

PREDICTION OF PERFORMANCE ABILITY OF THROWERS IN RELATION TO SELECTED ANTHROPOMETRIC MEASUREMENTS

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INTRODUCTION

It is clear that all the facets of shot technique have not yet been explored. This is fortunate, as otherwise we may reach a point of stagnancy, as the case might well have been where it is not for an innovation such as introduction by Peri O'Brien. Before 'O'Brien' we were probably more concerned with "style" as the new stance introduced by 'O'Brien' paved the way towards a more scientific approach to shot putting. Today technique is equally the key to better performance, although we can't escape the fact that "style" will always be an integral aspect in ultimate performance. This is due to the differences in the physical and anatomical structure of the human body, which differs from athlete to athlete.

OBJECTIVE OF THE STUDY

The purpose of the study was to predict the performance ability of throwers in relation to selected Anthropometric measurements. It was hypothesized that there may not be significant relationship between performance ability of throwers and Anthropometric measurements.

PROCEDURE AND METHODOLOGY

Twenty male athletes aged between 14-18 years were selected for this study. These subjects were selected from Sports Authority of India (SAI), Lucknow (U.P.) center. The following Anthropometric Measurements such standing height, weight, leg length, upper leg length, lower leg length, arm length, upper arm length, lower arm length, hip width, shoulder width, chest width, calf girth, thigh girth, chest girth, upper arm girth and lower arm girth tests were selected. The necessary data was collected by administering various tests for the chosen variables. The distance chosen for assessing the performance ability was administered in the Athletic ground of Sports Authority of India (SAI). To find out the Anthropometric measurements to the athletic performance, following statistical techniques were employed: Reliabilities, Correlations, Multiple correlation and Regression analysis.

RESULT OF THE STUDY

Table-01
Descriptive Analysis of Anthropometric Measurements with Shot Put Performance of Throwers

Variables	Mean	S.D	Min	Max
Standing height	174.80	4.96	165.00	183.00
Weight	71.75	3.46	66.00	78.00
Leg length	101.37	3.88	95.00	108.00
Upper leg length	51.15	2.10	47.50	55.50
Lower leg length	50.22	1.85	47.00	53.00
Arm length	82.22	2.42	77.50	86.50
Upper arm length	36.27	1.22	34.50	38.50
Lower arm length	45.92	1.46	43.00	48.00
Hip width	31.02	2.43	27.50	34.50
Shoulder width	35.52	1.88	32.00	38.50
Chest width	31.17	1.60	28.00	33.50
Calf girth	38.75	1.71	36.20	42.30
Thigh girth	55.68	1.96	51.70	59.00
Chest girth	90.50	2.87	85.10	95.00
Upper arm girth	29.46	2.02	26.30	32.30
Lower arm girth	25.78	1.29	24.00	28.00

Table-01 indicates Descriptive analysis of Anthropometric measurements (Mean, S.D, Minimum and Maximum) with shot put performance of Throwers. Mean and S.D of Anthropometric measurements are 174.80 and 4.96; 71.75 and 3.46; 101.37 and 3.88; 51.15 and 2.10; 50.22 and 1.85; 82.22 and 2.42; 36.27 and 1.22; 45.92 and 1.46; 31.02 and 2.43; 35.52 and 1.88; 31.17 and 1.60; 38.75 and 1.71; 55.68 and 1.96; 90.50 and 2.87; 29.46 and 2.02; 25.78 and 1.29 respectively.

Table-02
Relationship of Anthropometric Measurements with Shot Put Performance of Throwers

Variables	Coefficient of Correlation 'r'
Standing height	-0.111
Weight	0.472*
Leg length	-0.063
Upper leg length	-0.094
Lower leg length	-0.024
Arm length	-0.089
Upper arm length	-0.336
Lower arm length	0.101
Hip width	-0.252
Shoulder width	-0.201
Chest width	-0.402
Calf girth	-0.264
Thigh girth	-0.277
Chest girth	-0.230
Upper arm girth	0.452*
Lower arm girth	0.507*

From Table-02 it is clear that three Anthropometric measurements have significant relationship with shot put performance of throwers. They are weight (0.472); upper arm girth (0.452); and lower arm girth (0.507). In respect to other Anthropometric measurements (standing height, leg length, upper leg length, lower leg length, arm length, upper arm length, lower arm length, hip width, shoulder width, chest width, calf girth, thigh girth, and chest girth) the relationship with shot put performance is not found to be statistically significant at 0.05 level as they are below tabulated value i.e.0.444.

