



ISSN: 2456-0057  
IJPNPE 2018; 3(1): 1346-1350  
© 2018 IJPNPE  
www.journalofsports.com  
Received: 12-11-2017  
Accepted: 15-12-2017

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## Comparison of anthropometric variables between bodybuilders and weightlifters

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### Abstract

Anthropometry is the science of measuring the size and proportions of the human body 'anthropometry' means the measurement of man, whether living or dead, and consists primarily in the measurement of the dimensions of the body. Anthropometry represents the typical and traditional tool of human biology, physical, anthropometry and axiology. Recently it has taken a strong bonded relationship with physical education and sports. Anthropometric measurement was the first type of testing used in physical education in the word fifty separate measurements were recommended by the American association for the advancement of physical education.

In physiology we learn how our organs, systems, tissues, cells, and molecules with in cell work and how their functions are put together to maintain our internal environment. Physiology is the science dealing with the study of human body function. Exercise physiology is the study of how our body's structure and functions are changed as a result of exercise. Sports physiology is derived from exercise physiology to training the athlete and enhancing the athlete's sports performance.

Bodybuilding is one of the most popular games in the world. Participants of all ages have discovered Body builder to be fun. competitive educational and recreational and fitness oriented individual skill such as shooting, passing, and rebounding along with offensive and defensive team work and prerequisites for successful participation in the sports. To achieve to purpose of the study 10 subjects for each namely Body builder and Weight lifter from Pathanamthitta district were selected as subjects. The subject ranged from 55kg to 60kg. The criterion variables selected for this study was anthropometrical between district level Weight lifter and Bodybuilder subjects. The subjects who were participated in the district level tournaments were selected as subjects. The anthropometrical variables Height, weight, arm girth, forearm girth, thigh girth and calf girth were selected as dependent variables. The selected criterion variables for the study were assessed by the Height, weight, arm girth, forearm girth, thigh girth and calf girth following standardized test item: were assessed by measuring tape and the unit of measurements are in centimeters.. The sample present study have been delimited to the twenty district level Weight lifter and Body builder as subjects. Subjects were selected on the basis of the random sampling.

**Keywords:** comparison, anthropometric, variables, bodybuilders, weightlifters

### Introduction

Anthropometrical measurement for assessment of physical status was expanded quite naturally to include consideration of body types and the relation of physique to one's health, immunity from disease, posture, physical performance, and personality qualities. It soon became recognized that a single ideal physique was both impractical and unrealistic. Actually Hippocrates first realized this fact and classified human beings according to two basic physiques – long and thin, or short and thick. Kretschmer, the father of modern body – or somato - typing, defined three types by adding an in-between and referred to them as asthenic (lean), athletic, and pyknic (heavy). Early attempts to ascertain the nutritional status of individuals consisted of giving a desired weight for a certain height and later included age and sex differentiations. Age-height-weight tables were utilized in some schools for the purpose of discovering malnourished and obese children. Perceiving the inadequacy of height as a basis for predicting body weight, further investigations have resulted in methods of assaying weight that utilize skeletal dimensions and consider the gross proportion of bone, muscle, and fat. Presently, anthropometry considers individual differences, appraises each subject relative to his structural differences, and determines his potentialities in light of those structural characteristics. The first application of anthropometry in physical education began with

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Edward Hitchcock in 1861, when he undertook a study of anthropometrical measurements of Amherst College men, leading to the publication of anthropometrical tables almost annually for 40 years. The aim of anthropometry was depicted by Hitchcock as ascertaining the ideal or typical man as a guide in fostering the development of normal individuals. He provided his students with a chart showing average results associated with different variables, against which the student might plot his own results. In 1886.

Weightlifting improve your body composition and give you a toned appearance, it can also improve your overall health and make you a happier person. Weightlifting can help you burn fat, reduce your risk of diabetes, prevent back pain and even help you fight depression. Many people misunderstand the goal of lifting weights. To them, pumping iron is either about physical power or body sculpting. But there's a much more compelling reason for us to have healthy, strong muscles than appearance. Muscle tissue burns three times as many calories as fat, even when you're doing nothing more strenuous than watching television. Muscles burn calories around the clock — yes, even when you sleep — at a greater rate than other body tissue. That's why you need to keep making and maintaining muscle as you age: to keep your body's ongoing fat-burning metabolic engine revved.

