

THE INTERNATIONAL JOURNAL OF SCIENCE & TECHNOLEDGE

Relationship of Selected Anthropometric Variables to Playing Ability of Senior National Level Soccer Players

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Abstract:

Soccer is the most popular sport in world. Performance at optimal levels requires high levels of technical, tactical and physiological skills. Identification and selection of talented soccer players are not straightforward procedures. The data collected was analyzed by applying Pearson's product moment Correlation (r). This was used to find out the relationship of selected Anthropometric variables to playing abilities of senior national level soccer players, Kerala state. The subjects for the study were selected from during the time of Kerala state senior football coaching camp (Santosh trophy) held at FACT Udyogamandal ground Ernakulam. Age of the subjects ranged between 24 to 30 years. They were tested on selected Anthropometric variables namely Height, Weight, Arm length, Leg length, Calf girth and Thigh girth. These variables were put into statistical analysis of simple correlation and partial correlation to find out the relationship between selected criterions variables to playing ability.

Keywords: Soccer, performance, playing ability, anthropometric variables

1. Introduction

Sports in man's blood. Sports are recreation as well as competitions. Sports are individual activities relating and revitalizing in nature and provide opportunities for the most intelligent use of leisure time. Sports and war has been the vary life of contemporary civilization. Sports are worldwide phenomenon today. In period of world history was so popular organised and important as today. The term 'soccer' is the name that has commonly been given in North America to a form of football played with a spherical ball. It is the most widely played team game in the world and the most popular spectator sport. "Anthropometry is the science of measuring the men body and its parts. It is seen as an aid to the study of human evaluation and variation". Anthropometry, simply stated, consists of making external measurement of the human body. These measurements may either objective, using special instruments such as calipers or subjective, using a list of characteristics or a description of categories of guide judgment presently, anthropometry considers individual differences apprise each subject related to structural differences and determines potentialities in light of the striate characteristics.

2. Background of the Study

A study of the relevant literature is an essential step to get a full picture of what has been done with regard to the problem under study. Such review brings about a deep and clear perspective of the overall field.

The literature is any field forms the foundation upon which all future work will be built." Now a day the educational programme of any type is characterized by forms and innovative ideas. it seems to be necessary one to formulate such as review of various scholar's work. We can bring out a deep insight and clear perspective of the overall field in such reviews. In this chapter, literature related to the problem under study has been given. An attempt to the problem familiarize and to provide a solid basis of for understanding the present day.

Kim JH et al.(2015) Mar Which anthropometric measurements, including visceral fat, subcutaneous fat, body mass index, and waist circumference could predict the urinary stone composition most? Conducted a study, although there is growing evidence of relationship between obesity and some specific stone compositions, results were inconsistent. Due to a greater relationship between

