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RELATIONSHIP BETWEEN THROWING PERFORMANCE AND SELECTED PHYSICAL FITNESS AND MORPHOLOGICAL VARIABLES OF INTER-COLLEGIATE LEVEL JAVELIN THROWERS

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ABSTRACT

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. The purpose of the present study was to examine the relationship between throwing performance and selected physical fitness and morphological variables of inter-collegiate level javelin throwers. The present study was conduct on Thirty two (32) male javelin throwers participating at inter collegiate level competitions. The subjects were selected from Kuvempu University, Mandya University Tumkur University and Davangere universities of Karnataka. The age of subjects ranged between 22 to 28 years. The required data was collected during the competition. Throwing performance was assessed through three trials. The best of three trials was recorded as the score of the subject for throwing performance. The tester collected necessary data from selected subjects in identical standard setting. Standard testing procedures were adopted for the collecting data in the present investigation. The tester visited different Universities and collected necessary data through selected tests after inter collegiate athletic meet during 2024-25. The subjects were requested to assemble in a pre-designated place for data collection. After completing field tests including javelin throw and selected physical fitness variables, they were requested to assemble in a class room for morphological testing. There is no significant correlation between javelin throw performance and explosiveness, static strength, dynamic strength as well as core muscle strength. Further, significant association is not found between various morphological variables under investigation. Significant moderate positive correlation between javelin throw performance and wrist girth is found in this study.

Keywords: Javelin, Throwing Event, Inter-College, Physical Fitness and Morphology.

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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 (Sing, 2022). The evaluation of performance with objective criteria such as time, distance, and height has made athletics an important research area in sports sciences. Especially the shot put, discus, javelin, and hammer throw events are among the disciplines where the impact of physical and biological characteristics on performance is most clearly observed, as they are explosive movements requiring maximum force and speed production in a short time (Barak., et al. 2025).

Track and field throwing sports, including shot put, javelin, discus, and hammer throw, are Olympic sports with a rich history and global participation. No matter what kind of equipment and rules, executing a throw requires the proper and synchronized functioning of the entire kinetic chain musculature, which enables the creation of a harmonized movement pattern that facilitates the transmission of force. Going further into the matter, the development of athletic skills and sport-specific performance is built upon a foundation of excellent physical fitness, body composition and somatotype characteristics. (Zhao & Kewei Zhao, 2023).

Morphology is a branch of biology dealing with the study of the form and structure of organisms and their specific structural features. This includes aspects of the outward appearance (shape, structure, colour, pattern, size), i.e. external morphology), as well as the form and structure of the internal parts like bones and organs, i.e. internal morphology (or anatomy). Morphology is a branch of life science dealing with the study of gross structure of an organism or taxon and its component parts. Although it is difficult to pinpoint the emergence of modern morphology as a science, one of the early landmarks was the publication in of De human icorpor is fabrica by Andreas Vesalius, whose careful dissections of human bodies and accurate drawings of his observations revealed many of the inaccuracies in Galen's earlier descriptions of the human body. The field of morphology was developed by Johann Wolfgang von Goethe (1790) and independently by the German anatomist and physiologist Karl Friedrich Burdach .Within the field of biology, morphology is the study of the shapes and arrangement of parts of organisms, in order to determine their function, their development, and how they may have been shaped by evolution. Morphology is particularly important in classifying species, since it can often reveal how closely one species is related to another. morphology is the study of the shapes and arrangement of parts of organisms, in order to determine their function, their development, and how they may have been shaped by

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evolution. Morphology is particularly important in classifying species, since it can often reveal how closely one species is related to another. (Suresh., 2024).

METHODOLOGY

The purpose of the present study was to examine the relationship between throwing performance and selected physical fitness and morphological variables of inter-collegiate level javelin throwers.

The present study was conduct on Thirty two (32) male javelin throwers participating at inter collegiate level competitions. The subjects were selected from Kuvempu University, Mandya University Tumkur University and Davangere universities of Karnataka. The age of subjects ranged between 22 to 28 years. The required data was collected during the competition.

Throwing performance was assessed through three trials. The best of three trials was recorded as the score of the subject for throwing performance. The following morphological variables were selected for the present investigation. The details of tests are given in the table 1 as below.

TABLE 1.
DETAILS OF MORPHOLOGICAL VARIABLES, TESTS AND UNITS OF MEASUREMENT

Tests	Equipment	Unit of measurement
Standing height test	Stadiometer	Centimeters
Body weight measurement	Weighing scale	Kilograms
Arm length measurement	Measuring tape	Centimeters
Chest Circumference measurement	Measuring tape	Centimeters
Shoulder width measurement	Measuring tape	Centimeters
Relaxed arm girth measurement	Measuring tape	Centimeters
Flexed arm girth measurement	Measuring tape	Centimeters
Fore arm girth measurement	Measuring tape	Centimeters
Wrist girth	Measuring tape	Centimeters
Standing Broad Jump test	Measuring tape	Centimeters
Hand grip strength test	Handgrip dynamometer	Kilograms
Pushup test	--	Counts
Medicine ball throw test	Measuring tape	Meters

The tester collected necessary data from selected subjects in identical standard setting. Standard testing procedures were adopted for the collecting data in the present investigation. The tester visited different Universities and collected necessary data through selected tests after inter collegiate athletic meet during 2024-25. The subjects were requested to assemble in a pre-designated place for data collection. After completing field tests including javelin throw and selected physical fitness variables, they were requested to assemble in a class room for morphological testing. The objectives of the test were made clear to the subjects and brief explanation was given about each test prior to the testing. Cooperation in this regard was sought from each subject during data collection. The data was collected with minimal clothes on subjects.

