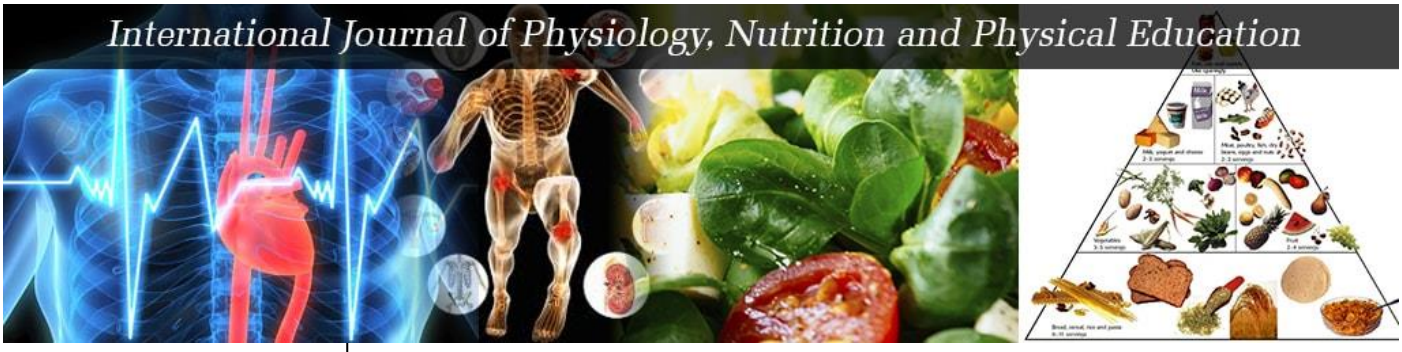

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The aerobic capacity and body composition profile of all India inter university soccer player

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Abstract
Soccer has become a very popular game in the world. Almost all the nations play the soccer game both for enjoyment and competition. Modern soccer is very fast by its nature. Modern soccer is a vigorous, fast game requiring accelerating sprint, rough tackling, and power in kicking and endurance to sustain skillful play for ninety minutes. The purpose of the study is to determine the aerobic capacity and body composition profile of all India university soccer players. Sixty male all India inter university soccer players were selected randomly as subjects for this study. The criterion measure chosen to test the aerobic capacity and body composition. For testing aerobic capacity the Cooper's 12 min. run/walk test administered .Body composition, fat percentage was estimated from four selected sites biceps, triceps, sub-scapular and supra-iliac. The collected data were statistically analyzed by using mean, standard deviation and product moment correlation. From the result of the study, it was found that there was a insignificant relationship between the fat percentage and aerobic capacity.

Keywords: Soccer, aerobic capacity, body composition, endurance

Introduction
Soccer has become a very popular game in the world. Almost all the nations play the soccer game both for enjoyment and competition. Modern soccer is very fast by its nature. Modern soccer is a vigorous, fast game requiring accelerating sprint, rough tackling, and power in kicking and endurance to sustain skillful play for ninety minutes. Soccer is a game which calls for strenuous and continuous thrilling action. The skills involved in the game are simple, natural, highly stimulating and satisfying to anyone who participates in the game, some of the well-known skills are kicking, running, jumping, throwing, and dodging and so on.
Modern soccer is a vigorous, fast game requiring accelerating sprint, rough tackling, and power in kicking and endurance to sustain skilful play for 90 minutes.
It has been claimed that a high level of general fitness with motor abilities like strength, endurance, speed of movement, jumping ability, agility, flexibility, and cardio-vascular endurance etc. Are the essential qualities required to be developed by the footballers to play this international game?
Usually there are two kind of endurance, muscular and cardio-respiratory. Cardio-respiratory endurance is characterized by moderate contraction of large muscle groups for relatively long periods of time during which maximal adjustment of the cardio-respiratory system are necessary as in sustained, running, swimming, climbing, bicycling and the like
Cardio-vascular endurance is one of the major physical fitness components required for the game of football.
Maximum aerobic power (VO_2 max) is recognized as an index of cardio-vascular function and is widely accepted as being important to the success in endurance sports/events.

Aerobic Capacity
The maximum amount of O_2 in ml an athlete can use in one minute/kg of body weight. Generally, the higher the VO2max, the higher the anaerobic threshold and the faster an athlete can go in endurance competitions without fatigue. Training can increase VO2max by up to 20%, which can be determined by graded exercise testing. It is only of academic interest as O_2 consumption can't be monitored during workouts.

Factors affecting Size and strength of heart, concentration of oxygen carriers in blood (haemoglobin), density of capillaries and mitochondria in the muscles, and activity of aerobic enzymes; proper training enhances these factors and increases aerobic capacity.