The relationship of anthropometric measurements and shot put performance of throwers are (weight, upper arm girth, and lower arm girth) is graphically presented in figure:-

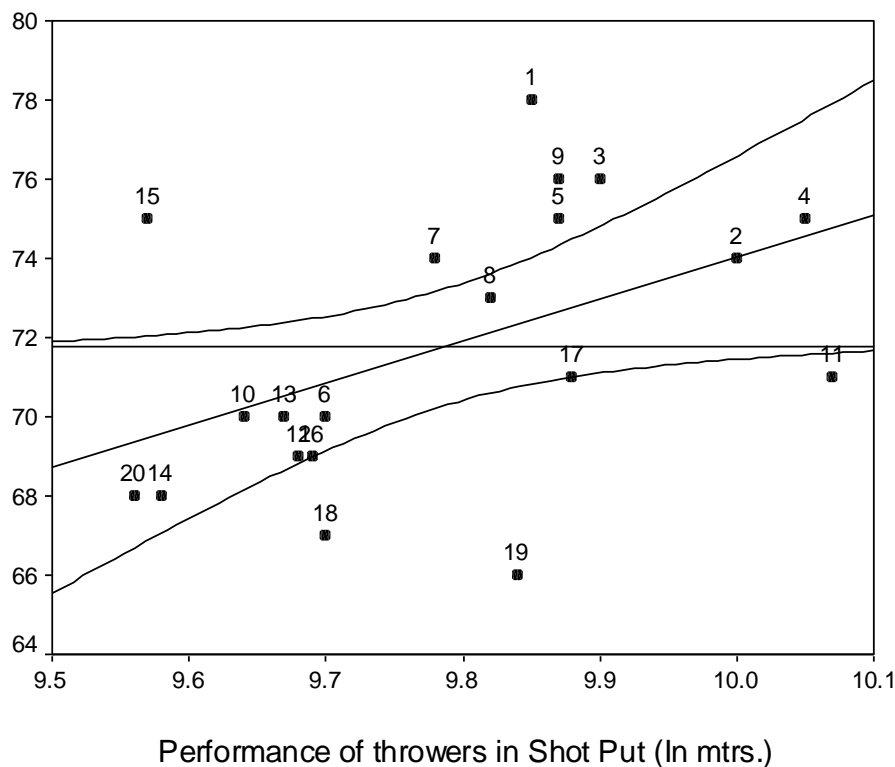


Fig. 01: Linear regression and relationship between Weight and Shot Put.