metabolic syndrome and some specific stone type, obesity measured by body mass index (BMI) has limitation in determining relationship between obesity and stone compositions. The aim of this study was to determine the relationship among BMI, visceral fat, and stone compositions. We retrospectively reviewed data of patients with urinary stone removed over a 5 year period (2011-2014). Data on patient age, gender, BMI, urinary pH, stone composition, fat volumes (including visceral fat, subcutaneous fat, total fat, waist circumference), and ratio for visceral to total fat using computed tomography based delineation were collected. To figure out the predicting factor while adjusting other confounding factors, discriminant analysis was used. Among 262 cases, average age was 52.21 years. Average BMI and visceral fat were 25.03 cm(2) and 124.75 cm(2), respectively. By chi square test, there was significant ($p < 0.001$) difference in stone types according to sex. By ANOVA test, BMI, visceral fat, visceral to subcutaneous fat ratio, the percentage of visceral fat and total fat showed significant association with stone types. By discriminant analysis, visceral fat was proved to be a powerful factor to predict stone composition (structure matrix of visceral fat = -0.735) with 42.0% of predictive value. Visceral fat adiposity strongly related with uric acid stone and has better predictive value than BMI or urinary pH to classify the types of stone. Aune D et.al. (2015) conducted a study Anthropometric factors and endometrial cancer risk: a systematic review and dose-response meta-analysis of prospective studies. Greater body mass index (BMI) has been convincingly related to increased endometrial cancer risk, however, whether adiposity earlier in life or abdominal fatness is an independent risk factor and whether weight gain or greater height increases the risk is not clear. As part of the Continuous Update Project of the World Cancer Research Fund International, we conducted a systematic review and meta-analysis of prospective studies of the association between anthropometric measures and endometrial cancer risk and searched PubMed and several other databases up to February 2015. Summary relative risks (RRs) were calculated using a random-effects model. Thirty prospective studies of BMI and endometrial cancer risk with 22 320 cases among 6 445 402 participants were included. The summary RR for a 5-unit increment was 1.54 [95% confidence interval (CI) 1.47-1.61, I(2) = 81%]. Although the test for non-linearity was significant, Pnon-linearity < 0.0001, and the curve was steeper within the overweight and obese BMI ranges, there was evidence of increased risk even within the high normal BMI range. The summary RR was 1.45 (95% CI 1.28-1.64, I(2) = 76%) per 5 BMI units for BMI in young adulthood, 1.18 (95% CI 1.14-1.23, I(2) = 67%) per 5 kg increase of weight, and 1.16 (95% CI 1.12-1.20, I(2) = 51%) per 5 kg of weight gained between young adulthood and study baseline, 1.27 (95% CI 1.17-1.39, I(2) = 71%) per 10 cm increase in waist circumference, 1.21 (95% CI 1.13-1.29, I(2) = 0%) per 0.1-unit increment in waist-to-hip ratio and 1.30 (95% CI 1.19-1.41, I(2) = 0%) per 10-cm increase in hips circumference. The summary RR was 1.15 (95% CI 1.09-1.22, I(2) = 61%) for a 10-cm increase in height. All measures of adiposity were associated with increased risk of endometrial cancer, and in addition increasing height was associated with increased risk

3. Methodology

In this chapter the methodology adopted for the study namely selection of subject, selection of variables, reliability of data, testers competency, instrument reliability, testers reliability, criterion measures, orientation of the subject, collection data, test administration and analysis were presented.

3.1. Selection of Subject

Thirty senior soccer players (N =30) who participated in the Santosh Trophy (2011-12) for Kerala state was selected as the subjects for the study.

3.2. Selection of Variables

The following variables were selected for the study:

Height	Stadiometer
Weight	Weighing machine
Arm length	Steel measuring tape
Leg length	Steel measuring tape
Thigh girth	Steel measuring tape
Calf girth	Steel measuring tape

Table 1: Anthropometric Variables

- i. Playing ability: Playing ability was chosen as the criterion variable for the study.
- ii. Reliability of Data: The reliability of data was censured by establishing the instrument reliability and testers competency.
- iii. Instrument reliability: The instrument used for the collection of data is of international standard and their test reliability was already set.
- iv. Tester's reliability: The tester's competency was established by test retest method under the supervision of experts in the field of physical education and sports.

3.3. Criterion Measures

The criterion measures chosen to test hypothesis were:

3.3.1. Anthropometric Variables

- Standing height in centimetres.

- Body weight in kilograms.
- Arm length in centimetres.
- Leg length in centimetres.
- Thigh girth in centimetres.
- Calf girth in centimetres.

3.3.2. Playing Ability

- The playing abilities were assessed by three qualified experts from the field of soccer.

3.3.3. Orientation of the Subject

Before measuring the anthropometric the investigator had briefly explained to the subject the purpose of study and their role in the study.

3.3.4. Collection of Data

The data pertaining to selected anthropometric measurements such as height, weight, arm length, leg length, thigh girth, calf girth were collected by administrating appropriate standard tests using correct measurement procedure

3.4. Test Administration

3.4.1. Physical Variables

1. Height

- Purpose : To measure the standing height of the individual
 Equipment : Stadiometer, Hard board
 Procedure : Height is the erect body length from sole of the foot to vertex. The subjects stood bare footed, erect, buttocks and upper back in contact the scale, the arms were hung naturally on the sides. The flat hand board was placed horizontally on his head and marked on the wall, the subject was asked to step out and the reading indicated by the hard board was read from the scale.
 Scoring : The highest point of the head was recorded to the nearest centimetre.

