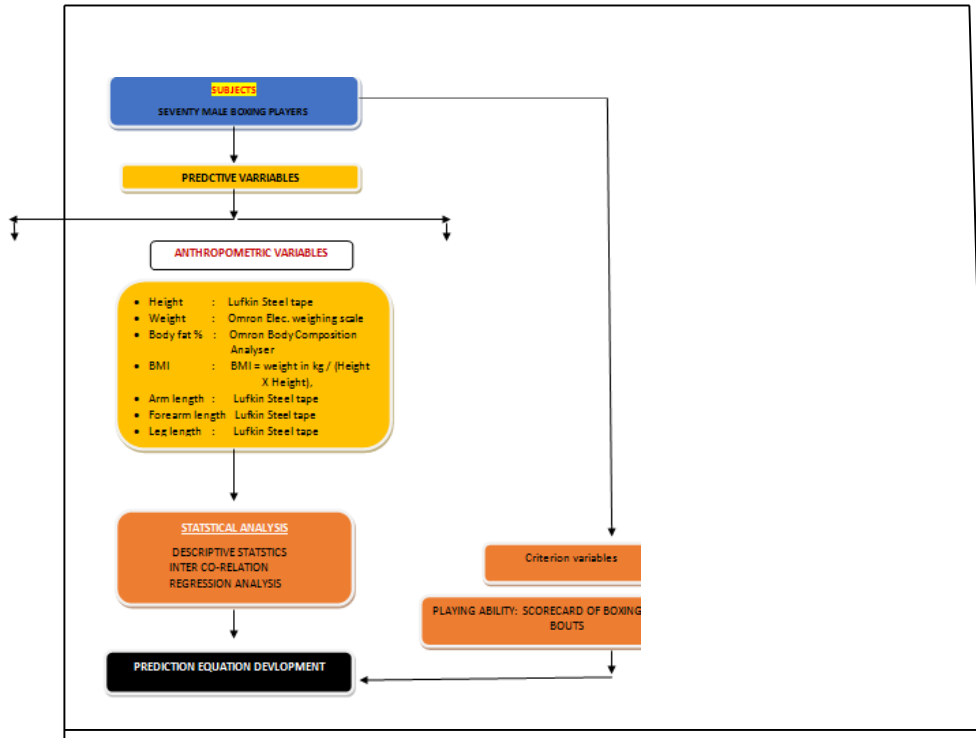


TABLE 1: DESCRIPTIVE TABLE OF SELECTED ANTHROPOMETRIC CHARACTERSTICS AND PERFORMANCE

	N	Minimum	Maximum	Mean	Std. Deviation
Performance	70	17.00	30.00	27.33	3.77
Weight (kg)	70	45.00	98.00	66.84	12.18
Height (cm)	70	152.00	192.00	172.60	8.22
BMI	70	15.39	35.14	22.45	3.97
Body Fat %	70	9.22	31.55	21.98	5.19
Arm Length (cm)	70	70.00	90.00	79.95	5.07
Fore Arm Length (cm)	70	42.00	58.00	49.95	3.91
Leg Length (cm)	70	90.00	116.00	103.43	6.43

Table-1 reveals that mean value and standard deviation of anthropometric characteristics for boxing players were found to be as : Boxing Performance 27.33 ± 3.77 , Weight 66.84 ± 12.18 , Height 172.60 ± 8.22 , Body Mass Index 22.45 ± 3.97 , Body Fat % 21.98 ± 5.19 , Arm Length 79.95 ± 5.07 , Fore Arm Length 49.95 ± 3.91 and Leg Length 103.43 ± 6.43 .

In the same categories, the minimum and maximum values for anthropometric characteristics were found to be as: For boxing performance 17 to 30, Weight (45 kg to 98 kg), Height (152cm to 192cm), Body Mass Index (15.39 to 35.14), Body Fat % (9.22 to 31.55), Arm Length (70cm to 90cm), Fore Arm Length (42cm to 58cm) and Leg Length (90cm to 116cm).



TABLE 2: RESIDUALS STATISTICS FOR CHECKING OUTLIERS

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	19.12	33.39	27.32	3.06	70
Residual	-7.03	4.07	0.00	2.19	70
Std. Predicted Value	-2.67	1.98	0.00	1.00	70
Std. Residual	-2.10	1.80	0.00	0.97	70
a. Dependent Variable: Performance					

Table no. 2 reveals that standard (standardized) residual, maximum value (1.802) and minimum value (-2.10), both values doesn't exceed +3 & -3. This proves that the range doesn't have any outliers.

TABLE 3: CORRELATION BETWEEN THE SELECTED DEPENDENT AND INDEPENDENT VARIABLES

Dependent	Independent Variables	Correlations Coefficient	Sig.
Boxing Performance	Weight	0.041	0.369
	Height	0.719*	0.000
	BMI	-0.383*	0.001
	Body Fat %	0.350*	0.002
	Arm Length	0.745*	0.000
	Fore Arm Length	0.617*	0.000
	Leg Length	0.336*	0.002

*Statistically significant at 0.05 level.

Table-3 reveals that boxing performance was found significantly correlated with Height, BMI, Body fat %, Arm Length, Forearm Length, Leg Length as the correlation coefficient values (0.719, -0.383, 0.350, 0.745, 0.617, 0.336) were found higher than the tabulated value at 0.05 level of significance. Boxing Performance was found not significant with weight as the correlation coefficient values were found lower than the tabulated value at 0.05 level of significance.

