International Journal of Yoga, Physiotherapy and Physical Education
www.sportsjournal.in
ISSN: 2456-5067
Received: 13-06-2022, Accepted: 28-06-2022, Published: 15-07-2022
Volume 7, Issue 4, 2022, Page No. 11-15

An association of selected anthropometric and physical fitness variables with the performance of the javelin throwers

Kunvar Singh
Assistant Professor, Department of Physical Education, GGV, Bilaspur, Chhattisgarh, India

Abstract
Purpose of the present study is to find out the relationship of selected anthropometric variables (height, weight, arm length, arm girth) and physical fitness variables (Speed, leg strength, back strength) with the performance of the Javelin throwers. Total 30 samples selected from Guru Ghasidas Vishwavidyalaya, Bilaspur. Age was ranging between18-28 years. Keeping the feasibility criterion in mind height, weight, arm length and arm girth selected as anthropometric variables, speed, leg strength and back strength selected as physical fitness variables. Performance of the Javelin throwers was selected as dependent variables. To know the significant relationship between selected anthropometric and physical fitness variables with the performance of the Javelin throwers, descriptive statistics and Pearson's Product Moment Correlation was used. All the data related to present study was analyzed with the help of 16.0 version software and the level of significant was set at .05 level of confidence. On the basis of the findings of the study it may conclude that Significant relationship was found between performance of javelin throwers with selected anthropometric variables -height (r=.807, p>0.05), weight (r=.845, p>0.05), arm length (r=.745, p>0.05) and arm girth (r=.897, p>0.05).
Significant relationship was found between performance of javelin throwers with selected physical fitness variable- speed (r=-.877, p>0.05), (r=.823, p>0.05), (r=.882, p>0.05.

Keywords: anthropometric, physical fitness, javelin throwers performance

Introduction

Throwing is a major skill found in many games and the development of this skill may be of paramount importance to some athletes. There are different types of throws that the thrower must be able to execute accurately. Throwing has many aspects that improve combined skills, including speed, body motion, arm speed, arm motion, distance, approach angle, aiming angle, etc. Javelin throw is the event of track and field in which a spear was thrown with the help of a strap wrapped around the center of the shaft. Throwing event in which athletes attempt to throw a javelin with a metal tip as far as they can. It necessitates a blend of strength, power, co-ordination, precision, and timing. The javelin throw was invented in 708 BC. It was added to the ancient Olympics as part of the pentathlon. The spear was thrown with the help of a strap wrapped around the center of the shaft.

Anthropometry (from the Greek human body, "human" and metron, "measurement") refers to the measurement of an individual body proportion. Anthropometry includes systematic measurements of the physical properties of the human body, primarily body size and shape dimensional descriptors. Anthropometry measures human size, shape, proportions, and composition by measuring, recording, and analyzing specific body dimensions such as height and weight, subcutaneous fat thickness, upper and lower limb length, and waist. Anthropometry is a science related to measuring the height, weight and proportions of the human body. It is also defined as the science of measuring parts or segments of the human body to find the dimensions of the human body.

Throwing events such as javelin throws and shot put are characterized by a very diverse duration of a single event, energetic demands, and high energy release rates. Anthropometric and physical fitness variables play important role throwing events most often need to resist gravity at various distances and heights, including thrown tackles. This indicates the need for a particular lean physique as a requirement for more efficient and economical performance in throwing event. Athletes with the optimal physique for a particular event are more likely to succeed than athletes lacking general attributes. Therefore, athletics, like any other dynamic sport, requires a variety of different and important properties such as anthropometric variables.