2. Weight

- Purpose : To measure the weight of the subject
 Equipment : Weighing machine
 Procedure : The weight of the subject was taken with a level type laboratory anthropometric weighing machine. The subject stood at the centre of the weighing machine and weight evenly distributed between both feet. The weight was recorded from the indicator needle of dial.
 Scoring : The weight was read and recorded correct to the half of a kilogram

3. Arm length

- Purpose : To measure the arm length of the subject
 Equipment : Steel tape
 Procedure : The subjects wore sleeveless banyan. The initial end of the measuring tape was placed on the acromion process and the arm was brought to abduction position, the tape was brought firmly up to the arm with the middle finger and the tape.
 Scoring: : The reading was taken to the nearest 1/100th of a centimetre

4. Leg Length

- Purpose : To measure subjects leg length
 Equipment : Measuring steel tape, Pencil, Score sheet
 Procedure : The subject wore ideal clothing at the time of measuring the measuring tape's initial end was placed on the greater trochanter of femur (or anterior superior spine of the ilium) and firmly brought towards the sole of the foot and the tape recording was recorded.
 Scoring : The reading was taken nearest 1/100th of a centimetre.

5. Calf girth

- Purpose : To measure the circumference of the calf
 Procedure : Calf girth was measured with a tape is wrapped horizontally around the naked lower leg of the subject at the maximal bulge of the calf muscle with slight up and down movements of the steel tape keeping it in a horizontal direction. The maximal circumferential measurements give the value of calf circumference.
 Equipment : Measuring steel tape
 Scoring : Measurement was taken in Centimetre.

6. Thigh girth

Purpose : To measure the circumference of the thigh at midpoint of femur length.

Equipment : Measuring steel tape

Procedure : Thigh Circumferences was measured with a tape placed around the thigh at a midpoint of femur length horizontally.

Scoring : Measurement was taken in Centimetre

3.4.2. Playing Ability

To judge the playing ability of the subject on five rating scale was used by three experts who had the required experience and qualifications in the field of football. The subjective rating was done to assess the playing ability during the time of Kerala state senior football coaching camp (santosh trophy) held at (fact udyogamandal ground Ernakulum). The experts observed the game and on the basis of five point rating scale they assessed each individual player and ranked them according to their individual performance in their technical and the tactical aspects. The score was the average of the three experts rating.

3.5. Statistical Technique

The data collected was analyzed by applying Pearson's product moment Correlation (r). This was used to find out the relationship of anthropometrical variables to playing abilities of senior national level soccer players, Kerala state. For this purpose the following formula was used.

$$r = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{N \sum X^2 - (\sum X)^2} \sqrt{N \sum Y^2 - (\sum Y)^2}}$$

4. Results and Analysis

This chapter deals with the analysis of the data collected from the subjects under study. The purpose of the study was to analyze the relationship of selected anthropometric variables to playing abilities of senior national level soccer players, Kerala state. They were tested on Anthropometric variables namely height, weight, arm length, leg length, thigh girth, calf girth. These variables were put into statistical analysis and the results of which are presented in this chapter.

4.1. Test of Significance

This is the crucial portion of the thesis in arriving at the conclusion by examining the hypothesis. The procedure or testing the hypothesis was ended either by accepting the hypothesis or rejecting the hypothesis in accordance with the result that is obtained in relation to the level of confidence, 0.05 level of confidence, which was considered sufficient for this study.

4.2. Level of Significance

The probability level below which we reject the hypothesis is termed as the level of significance.

4.3. Tables and Figures

Anthropometric Variables	Coefficient of Correlation
Height	-0.205
Weight	0.158
Arm Length	-0.032
Leg Length	-0.249
Thigh Girth	0.309
Calf Girth	0.294

Table 2: the coefficient correlation of anthropometric variables to playing ability

*Correlation is significant at the 0.05 level

The analysis of Table-2 shows that-

The obtained correlation value of height to the playing ability was

-0.205. It was lesser than the required correlation value of .355. However there was a negative relationship when the playing ability was related with height.

