# TO PREDICT THE PERFORMANCE ABILITY OF SPRINTERS AND THROWERS IN RELATION TO SELECTED PHYSIOLOGICAL VARIABLES

**Dr. Baiju Abraham**
Assistant Professor, Dept. of Physical Education, Lucknow Christian Degree College, Lucknow, India.

## INTRODUCTION

Application of modern science and technology to sports is an effort to analyze and improve performance and is not a new idea. These efforts command little attention until a number of small innovates countries begin to organize program dedicated to the scientific development of Olympic athletes. The world of sports then became intrigued with the sports sciences area of bio-mechanics, physiology, sports sciences and sports psychology and the application of practical methods including carbohydrates loading, blood doping, slow analysis, attitude training, relaxation technique and numerous others. There was a sudden realization that sports sciences offered the key to athlete domination.

In last decade's notable progress has been made in the assessment of body composition and several new techniques have been suggested. Nevertheless, anthropometric techniques have as often been employed and have been particularly useful in estimating the fat and non-fat component of the human body because, despite the fact that they produce less precise results. They are relatively simple, non-invasive, in explosive and can be applied to large samples. Many prediction equations based on one or more variables have thus been formulated and tested. These prediction equations have made it possible to calculate the body density and then other body components (fat body percentage, fat body mass, and fat free mass).

## OBJECTIVE OF THE STUDY

The purpose of the study was to predict the performance ability of sprinters and throwers in relation to selected physiological variables.

## PROCEDURE AND METHODOLOGY

Forty male athletes aged between 14-18 years were selected for this study in which twenty male athletes were Sprinters and twenty male athletes were Throwers. These subjects were selected from Sports Authority of India (SAI) Lucknow, (U.P.). The following physiological variables such as Resting pulse rate, Positive breath holding time, Negative breath holding time, Body composition, Systolic blood pressure, Diastolic blood pressure, Respiratory rate and Maximum

expiratory pressure were selected. The necessary data was collected by administering various tests for the chosen variables. The time and distance chosen for assessing the performance ability was administered in the Athletic ground of Sports Authority of India (SAI). To find out the physiological variables to the 100mtrs sprint and shot-put performance, following statistical technique were employed: correlations, multiple correlations and regression analysis.

## RESULTS OF THE STUDY

**Table-01**
**Relationship of Physiological Variables with 100mtrs Sprint Performance of Sprinters and Shot put performance of Throwers.**

| Variables | Coefficient of Correlation 'r' | |
|---|---|---|
| | **Sprinter** | **Throwers** |
| Resting Pulse Rate | 0.165 | -0.775* |
| Positive Breath Holding Time | -0.501* | -0.269 |
| Negative Breath Holding Time | -0.002 | -0.094 |
| Body Composition | -0.132 | 0.021 |
| Systolic Blood Pressure | -0.116 | -0.042 |
| Diastolic Blood Pressure | -0.234 | -0.132 |
| Respiratory Rate | -0.373 | 0.047 |
| Maximum Expiratory Pressure | -0.285 | 0.361 |

From table-01 it is clear that one physiological variable have significant relationship with 100mtrs sprint performance and one variable with shot put performance. They are positive breath holding time (-0.501) and resting pulse rate (-0.775). In respect to other physiological variables of sprinters (resting pulse rate, negative breath holding time, body composition, systolic blood pressure, diastolic blood pressure, respiratory rate and maximum expiratory pressure) the relationship with 100mtrs sprint performance and the variables of shot-put performance of throwers (positive breath holding time, negative breath holding time, body composition, systolic blood pressure, diastolic blood pressure, respiratory rate and maximum expiratory pressure) is not found to be statistically significant at 0.05 level as they are below tabulated value i.e.0.444.

The relationship of physiological variables and 100mtrs sprint performance (positive breath holding time) and shot-put performance (resting pulse rate) is graphically presented in figure:-
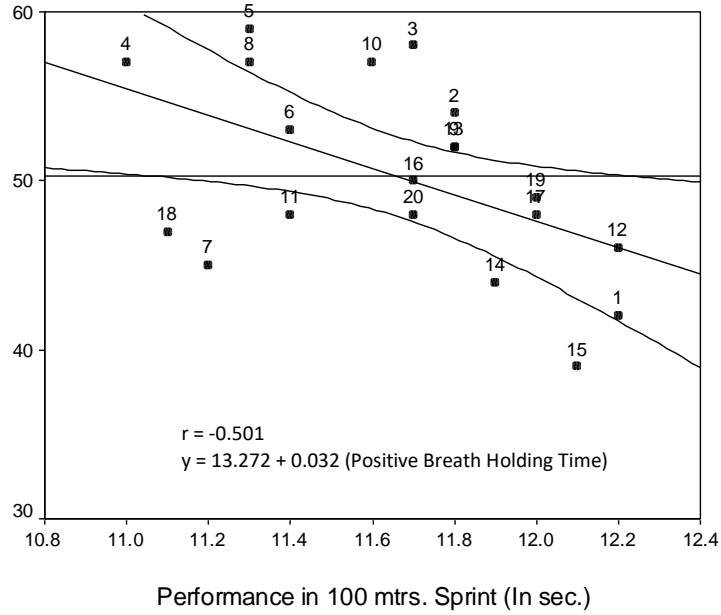
r = -0.501
y = 13.272 + 0.032 (Positive Breath Holding Time)

Performance in 100 mtrs. Sprint (In sec.)