Aerobic capacity refers to a child's ability to sustain a certain level of aerobic activity for a certain length of time. An aerobic activity is one that requires oxygen exchange in the blood to a greater degree than other activities, such as running versus strength training. Being able to sustain aerobic activity for longer periods of time depends on the body's ability to transport oxygen to the tissues and muscles of the body and then use it efficiently once it gets there. In the scientific world, our aerobic capacity can be measured and is called *VO2 max*. In a broken nutshell, VO2 max is the maximum level of the body's ability to effectively take up oxygen, transport it, and use it for sustained exercise energy.

Normally, in adults, this ability to use oxygen can be improved with training and exercise. Improvements can be made with as little as 15 to 20 minutes of exercise 3 times a week. If you exercise more, your aerobic capacity can continue to improve to a certain point before it levels off. The interesting point about children is that even when recommendations for adult exercise are used, only small improvements (approximately 5%-10%) in aerobic capacity are seen until your child reaches puberty. Additional improvements can result simply from their ability to do the movements more easily, more efficiently, and with more motivation. The other factors that influence the performance in football is body composition, the proportion of lean body mass and deposit fat.

What Is Body Composition?

Have you ever thought about your weight? Or perhaps, you've made resolutions to get into better shape. Many people are consumed with issues surrounding weight, obesity, self-image, and health. There is certainly pressure to be thin and look like the celebrities and models who adorn magazine covers. However, an obsession with the number on the scale is often a misguided way of thinking about general health. It is more important to ask, what is that weight made up of?

This is where the concept of body composition comes in. Body composition is exactly what the name states: what our bodies are composed of. Now, it could be said that in a general sense we are all made up of the same parts. It is true that everybody contains muscle, bone, organs, tissue, and fat. However, proportionately, fat in particular varies immensely from person to person. And, this is the primary focus of body composition: the percentage of stored fat in a body versus lean mass. In this lesson, we'll take a closer look at this comparison and explore the ways in which body composition is determined.

Fat vs. Lean Mass

Let's take a look at the concept of fat versus lean mass. First of all, it is important to understand the different types of fat in a body. Not all fat is the enemy. Everyone has some fat, and we all need a certain amount of fat for our bodies to function properly, known as essential fat. Stored

Fat is the culprit. Stored fat is that extra layer of fat that is found under the skin in places such as the stomach and rear end. A spare tire around one's waist is stored fat.

Lean mass is essentially everything else found in a body, including bones, muscles, tissues, and organs. It will come as no surprise that a healthy body has less stored fat and more lean mass. You may be getting a better understanding of why considering only a person's weight is not always an accurate measure of good health. You can put two people side-by-side that weigh exactly the same, but one may have a higher percentage of fat versus lean mass. So, how can you find out your specific body composition?

Materials and Methods

Forty male all India inter university soccer players were selected randomly for this study from Banaras Hindu University, Lakshmibai national institute of physical education Gwalior and Vidyasagar University. The criterion measures chosen to test the aerobic capacity and body composition are: For testing the aerobic capacity the coopers 10 mins run/walk test was administered. Fat percentage was estimated by adding the skin fold measurements in millimeters taken from four selected sites (namely biceps, triceps, sub-scapular and supra-iliac) using the method of Durin and Rahaman method Lean body weight was calculated by subtracting weight of body fat (in kg) from the total body weight(in kg)

Body density was calculated using abdominal using abdominal skin fold

(a) Chest skin fold)

(b) Arm skin fold

(c) By using formula

$$\textbf{Body density} = 1.1017-(0.000282)\times(a)-(0.000737)\times(b)-(0.00088)\times(c)^3$$

Aerobic Capacity

Aerobic capacity was measured with the help of coopers 12 mins run/walk test which was conducted on the standard track of Banaras Hindu University, Lakshmibai national institute of physical education Gwalior and Vidyasagar University, the track was marked of 50 m, segments, the subject were started in a group of five. A lap scorer was assigned for each subject, a staring signal by sounding a clap scorer was given and simultaneously a stop watch was started by the time keeper, the time keeper blew a whistle at the end of the twelfth minute at which the subjects stopped in their places, the lap scorers noted down the distance covered by each subjects to the nearest fifty meters.

Fat Percentage

To obtain the percentage of fat each subjects skin fold measurements were taken at four selected sites in the body namely biceps, triceps, sub scapula and supra iliac.

Biceps

The skin fold thickness of biceps was measured with the help of skin fold caliper, the subject stood with the arm by the side and elbow extended but in relaxed position. A double layer of skin of dominant side along with subcutaneous tissue was grasped with the thumb and fore-finger of the left hand over the biceps muscles on the front of the subjects arm, half way between the acromion and the elbow, where the skin fold runs parallels to the long axis of the arm, the skin fold caliper was placed gently into the grasped skin without removing the fingers and thickness of the skin was recorded from the indicator needle of dial, it was measured to the nearest millimeter.