The obtained correlation value of weight to the playing ability was 0.158. It was lesser than the required correlation value of .355. However there was a negative relationship when the playing ability was related with weight.

The obtained correlation value of arm length to the playing ability was -0.032. It was lesser than the required correlation value of .355. However there was a negative relationship when the playing ability was related with arm length.

The obtained correlation value of leg length to the playing ability was -0.249. It was lesser than the required correlation value of .355. However there was a negative relationship when the playing ability was related with leg length.

The obtained correlation value of thigh girth to the playing ability was 0.309. It was lesser than the required correlation value of .355. However there was a negative relationship when the playing ability was related with thigh girth.

The obtained correlation value of calf girth to the playing ability was 0.294. It was lesser than the required correlation value of .355. However there was a negative relationship when the playing ability was related with calf girth.

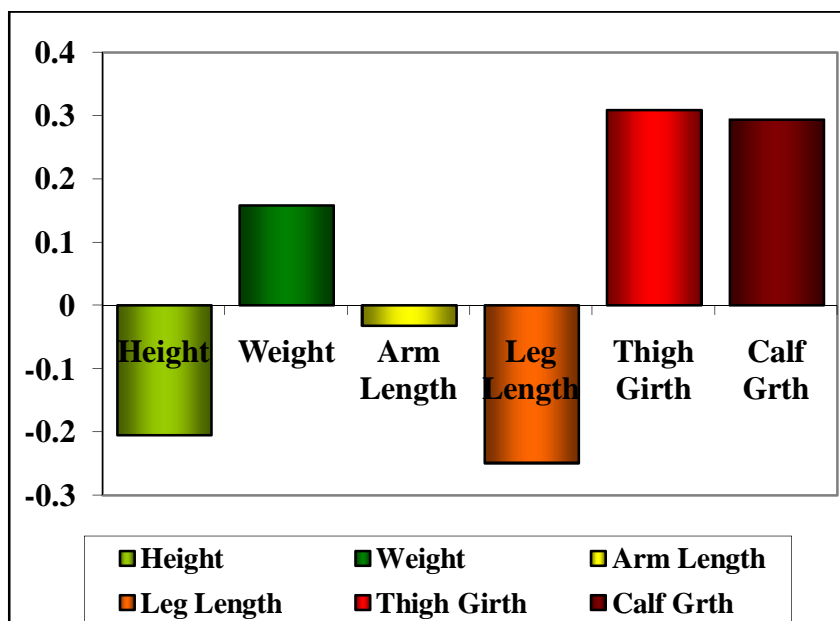


Figure 1: Graphical representation of relationship of selected anthropometric variables to the playing ability
*Correlation is significant at the 0.05 level

Criterion	Variable Correlated	Control Variable	Coefficients of Partial Correlation
MEAN PERFORMANCE	height	Weight ,arm length Leg length, thigh girth, Calf girth	-.301
	weight	height, arm length leg length, thigh girth, calf girth	.272
	Arm length	height, weight, leg length, thigh girth, calf girth	.338
	Leg length	height, weight, thigh girth, arm length, calf girth	-.203
	Thigh girth	height, weight, arm length, leg length, calf girth	.190
	Calf girth	height, weight, leg length, arm length, thigh girth	.289

Table 3: the coefficient of partial correlation of anthropometric variables to playing ability

The above table which is a partial correlation table using the test values we can make the following conclusions
From table 3, it is clear that after each variable was partialled out from the criterion variable of performance of football players, there was no big difference in the ‘r’ value. The fact is proved the ‘r’ value of -.301, .272, 0.338, -.203, .190 and .289 when the variable of height, weight arm length, leg length, thigh girth and calf girth, was partialled out respectively. Fifth order partial correlation was calculated for the same. It can be concluded that the contributory factor of the all variable to the performance is more or less equal.