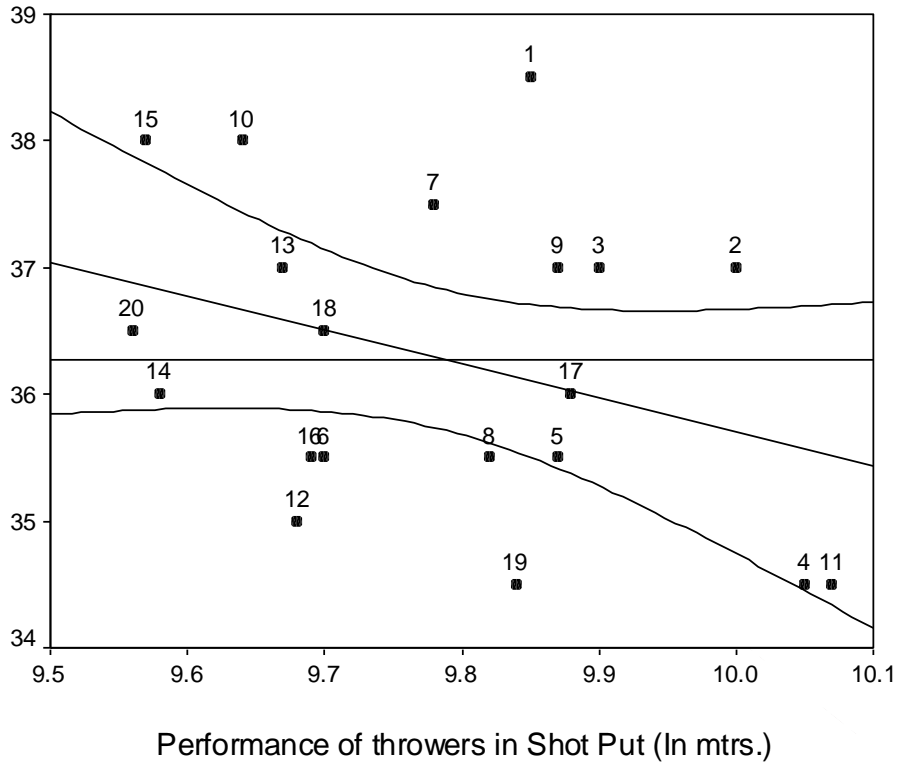


Fig. 02: Linear regression and relationship between Upper Arm Girth and Shot Put.

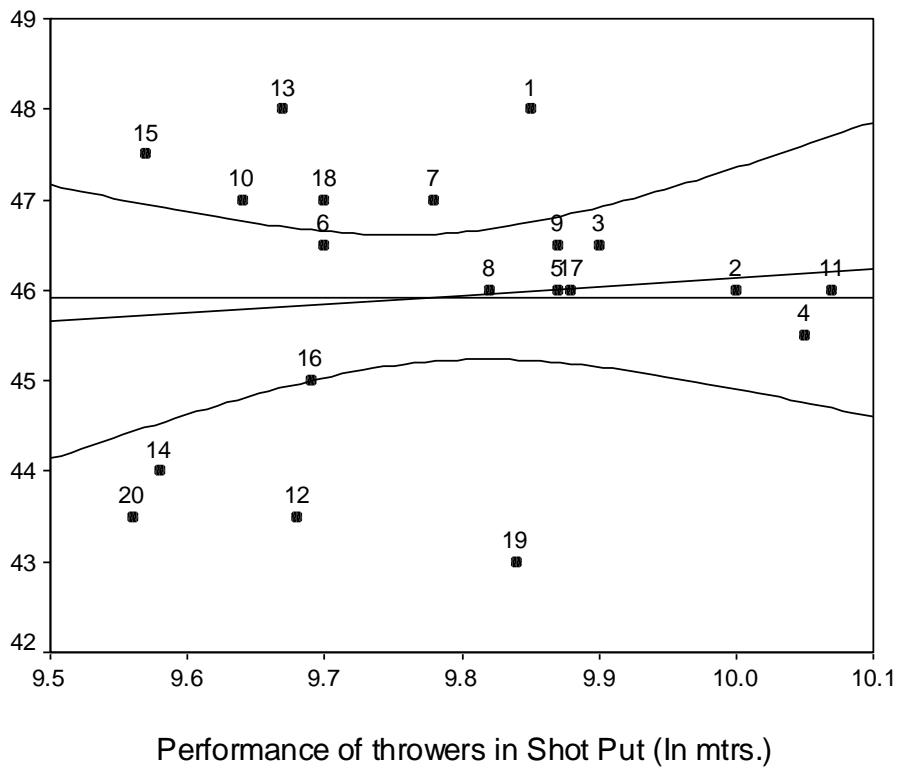


Fig. 03: Linear regression and relationship between Lower Arm Girth and Shot Put.

Table-03
Combined Contribution Anthropometric Measurements with Shot Put
Performance of Throwers

Criterion Variables	Independent Variables	Multiple Correlation	Coefficient of Multiple Correlation
Shot Put	Weight (9) Upper arm girth (22) Lower arm girth (23)	R _{c. 9(22)(23)}	0.908*

*Significant at 0.05 level of confidence

Table-03 has disclosed that the combined contribution of Anthropometric measurements of shot put performance are weight (9); upper arm girth (22); and lower arm girth (23); is significantly at 0.05 level of confidence as the computed value of 0.908* (R_{c.9(22)(23)}) for multiple correlation was more than the value of 0.444 required for the multiple correlation coefficient to be significant at 0.05 level of significant with 18 degree of freedom. From the obtained value of multiple correlations it can be deduced that all the above variables taken together contribute to shot put performance of throwers.