Bodybuilding is the use of progressive resistance exercise to control and develop one's musculature. An individual who engages in this activity is referred to as a bodybuilder. In competitive amateur and professional bodybuilding, bodybuilders appear in lineups doing specified poses, and later perform individual posing routines, for a panel of judges who rank competitors based on criteria such as symmetry, muscularity and conditioning. Bodybuilders prepare for competition through a combination of dehydration, fat loss, oils, crab loading to achieve maximum vascularity, and tanning (or tanning lotions) which makes their muscular definition more distinct. Well-known bodybuilders include Ronnie Coleman, Steve Reeves, Reg Park, Arnold Schwarzenegger, Juliana Malacarne, Dana Lynn Bailey and Lou Ferrigno.

## Methodology

### Selection of the subjects

To achieve the purpose of the study, 10 body builders and 10 weight lifters were selected randomly as subjects from district level competitions. The weight of the subjects will be selected ranges from 55 Kg to 60 Kg (weight category). The players who were participated in the district level competitions may randomly select as subjects for this study.

### Selection of variables

Players who are going to win medals at any standard are neither simply born nor made. Natural ability is no longer enough at any level but is, in sprinting especially, an essential basis upon which the carefully nurtured product is moulded. Strangely enough, natural talent is very readily recognized, but the "stuff" which goes to make up the talent is most difficult to analyse.

The ability of individuals to experience, learn and refine physical fitness components are greatly affects their ability to perform any physical activity. This chapter explores the processes that individuals undertake when learning a new skill and how these processes can be adapted to help individuals learn these skills more easily and quickly. It also examines the ways in which movement can be assessed.

There is a variety of views about how learning actually

occurs. Basically, we learn in four main ways:

In a discussion of anthropometrical components are of greatest importance.

For example, anthropometrical disciplines play a vital role or cooperating as a team member are extremely important aspects of performance. The anthropometrical components i.e., height, weight, arm girth, forearm girth, thigh girth and calf girth an important role in almost all games and sports since; the following variables were selected for this study,

- 1) Height
- 2) Weight
- 3) Arm girth
- 4) Forearm girth
- 5) Thigh girth and
- 6) Calf girth

### Selection of test

The present study was undertaken primarily to compare the selected anthropometrical variables among bodybuilders and weight lifters. As per the available literatures, the following standardized tests were used to collect the relevant data on the selected criterion variables and they were presented in the table I.

**Table 1:** Selection of Test Items and its Unit of Measurement

S.No	Criterion Variables	Test Items	Unit of Measurement
1	Height	Stadiometer	In Centimeters
2	Weight	Weighing Machine	In Kilograms
3	Arm Girth	Steel Measuring Tape	In Centimeters
4	Forearm Girth	Steel Measuring Tape	In Centimeters
5	Thigh Girth	Steel Measuring Tape	In Centimeters
6	Calf Girth	Steel Measuring Tape	In Centimeters

### Competency of the tester

All the measurements in this study were taken by the investigator with the assistance of qualified fitness instructors. To ensure that the assistants of the investigator were versed with the technique of conducting tests, they had a number of practice sessions in the correct testing procedure. The tester's reliability was established by test and retest methods.

### Reliability of data

Test and retest method was followed in order to establish reliability of data by using 10 subjects. All the dependent variables selected in the present study were twice for the subjects by the same personnel's under similar conditions. The intra class coefficient of correlation was to find out the reliability of the data and the results are presented in Table II

### Reliability of instruments

Instruments such as digital weighing machine and standard measuring steel tape are available from Ayroor Fitness Centre, Pathanamthitta. Since the reliability of instrument used ensured by their manufactures, they were considered adequately reliable and valid for this study.

### Tester's reliability

Before conducting the test the researcher discussed about

testing procedure with concerned guide and staff members and got sufficient experience to administer the test. The testing procedure should be clearly explained to the body builders and weight lifters

### **Orientation of the subjects**

Before collection of the data, the subjects were oriented about the purpose of the study that was find out the comparative study on selected anthropometrical variables between district level body builders and weight lifters.

### **Collection of the data**

The data on height was assessed by stadia meter and the units of measurement are in centimeters, the weight was assessed by weighing machine and the unit of measurement in kilograms, the arm girth was assessed by steel measuring tape and the unit of measurement in centimeters, the forearm girth was assessed by steel measuring tape and the unit of measurement in centimeters, thigh girth was assessed by steel measuring tape and the unit of measurement in centimeters and calf girth was assessed by steel measuring tape and the unit of measurement in centimeters.

### **Administration of the tests**

Standardized test were employed to measure the criterion and determinant variables. The objectives, equipment's used, description, and scoring of tests is explained below

#### **Height**

Purpose

To measure the standing height of the subject

Equipment

Stadiometer

Procedure

The subject should stand upright, with the back against the head erect, forward and looking straightened. The subject should be gently straightened upright; the heels placed together. Buttocks and shoulder should be in contact with the wall or gently until it touches the top of the head. Appropriate clothing no shocks or shoes.