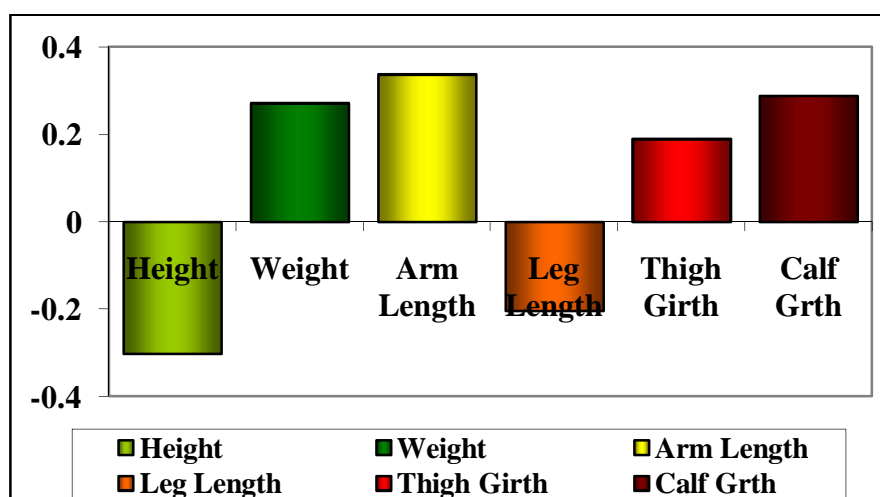


Figure 3: Graphical representation of the coefficient of partial correlation of anthropometric variables to playing ability

4.4. Discussion of Findings

The finding of the study revealed that anthropometric variables did not show any significant relationship with performance of state level soccer players. Soccer is a game, which requires speed, endurance and strength to endure ninety minute of quick sprint, stopping, change in direction and jumps. Hence the results are justified. The probable reason would be the number of players selected for the study. A large sample would have given a different result probably. The data was collected on the players during the peak of this coaching camp which may have forced them to not to go all out during testing.

4.5. Discussion on Hypothesis

On the basis of the findings of the study the hypothesis stated in the first chapter that there will be a significant relationship between anthropometric and playing ability has been rejected.

5. Summary, Conclusions and Recommendations

5.1. Summary

The purpose of the study was to analyze the relationship of selected anthropometric variables to playing abilities of senior national level soccer players. The subjects for the study were selected from during the time of Kerala state senior football coaching camp (santosh trophy) held at FACT Udyogamandal ground Ernakulum. Age of the subjects ranged between 24 to 30 years. A total number of Thirty senior soccer players (N =30) who participated in the Santosh Trophy (2011-12) for Kerala state was selected as the subjects for the study.

The Anthropometric variables selected for the study was namely, Height, Weight, Arm length, Leg length, Calf girth and Thigh girth. The anthropometric variables were measured with flexible steel tape, stadiometer and portable weighing machine.

These variables were put into statistical analysis of simple correlation and partial correlation to find out the relationship between selected criterion variables to playing ability.

5.2. Playing Ability

To judge the playing ability of the subject on five rating scale was used by three experts who had the required experience and qualifications in the field of football. The subjective rating was done to assess the playing ability during the time of Kerala state senior football coaching camp

The analysis of data revealed significant relationship of agility (-0.596), endurance (0.439) and a small contribution of calf girth (0.294) to soccer playing ability. But Speed, Power, Flexibility, Height, Weight, Arm length, Leg length, calf girth and Thigh girth variables are not significant relationship with the soccer playing ability.

5.3. Conclusions

On the basis of the results of the study, the following conclusions were drawn;

- There was a positive correlation between physical fitness variable of agility and endurance positively related to the playing ability of state level soccer players.
- Agility proved to be the single contributory variables to playing ability of state level soccer players.
- Endurance proved to be the single contributory variable to playing ability of state level soccer players

5.4. Recommendations

On the basis of findings of the study and the conclusions drawn, the following recommendations are made;

- The study can be used as a guideline for the coaches and physical education teachers for talent identification in soccer.
- The results of the study can be used to as an aid in selection of players.
- Similar study may be conducted with junior soccer players.
- It is recommended that similar study may be conducted with female soccer players.
- Similar study can be conducted on sports persons belonging to other sports.

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