The raw data collected was subject ted to descriptive statistics like mean and standard deviation for assessing the normalcy of data. Pearson's product moment correlation coefficient was calculated using SPSS. The interpretation was done using Guildford's (zarkasyi, 2015) table for establishing degree of association. Scatter gram was used wherever necessary to make pictorial interpretation.

TABLE 2.
GUILFORD'S INTERPRETATION OF THE MAGNITUDE OF SIGNIFICANT CORRELATIONS

ABSOLUTE VALUE OF R	INTERPRETATION
< 0.19	Slight; almost no relationship
0.20–0.39	Low correlation; definite but small relationshi
0.40–0.69	Moderate correlation; substantial relationship
0.70–0.89	High correlation; strong relationship
0.90–1.00	Very high correlation; very dependable relati
≥ 0.30	Practically significant relationship

FINDINGS

The raw data were subjected to descriptive statistics like mean and standard deviation and the results are given in table 3 as below.

TABLE 3.
DESCRIPTIVE RESULTS ON JAVELIN THROW PERFORMANCE AND MORPHOLOGICAL VARIABLES OF INTER-COLLEGIATE LEVEL JAVELIN THROWERS.

Variables	Mean	Std. Deviation
Javelin throw performance	49.67	4.03
Standing Height	173.13	5.59
Body weight	65.41	6.55
Arm length	0.94	5.62
Chest Circumference	6.72	4.42
Shoulder width	47.47	3.98
Relaxed arm girth	8.94	1.76
Flexed arm girth	2.34	2.28
Fore arm girth	29.28	2.82
Wrist girth	21.13	1.04
Standing Broad Jump	2.18	0.20
Hand grip strength	49.29	3.92
Pushup	43.00	3.53
Medicine ball throw	5.05	0.47

Descriptive statistics (mean and standard deviation) of javelin throw performance along with selected anthropometric and physical fitness variables are presented in Table 03. The mean javelin throw performance of the athletes was 49.67 ± 4.03 m, indicating a moderate level of performance with acceptable variability among participants. The average standing height and body weight were 173.13 ± 5.59 cm and 65.41 ± 6.55 kg, respectively, reflecting relatively homogeneous physical characteristics.

With respect to limb dimensions, the mean arm length was recorded as 80.94 ± 5.62 cm, while shoulder width and chest circumference averaged 47.47 ± 3.98 cm and 86.72 ± 4.42 cm, respectively. Upper-arm muscularity, assessed through relaxed and flexed arm girth, showed mean values of 28.94 ± 1.76 cm and 32.34 ± 2.28 cm, whereas forearm and wrist girths were 29.28 ± 2.82 cm and 21.13 ± 1.04 cm, respectively.

In terms of physical fitness variables, the mean standing broad jump performance was 2.18 ± 0.20 m, indicating good explosive leg power. Hand grip strength averaged 49.29 ± 3.92 kg, reflecting adequate upper-body strength relevant to javelin throwing. Muscular endurance, as measured by push-ups, had a mean value of 43.00 ± 3.53 repetitions, while explosive upper-body power assessed through the medicine ball throw recorded a mean of 5.05 ± 0.47 m.

TABLE 4.
SUMMARY OF CORRELATION BETWEEN JAVELIN THROW PERFORMANCE AND SELECTED MORPHOLOGICAL VARIABLES

Variables	Correlation 'r'
Arm length	.173
Chest Circumference	.217
Shoulder width	.178
Relaxed arm girth	.200
Flexed arm girth	.254
Fore arm girth	.094
Wrist girth	.485**
Standing Broad Jump	.195
Hand grip strength	.309
Pushup	-.138
Medicine ball throw	.084

** Correlation is significant at the 0.01 level of (2 tailed)

From table 4 it is evident that there exists significant moderate positive correlation between javelin throw performance and wrist girth in the present investigation. Significant correlation was not found between other

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morphological variables and javelin throw performance. The above significant result is depicted in figure 1 as below.

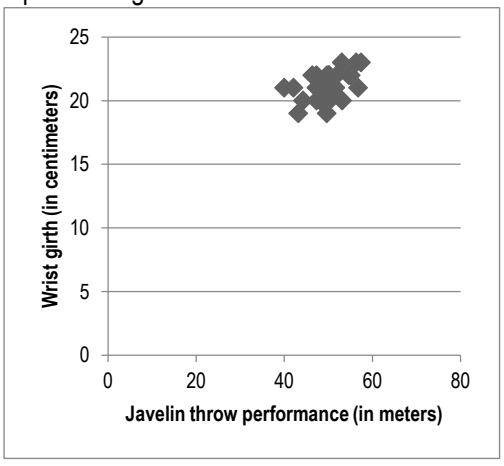

Figure 1. Graphical illustration of association between javelin throw performance and wrist girth in inter-collegiate level javelin throwers.

DISCUSSION

It is noteworthy that there is no significant correlation between javelin throw performance and explosiveness, static strength, dynamic strength as well as core muscle strength. The inter-collegiate level javelin throwers in the present investigation might lack preparation in physical fitness aspect. Desired changes in morphological aspects are also not visible in these throwers. An in depth analysis may be needed to find out reasons for lack of association between dependent and independent variables.

CONCLUSION

There is no significant correlation between javelin throw performance and explosiveness, static strength, dynamic strength as well as core muscle strength. Further, significant association is not found between various morphological variables under investigation. Significant moderate positive correlation between javelin throw performance and wrist girth is found in this study.

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