Triceps

The skin fold thickness of triceps was measured with help of

skin fold caliper; the subjects stood with the arm by the side and elbow extended but in relaxed position. A double layer of skin of dominant side along with subcutaneous tissue were grasped with the thumb and fore-finger of the left hand over the triceps muscle on the arm, half way between the acromion and the elbow, where the skin fold runs parallel to the axis of the arm, the skin fold caliper was placed gently into the grasped skin without removing the finger and thickness of the skin was recorded from the indicator needle of the dial, it was measured to the nearest millimeter.

Sub-Scapular

The skin fold thickness of the sub-scapular was measured with the help of skin fold caliper. The subject stood with the shoulder erect but relaxed and the arms by the sides. A double layer of skin and subcutaneous tissue were grasped with the thumb and fore-finger of the left hand in a position one to two inches above the right anterior, supra-iliac spine where the anterior superior skin fold runs forward and slightly downward. The skin fold calipers were placed gently into the grasped skin without removing the finger and thickness of the skin was recorded from the indicator needle dial. It was measured to the nearest millimeter.

Supra-Iliac

The skin fold thickness of supra-iliac was measured with the help of skin fold caliper. The subjects stood in a normal erect posture and the subjects was instructed o draw in a medium breadth and hold it while in the same position, a double layer of skin and subcutaneous were grasped with the thumb and fore-finger in a position one to two inches above the right anterior superior iliac spine where the anterior superior skin fold run forward and slightly downward. The skin fold caliper was placed gently to grasp the skin without removing the finger and thickness of the skin was recorded form the indicator needle of the dial. It was measured to the nearest millimeter.

Body Density

The following sites of the body were taken for the measurement of skin fold thickness to determine body density and after measuring the skin fold thickness the body density was calculated by the following formula.

$$\textbf{Body density} = 1.1017-(0.000282) \times a-(0.000736) \times b-(0.00088) \times c$$

The sites were:

a. Abdominal skin fold(a)
b. Chest skin fold(b)
c. Arm skin fold(c)

Abdominal Skin Fold

The abdominal skin fold thickness was measured with the help of skin fold caliper. The subjects stood with the arm flexed and placed on the waist. A double layer of skin and subcutaneous tissue was grasped with the thumb and forefinger of the left hand of the medial abdomen at the mid axillaries line at the waist level where the skin fold runs transversely to the rectus abdominal muscle. The skin fold caliper was placed gently into the grasped skin without removing the fingers and the thickness of the skin was recorded from the indicator needle of the dial. It was measured to the nearest millimeter.

Chest Skin Fold

The chest skin fold thickness was measured with the help of skin fold caliper. The subject stood with arm flexed and hands on the waist. A double layer of skin and subcutaneous tissue was grasped with the thumb and fore finger of the left hand over the chest at the level of the xiphoid in the mid axillaries line. The skin fold caliper was placed gently into the grasped skin without removing the fingers and thickness of the skin was recorded from the indicator needle of dial. It was measured to the nearest millimeter.

Arm Skin Fold

The arm skin fold was obtained by taking measurement at triceps using the procedure explained earlier.

Lean Body Mass

The lean body weight was calculated by converting the fat percentage into kilogram and which was subtracted from the total body weight I kilogram using the procedure explained earlier.

Statistical Technique

To determine the aerobic capacity and body composition profile of all India inter university soccer players the mean and standard deviations were evaluated for all the variables and the product moment correlation was computed by the help of IBM SPSS 20.

Discussion

An insight negative relationship between aerobic capacity and fat percentage, may be due to the fact that excess of fat act as a dead weight which an individual has to carry for executing various movements, this additional weight possess extra demands on the system of the body where by an individual gets exhausted soon, the aerobic capacity due to the fact that fat does not provide energy to the working muscle during activity, therefore there is negative correlation its fat percentage and aerobic capacity.

The reason for significant relationship between aerobic capacity and lean body mass may be because lean body mass mainly comprises of muscles which help the individual to perform better in distance running. As the individual has more of muscle and less of fat tissue the significant relationship between aerobic capacity and lean body mass seems logical, lean body mass(percentage) as a whole basically contribute to carry an aerobic functions thus helps in the aerobic type of activity.

The aerobic capacity is insignificantly related to the body density which may be because of greater amount of fat in body (mean=15.2875) which may place additional demands on human organism. It may also be because of larger surface area which may put extra frictional process there by leading the individual to undergo extra amount of work, which can be done more efficiently when this extra amount of fat is absent.

Conclusion

With the limitation of the present study, the following conclusion may be drawn.

1. Lean body mass (percentage) was found to be significantly related to the aerobic capacity.
2. There was negative significant relationship between the fat percentage and the aerobic capacity.
3. Body density was also found to be insignificantly related to the aerobic capacity.

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