Scoring

Height was recorded correct to the nearest centimeter.

#### **Body Weight**

Purpose

To measure the body weight of the individual subject.

Equipment

Digitalized weighing machine

Procedure

The subjects were wearing the minimum of clothing. The standard weighting used to measure body weight should be pleased in an area which was smooth and even surface and with sufficient light, so that the investigators is capable of properly recording the observation.

#### **Scoring**

The zero point of the weighing machine must be checked often during the measurement the weight of the subjects was recorded to the nearest kilogram.

#### **Arm Girth (Fore Arm Measurement)**

Purpose

To measure the fore arm girth

Equipment

Flexible steel tape

#### **Procedure**

The subject assumes a relaxed standing position with the left arm with the arm hanging by the side. The subjects right arm is raised interiorly to the horizontal with the forearm supinated. The measure stands to the side of the subjects and with the steel tape loosely in position. The subject is asked to partially tense the elbow flexors to identify the probable peak of the contracted muscles. The subject is encouraged to contact the fore arm muscles as strongly as possible and hold it while the measurement is made at peak of the fore arm.

#### **Scoring**

Numbers of centimeters intercept from zero indicators in recorded as the circumference of the arm flexed and the reading as in nearest to 0.1 cm the tape.

#### **Forearm Girth**

Purpose

To measure the forearm girth

Equipment

Flexible steel tape

Procedure

The subject assumes a relaxed standing position with the left arm with the arm hanging by the side. The subjects right arm is raised interiorly to the horizontal with the forearm supinated. The measure stands to the side of the subjects and with the steel tape loosely in position. The subject is asked to partially tense the elbow flexors to identify the probable peak of the contracted muscles. The subject is encouraged to contact the forearm muscles as strongly as possible and hold it while the measurement is made at peak of the forearm.

#### **Scoring**

Numbers of centimeters intercept from zero indicators in recorded as the circumference of the forearm and the reading as in nearest to 0.1 cm the tape.

#### **Thigh Girth**

Purpose

To measure the thigh circumference of the subjects.

Equipment

Flexible steel tape measure and pen suitable for marking the skin.

Procedure

First mark the site to be measured this girth measurement is usually taken on the right side of the body. The subject stands erect with their weight evenly distributed on both feet and legs slightly parted. The circumference measure is taken at the level of the midpoint on the lateral (outer side) surface of the thigh midway between frochanterion (top of the tibia bone). When recording, you need to make usurer the tape is not too tight or too loose, is lying flat on the skin, and with the tape horizontal.

#### **Scoring**

Measurements were recorded to the nearest 0.1cm.

#### **Calf Girth**

Purpose

To measure the calf circumference of the subjects.

Equipment

Flexible steel tape measure and pen suitable for marking the skin.

Procedure

The girth measurement is usually taken on the right side of

the body, the subject stands erect with their weight evenly distributed on both feet and legs slight a part. The measurement is taken at the level of the largest circumference of the calf the maximal girth not always obvious and the tape may need to be moved up and down to find the point of maximum circumference. When recording you need to make sure the tape is not too tight or too loose is lying flat on the skin, and horizontal. It may help to have the subject stand on a box to make the measurement easier.

**Scoring**

Measures were recorded to the nearest 0.1 cm

**Experimental design and statistical procedures**

The experimental design used for this study was static group comparison design. The collected data were statistically analyzed for significant mean difference using independent ‘t’ test. In this cases 0.05 level of significance was used to test the hypothesis. Statistical Package for Social Sciences (SPSS), 16th version was utilized for all statistical computations.

**Statistical technique**

In order to examine the hypothesis of the study, descriptive statistics, independent sample “t” and analysis of variance will be employed.

Mean, Standard Deviations and Independent ‘t’ on Height of District Level Bodybuilders and Weight Lifters

Group	Number	Mean	Standard Deviation	‘t’ –Value
Bodybuilders	10	1.66	4.45	1.00
Weight lifters	10	1.67	4.53	

(Height scores in Centimeters)

(Table value required for significance at 0.05 level for ‘t’-test with df 18 is 2.101).

The table I the mean values obtained for district level bodybuilders and weight lifters were 1.66 and 1.67 respectively and the ‘t’ test value between the means is 1.00 Since the obtained ‘t’ test value of 1.00 is lesser than the table value of 2.101 with df 18 at 0.05 level of confidence, it was concluded that the district level bodybuilders and Mean, Standard Deviations and Independent ‘t’ on Weight of District Level Body builders and Weight Lifters

Group	Number	Mean	Standard Deviation	‘t’ –Value
Bodybuilders	10	61.70	3.53	.017
Weight lifters	10	58.30	1.77	

(Weight scores in kilogram)

(Table value required for significance at 0.05 level for ‘t’-test with df 18 is 2.101).