Table-04
Linear Regression Equations of Anthropometric Measurements with Shot Put
Performance of Throwers

1.	$y = 8.28 + 0.021$ (weight)
2.	$y = 8.768 + 0.034$ (upper arm girth)
3.	$y = 8.220 + 0.060$ (lower arm girth)

Where y = Criterion Variables i.e. shot put performance

Multiple Linear Regression Analysis

The Multiple Linear Regression Analysis in order to predict shot put performance.
 For shot put Performance

$$Y = 9.866 \text{ (constant)} + 0.004 \text{ (weight)} - 0.006 \text{ (upper arm girth)} + 0.041 \text{ (lower arm girth)}.$$

The result of the study revealed that there is a significant relationship between weight, upper arm girth and lower arm girth and shot put performance.

As a whole the variables Anthropometric measurements which have shown high relationship (weight, upper arm girth and lower arm girth) with shot put performance. The insignificant coefficient of correlation or low correlation (standing height, leg length, upper leg length, lower leg length, arm length, upper arm length, lower arm length, hip width, shoulder width, chest width, calf girth, thigh girth, and chest girth) shown by the variables does not mean that those variables are not contributing to the performance may be due to small sample size.

DISCUSSION OF HYPOTHESIS

It was hypothesized that there may not be significant relationship between performance ability of throwers and Anthropometric measurements. The result of the study shows the significant difference in weight, upper arm girth, and lower arm girth and hence the hypothesis is rejected. Whereas the other variables such as standing height, leg length, upper leg length, lower leg length, arm length, upper arm length, lower arm length, hip width, shoulder width, chest width, calf girth, thigh girth, and chest girth are found not to be significantly related and hence the hypothesis is accepted.

CONCLUSIONS

1. The Anthropometric measurements namely weight, upper arm girth and lower arm girth are significant related to shot put performance.
2. The Anthropometric measurements standing height, leg length, upper leg length, lower leg length, arm length, upper arm length, lower arm length, hip width, shoulder width, chest width, calf girth, thigh girth and chest girth are not found to be significantly related to shot put performance.
3. The multiple linear regression equations developed in the study for independent variables are Anthropometric measurements which have shown significant relationship to shot put performance are weight, upper arm girth and lower arm girth can be effectively used for prediction of shot put performance.

REFERENCES

- Clarke, H.Harrison, Application of Measurement to Health and Physical Education, 5th ed. (Englewood Cliffs, N. J. Prentice Hall, Inc., 1976), P. 252.
- Johnson, Barry L. and Nelson, Jack K., Practical Measurement for Evaluation in Physical Education, 3rd ed. (Delhi: Surjeet Publication, 1982), P.76
- Kansal,Devinder K., Test and Measurement in Sports and Physical Education (New Delhi: D.V.S. Publication, 1996), P. 122.
- Mathews, Donald K., Measurement in Physical Education 5th ed. (Philadelphia: W. B.Saunders Company, 1978), P. 19.
- Booyesen Hannes, Thought on Shot Put Technique, Track Technique (1971): 1365.
- Dolores, Dronfield Mirriam, “A Comparison of the Relationship of Shoulders Flexibility and other Selected Factors to Throwing Performance by College Women” Completed Research in Health, Physical Education and Recreation 12 (1970): 218.
- Ecker Tom, “Angle of Release in Shot Putting”. Athletic Journal 6 (February 1970): 52.
- Clarke, H.Harrison, “Joints and Body Range of Movements” Physical Fitness Research Digest (Washington D.C. President’s Council on Physical Fitness and Sports, 1975), P. 1-18
- Psiakes Ivan John, “The Rotation of Shot Put Style”. Track and Field Quarterly Review, 1: 87 (Spring 1987) : 56.
- Wilkinson, Charles Dewey “Selected Anthropometric Measures and Two Methods of Putting the Shot,” Dissertation Abstracts International 34: 8 (February 1974): 4851-A.