TABLE 4: MODEL SUMMARY SHOWING PEARSON'S CORRELATION BETWEEN PERFORMANCE AND SELECTED ANTHROPOMETRIC CHARACTERISTICS

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.745 ^a	0.555	0.548	2.535
2	0.777 ^b	0.603	0.591	2.41119
3	0.797 ^c	0.635	0.618	2.33036
4	0.813 ^d	0.660	0.639	2.26452
a. Predictors: (Constant), Arm Length b. Predictors: (Constant), Arm Length, BMI c. Predictors: (Constant), Arm Length, BMI, Weight d. Predictors: (Constant), Arm Length, BMI, Weight, Body Fat % e. Dependent Variable: Performance				



Four regression models have been presented in table 4. In the model no. 4 the value of R square is 0.660 which is found to be maximum and therefore; this model was used to develop regression equation. It can also be seen that in the fourth model four independent variables (Arm length, BMI, Weight and Body Fat %) have been identified, so regression equation will be developed on the basis of these four independent variables only. Since R square value for this model is 0.660, which implies that 66.0% of boxing performance is obtained by these four independent variables. Moreover it can be said that the independent variable performance can be explained by the dependent variables, in this case 66% can be explained, which is very large.

TABLE 5: ANALYSIS OF VARIANCE

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	544.412	1	544.412	84.708	.000 ^a
	Residual	437.031	68	6.427		
	Total	981.443	69			
2	Regression	591.915	2	295.958	50.906	.000 ^b
	Residual	389.528	67	5.814		
	Total	981.443	69			
3	Regression	623.023	3	207.674	38.242	.000 ^c
	Residual	358.420	66	5.431		
	Total	981.443	69			
4	Regression	648.119	4	162.030	31.597	.000 ^d
	Residual	333.324	65	5.128		
	Total	981.443	69			
a. Predictors: (Constant), Arm Length b. Predictors: (Constant), Arm Length, BMI c. Predictors: (Constant), Arm Length, BMI, Weight d. Predictors: (Constant), Arm Length, BMI, Weight, Body Fat % e. Dependent Variable: Performance						

Table 5 shows the usefulness of the linear regression model, This table indicates that the regression model predicts the dependent variable significantly well, since F value for model no. 4 (F= 31.597) has found significant (p<0.05), which reveals that overall, the regression model statistically significantly predicts the outcome variable.

TABLE 6: REGRESSION COEFFICIENT OF SELECTED ANTHROPOMETRIC CHARACTERISTICS IN PREDICTING BOXING PERFORMANCE

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-16.954	4.821	0.745	-3.517	0.001
	Arm Length	0.554	0.060		9.204	0.000
2	(Constant)	-9.097	5.346		-1.702	0.093
	Arm Length	0.516	0.059	0.694	8.778	0.000
	BMI	-0.215	0.075	-0.226	-2.858	0.006
3	(Constant)	7.940	8.796		0.903	0.370
	Arm Length	0.299	0.107	0.402	2.794	0.007
	BMI	-0.770	0.243	-0.811	-3.167	0.002
	Weight	0.191	0.080	0.618	2.393	0.020
4	(Constant)	7.205	8.554		0.842	0.403
	Arm Length	0.271	0.105	0.364	2.588	0.012
	BMI	-0.759	0.236	-0.799	-3.211	0.002
	Weight	0.192	0.078	0.621	2.476	0.016
	Body Fat %	0.120	0.054	0.165	2.212	0.030

a. Dependent Variable: Performance

DISCUSSION ON FINDINGS

Boxing performance was found significantly correlated with Height, BMI, and Body Fat %, Arm Length, Fore Arm Length, and Leg Length as the correlation coefficient values (0.719, -0.383, 0.350, 0.745, 0.617, and 0.336) were found higher than the tabulated value at 0.05 level of significance. Boxing performance was found not significant with Weight as the correlation coefficient values were found lower than the tabulated value at 0.05 level of significance.

Four regression models have been presented for anthropometrical variables and the model no. 4 with the R square value of 0.660 was used to develop regression equation. It can also be seen that in the fourth model four independent variables (Arm length, BMI, Weight and Body Fat %) have been identified, so regression equation was developed on the basis of these four independent variables only. Since R square value for this model is 0.660, which implies that 66.0% of boxing performance is obtained by these four independent variables. Moreover it can be said that the independent variable performance can be explained by the dependent variables, in this case 66% can be explained, which is very large.

The analysis of variance indicates that the regression model predicts the dependent variable significantly well, since F value for model no. 4 ($F= 31.597$) has found significant ($p<0.05$), which reveals that overall, the regression model statistically significantly predicts the outcome variable and finally model no 4 most accurately justifies the boxing performance, with Arm Length as the best anthropometrical predictor for performance in boxing.

CONCLUSIONS

1. The results of the study revealed that an Inter-relationship exists significantly between the anthropometrical variables and boxing performance.
2. The results revealed that out of seven (07) anthropometric characteristics, arm length of the boxing players was identified as the most significant predictor variable contributing the boxing performance.
3. As per the findings of the study it is stated that some of the anthropometric variables arm length, BMI, Weight, and body fat percentage of the boxing players are having direct relationship with boxing playing ability.

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