Sports overall performance depends on physical, physiological and psychological parameters. Physical fitness required for every one either he or she is in job or living sedentary life. For better performance every game and sports required some specific performance related components. There are some performance related components such as speed, agility, strength, endurance and flexibility. Every sport has need for a combined of four components; strength, endurance, speed, agility, power. If your goal is to succeed in sports, your approach should be to improve your performance-related factors such as strength and speed. Speed is not always simply how rapid a person can run, but depends on their acceleration, the maximum speed of movement, and also on

maintaining speed. When we talk about speed during approach run, we are talking about a lot more than just running fast. Speed is not necessarily the speed at which a person can run, but depends on acceleration, maximum speed of movement, and how to maintain speed.
If we talk about succeed in throwing performance the most important variables is strength. Strength is the ability of an individual to overcome resistant. Strength may be explosive type or may be strength endurance that contributes according to nature of the event. Leg and back strength is the strength of the leg and back which play important role by summation of force from different joint such as knee, ankle and hip joint at the time of release.
It is clear that there is a lot of controversy in the conclusions when trying to identify the exact anthropometric variables associated with throwing velocities. The purpose of this study was to investigate possible relationships between anthropometric properties and throwing velocities.

Objective of the Study

- To find out the relationship of selected anthropometric variables (height, weight, arm length, arm girth) with the performance of Javelin throwers.
- To find out the relationship of selected physical fitness variables (Speed, leg strength, back strength) with the performance of Javelin throwers.

Hypothesis of The Study

It was hypothesized that there will be no relationship of selected anthropometric variables (height, weight, arm length, arm girth) with the performance of Javelin throwers.
It was hypothesized that there will be no relationship of physical fitness variables (Speed, leg strength, back strength) with the performance of Javelin throwers.

Methodology

Selection of subjects

For the purpose of the present study total 30 samples selected from Guru Ghasidas Vishwavidyalaya, Bilaspur. Age was ranging between18-28 years.

Selection of Variables: For the purpose of the study and Keeping the feasibility criterion in mind, following variables were selected for the present study:

Independent variables

- **Anthropometric Variables**
- Height
- Weight
- Arm length
- Arm girth

- **Physical Fitness Variable**
- Speed
- Leg strength
- Back strength

Dependent variables

Performance of the Javelin throwers was selected as dependent variables. Performance was measured on the basis of distance covered by the javelin after a successful attempt.

Criterion Measures

To measure length of various body parts (height, arm length, arm girth) stadiometer and measuring tape was used and recorded in centimeters.
Weight was measured with the help of electronic weighing machine.
Speed of throwers was measured by 50m run.
Leg and Back strength was measured with the help of leg and back strength dynamometer.
Performance of Javelin Throwers was measured by the distance covered by the Javelin after a successful throw and measured by measuring tape in meters.

Statistical Technique

To know the significant relationship between selected anthropometric and physical fitness variables with performance of the Javelin throwers descriptive statistics and Pearson's Product Moment Correlation was used. All the data related to present study was analyzed with the help of 16.0 version software and the level of significant was set at .05 level of confidence.

Result and findings of the study

Table 1: Descriptive statistics of selected anthropometric variables (Height, weight, arm length and arm girth)

Sr. No.	Variables	N	Mean	Std. Deviation
1	Height	30	177.45	4.902
2	Weight	30	73.85	7.70
3	Arm Length	30	61.96	3.17
4	Arm Girth	30	25.39	1.75

Table-1 descriptive statistics i.e. Mean, SD of selected anthropometric variables (Height, weight, arm length and arm girth) of Javelin throwers. The Mean and SD of selected variables are i.e Height **(**177.45±4.902), Weight (73.85±7.70), Arm length (61.96±3.17), Arm girth (25.39±1.75).

Table 2: Descriptive statistics of selected Physical Fitness variables (Speed, Leg strength, Back strength and Performance of Javelin throw)

Sr. No.	Variables	N	Mean	Std. Deviation
1	Speed	30	7.550	.793
2	Leg strength	30	132.48	5.421
3	Back strength	30	132.40	5.226
4	Performance of Javelin throw	30	59.117	3.731

Table-2 describes the descriptive statistics i.e. Mean, SD of selected Physical Fitness variables (Speed, Leg strength, Back strength and Performance of Javelin throw) of Javelin throwers. The Mean and SD of selected variables are i.e Speed (7.550±.793),Leg strength (132.48±.5.421), Back Strength (132.40±5.226)and Performance of Javelin throwers (59.117±3.731).