**Fig. 01**: Linear regression and relationship between Positive breath holding time and Sprint (100 meters).



r = -0.775
y = 12.576 − 0.043 (resting pulse rate)

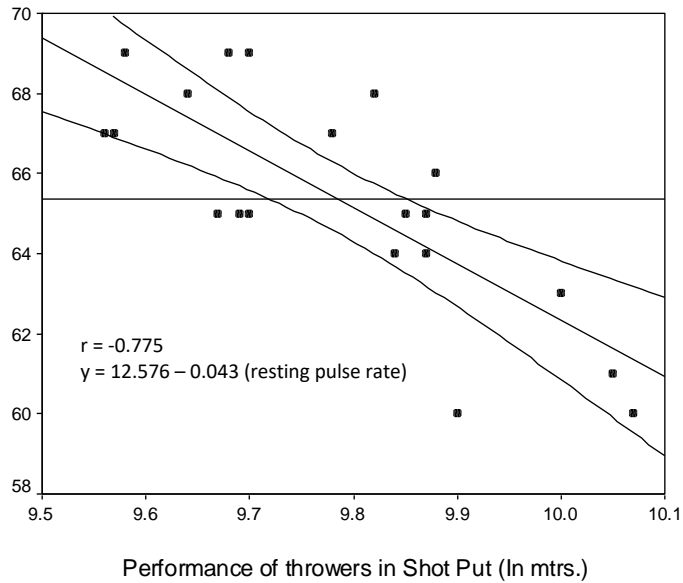Performance of throwers in Shot Put (In mtrs.)

**Fig. 02:** Linear regression and relationship between Resting Pulse Rate and Shot Put.

**Table-02**
**Combined Contribution of Physiological Variables with 100mtrs Sprint Performance of Sprinters and Shot-put performance of Throwers**

| Criterion Variables Correlation | Independent Variables | Multiple Correlation | Coefficient of Multiple |
|---|---|---|---|
| 100mts Sprint | Positive breath holding time (25) | Rc. (25) | 0.960* |
| Shot put | Resting pulse rate (24) | Rc.(24) | 0.908* |

*Significant at 0.05 level of significance

Table-02 has disclosed that the combined contribution of physiological variables of 100mtrs sprint performance are Positive breath holding time (25); and shot-put performance are resting pulse rate (24) is significant at 0.05 level of confidence as the computed value of 0.960* (Rc.(25)) and 0.908* (Rc.(24)) 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 100mtrs sprint performance and shot put performance.

**Table-03**

**Linear Regression Equations of Physiological Variables with 100mtrs Sprint Performance of Sprinters and shot-put performance of Throwers**

1.   $y = 13.27 + 0.03$ (positive breath holding time)      Sprinters
2.   $y = 12.576 – 0.043$ (resting pulse rate)      Throwers)

Where y = Criterion Variables i.e.100mtrs sprint performance and shot-put performance

**Multiple Linear Regression Analysis:**
The Multiple Linear Regression Analysis in order to predict 100mtrs sprint performance and shot-put performance.
For 100 meter Sprint Performance and Shot-Put Performance
     $Y = 4.283$ (Constant) $–0.012$ (Positive Breath Holding Time).

Y = 9.866 (constant) – 0.027 (Resting Pulse Rate).

The result of the study revealed that there is a significant relationship between positive breath holding time and 100mtrs sprint performance as well as resting pulse rate in shot-put performance.

As a whole, the physiological variables which have shown high relationship i.e (positive breath holding time) with 100 meters sprint performance and (resting pulse rate) with shot-put performance. The insignificant coefficient of correlation or low correlation with the 100 meters sprint performance were (resting pulse rate, negative breath holding time, body composition, systolic blood pressure, diastolic blood pressure, respiratory rate and maximum expiratory pressure) and shot-put performance were (positive breath holding time, negative breath holding time, body composition, systolic blood pressure, diastolic blood pressure, respiratory rate and maximum expiratory pressure) shown by the variables does not mean that those variables are not contributing to the performance may be due to the small sample size.

## CONCLUSIONS:-

1. The physiological variables namely and positive breath holding time and resting pulse rate are significant related to 100mtrs sprint performance and shot-put performance.
2. The physiological variables namely resting pulse rate, negative breath holding time, body composition, systolic blood pressure, diastolic blood pressure, respiratory rate and maximum expiratory pressure are not found to be significantly related to 100mtrs sprint performance as well as the variables namely positive breath holding time, negative breath holding time, body composition, systolic blood pressure, diastolic blood pressure, respiratory rate and maximum expiratory pressure 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 physiological variables which have shown significant relationship to 100mtrs sprint performance are positive breath holding time and shot put performance are resting pulse rate can be effectively used for prediction of 100mtrs sprint performance and shot-put performance.

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