The table II the mean values obtained for the district level bodybuilders and weight lifters were 61.70 and 58.30 respectively and the ‘t’ test value between the means is .017. Since the obtained ‘t’ test value of .017 is lesser than the table value of 2.101 with df 18 at .05 level of confidence, it was concluded that the district level bodybuilders and weight

lifters had no significant difference on weight lifters had no significant Mean, Standard Deviations and Independent ‘t’ on Arm Girth of District Level Bodybuilders and Weight Lifters

Group	Number	Mean	Standard Deviation	‘t’ –Value
Bodybuilders	10	34.40	1.14	.057
Weight lifters	10	32.76	2.77	

(Arm girth in Centimeters)

(Table value required for significance at .05 level for ‘t’-test with df 18 is 2.101).

The table III the mean values obtained for the district level bodybuilders and weight lifters were 34.40 and 32.76 respectively and the ‘t’ test value between the means is .057. Since the obtained ‘t’ test value of .057 is less than the table value of 2.101 with df 18 at .05 level of confidence, it was concluded that the district level bodybuilders and weight lifters had no significant difference in the performance on Arm girth.

difference on Height Mean, Standard Deviations and Independent ‘t’ on Forearm Girth of District Level Bodybuilders and Weight lifters

Group	Number	Mean	Standard Deviation	‘t’ –Value
Bodybuilders	10	27.67	1.47	0.139
Weight lifters	10	25.26	2.46	

(Forearm girth in Centimeters)

(Forearm girth in Centimeters)

(Table value required for significance at .05 level for ‘t’-test with df 18 is 2.101).

The table IV the mean values obtained for the district level bodybuilders and weight lifters were 27.67 and 25.26 respectively and the ‘t’ test value between the means is .139 Since the obtained ‘t’ test value of .139 is greater than the table value of 2.101 with df 18 at .05 level of confidence, it was concluded that the district level bodybuilders and weight lifters had significant difference in the performance of Forearm girth. The weight lifters had no significant difference on Forearm girth.

Mean, Standard Deviations and Independent ‘t’ on Thigh Girth of District Level Bodybuilders and Weight Lifters Players

Group	Number	Mean	Standard Deviation	‘t’ –Value
Bodybuilders	10	54.42	3.28	.444
Weight lifters	10	54.07	3.94	

(Thigh girth scores in Centimeters)

(Table value required for significance at .05 level for ‘t’-test with df 18 is 2.101).

The table V the mean values obtained for the district level



bodybuilders and weight lifters were 54.42 and 54.07 respectively and the 't' test value between the means is .444. Since the obtained 't' test value of .444 is lesser than the table value of 2.101 with df 18 at .05 level of confidence, it was concluded that the district level bodybuilders and weight lifters had no significant difference in the performance on Thigh Girth .

Mean, Standard Deviations and Independent 't' on Calf Girth of District level Bodybuilders and Weight Lifters

Group	Number	Mean	Standard Deviation	't' -Value
Bodybuilders	10	36.18	2.42	.869
Weight lifters	10	35.11	2.46	

(Calf girth scores in Centimeters)

(Table value required for significance at .05 level for 't'-test with df 18 is 2.101).

The table VI the mean values obtained for the district level bodybuilders and weight lifters were 36.18 and 35.11. Respectively and the 't' test value between the means is .869. Since the obtained 't' test value of .869 is lesser than the table value of 2.101 with df 18 at .05 level of confidence, it was concluded that the district level bodybuilders and weight lifters had no significant difference in the performance on Calf Girth.

### Summary

Anthropometry is the science of measuring the size and proportions of the human body 'anthropometry' means the measurement of man, whether living or dead, and consists primarily in the measurement of the dimensions of the body. Anthropometry represents the typical and traditional tool of human biology, physical, anthropometry and axiology. Recently it has taken a strong bonded relationship with physical education and sports. Anthropometric measurement was the first type of testing used in physical education in the word fifty separate measurements were recommended by the American association for the advancement of physical education.

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### Conclusions

The following conclusions were drawn from the result of the study,

1. The selected anthropometric characteristics in terms of girth parameters, both bodybuilders and weight lifter possessing insignificant mean differences; and
2. While comparing to Weight Lifters and bodybuilders, no difference in muscle girth also.

### Recommendations

Based on the results of the study, the following recommendations were drawn.

1. The same study may be conducted in other sports and games.
2. The parallel study may be conducted to find out the performance other physical variables.
3. A comparative study may be conducted in rural and urban areas subjects as subjects.
4. The same study may be conducted for the female gender.

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