Table 3: Correlation Coefficient of Selected Anthropometric variables (Height, weight, arm length and arm girth) with the Performance of Javelin thrower)

Independent Variables	Correlation Coefficient (r)	p-value
Height	.807	.000
Weight	.845	.000
Arm Length	.745	.000
Arm Girth	.897	.000

Table-4 indicates that there exists a significant relationship between performance of Javelin throwers with selected anthropometric variables *i.e.* (Height, weight, arm length and arm girth) as the p-values were less than 0.05.

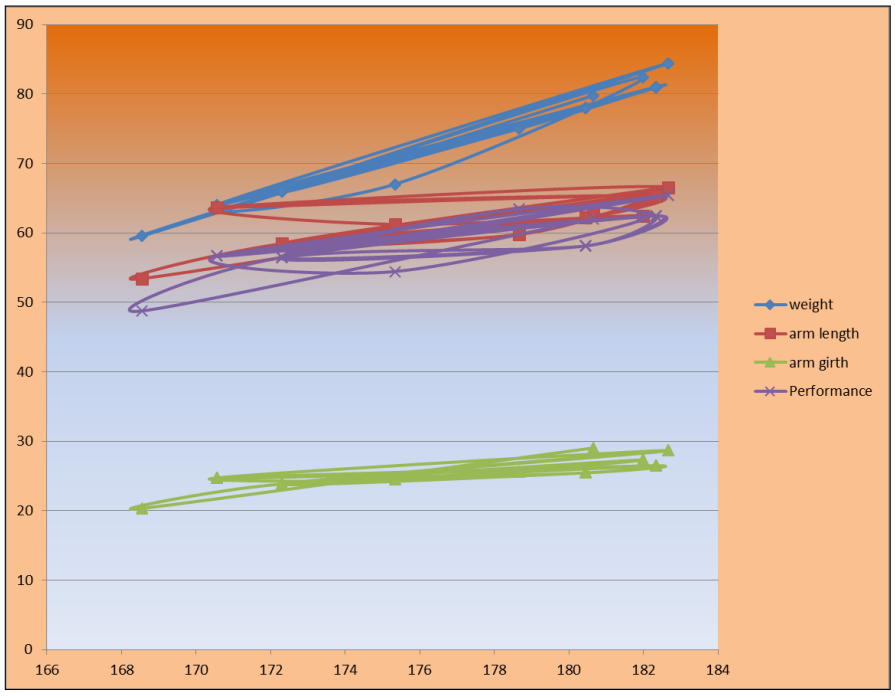

Fig 1

Table 4: Correlation Coefficient of Selected Physical Fitness variables (Speed, Leg strength and Back strength with the Performance of Javelin thrower)

Independent Variables	Correlation Coefficient (r)	p-value
Speed	-.877	.000
Leg strength	.823	.000
Back strength	.882	.000

Table-4 indicates that there exists a significant relationship between performance of Javelin throwers with selected physical fitness variables *i.e.* Speed, Leg Strength and back strenth as the p-values were less than 0.05.

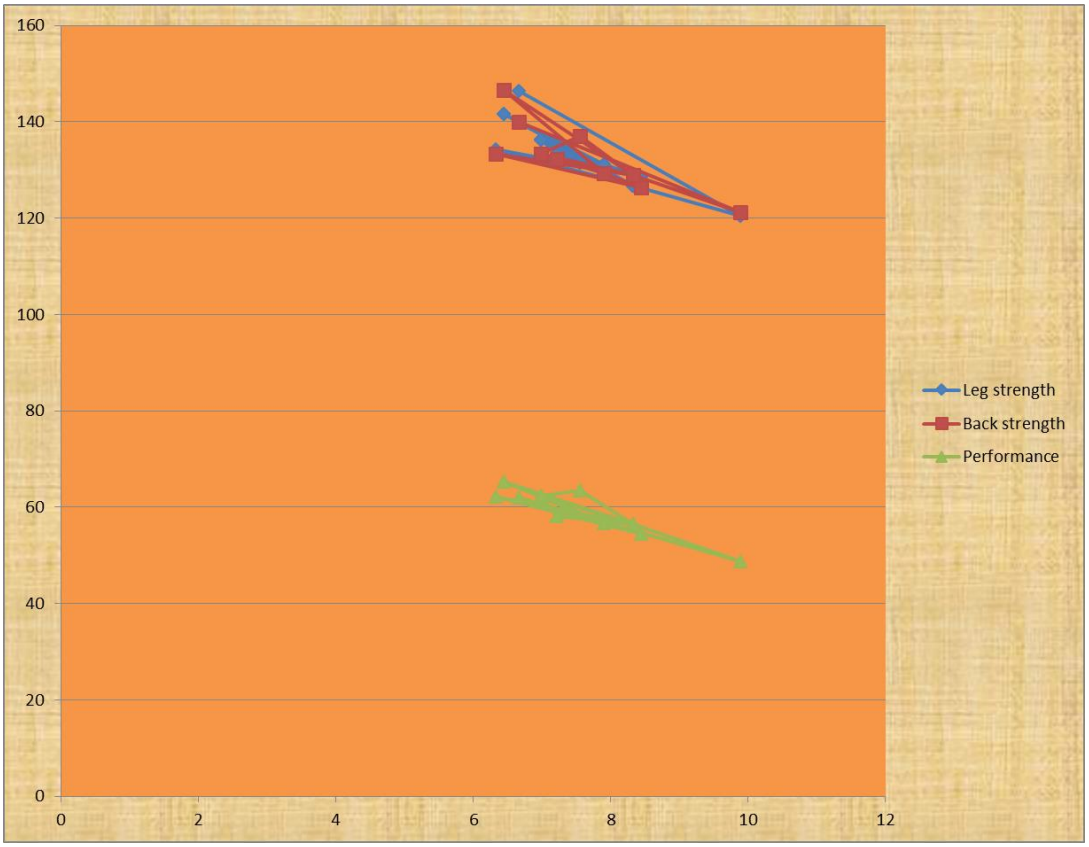

Fig 2

Discussion of findings

The correlation values of selected anthropometric variables: Height (.807), Weight (.845), Arm Length (.745) and Arm Girth (.897) was found significant in relation performance of Javelin throwers. Height of the throwers provides optimum angle of release that increase the throwing distance of Javelin. Body weight of the thrower may be lean body mass means muscles mass without fat by which throwers generated maximum force to produce optimum level of momentum that increase throwing performance of the Javelin throwers. Arm length of the throwers provides extra leverage that provide maximum amount of strength and stability which increase the performance of the throwers. Increase in the arm girth is directly related to increase in the size and shape of the muscles, means players had increases muscle mass by weight training or other means of training. Good amount of muscle mass has capabilities to high number of mitochondria, hemoglobin, and other muscles components that increase oxygen carrying capacity, enhance energy production system.

The correlation values of selected physical fitness variables: speed (-.877), leg strength (.823), and back strength (.882) was found significant in relation performance of Javelin throwers. Probable reason of this result may the speed at the time of approach run provide optimum level of momentum to release javelin with maximum force. At the time of release throwers back and leg strength are the important components to generate maximum force from different joints such as ankle, knee, and hip joint, which increase maximum strength to release javelin in efficient manner.

Conclusions

On the basis of the findings of the study following conclusions have been drawn:

- Significant relationship was found between performance of javelin throwers and height (r=.807, p>0.05).
- Significant relationship was found between performance of javelin throwers and weight (r=.845, p>0.05).

- Significant relationship was found between performance of javelin throwers and arm length (r=.745, p>0.05).
- Significant relationship was found between performance of javelin throwers and arm girth (r=.897, p>0.05).
- Significant relationship was found between performance of javelin throwers and speed (r=-.877, p>0.05).
- Significant relationship was found between performance of javelin throwers and leg strength (r=.823, p>0.05).
- Significant relationship was found between performance of javelin throwers and back strength (r=.882, p>0.05

At the starting it was hypothesized that there will be no significant relationship between selected anthropometric and physical fitness variable with the performance of javelin throwers is not accepted at .05 level of significant.

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