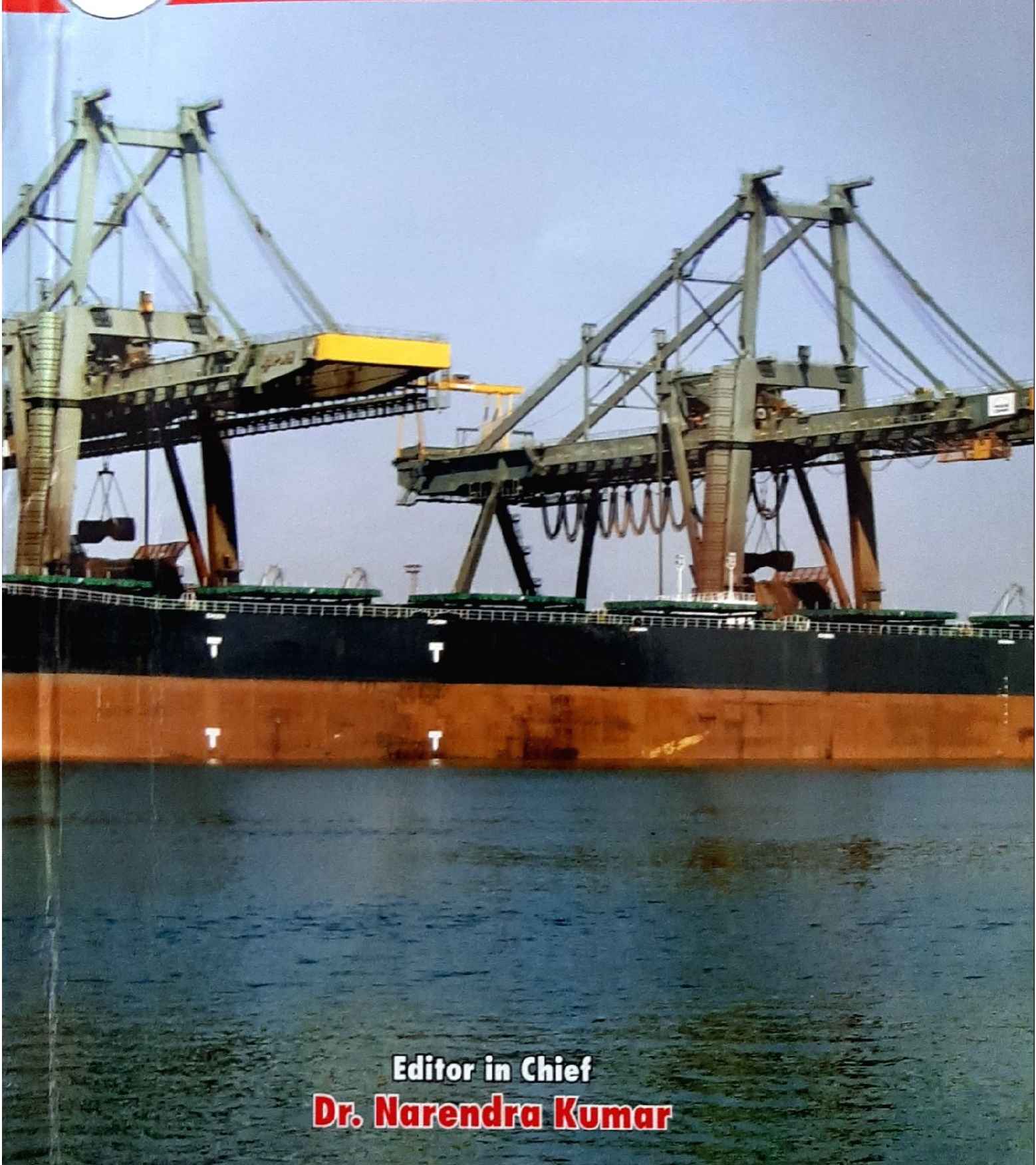


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Physical Education

The Comparative Study of Body Composition of State Level Runners and Footballers

✉ **Vinodchandra Rajendra Pawar ***

✉ **Dr. SK. Md. Attaullah M.K. (Jagirdar)****

Abstract

The purpose of this study is to find out the body composition (fat percentage) differences of state level runners and footballers. Total 80 subjects from state level athletic competition and north zone level football competition were randomly selected. ANOVA was applied on gathered data. Level of significance of findings of this study was set at .05 level. Findings of the study revealed the mean fat percentage of sprinter is significantly greater than mean fat percentage of long distance runners.

Keywords: Runner, Footballers, body composition, sprinter, body fat

Introduction

The game of football is both an art and science. It involves techniques of running, passing, kicking, tackling, blocking, heading, juggling and dribbling. Often all these activities have to be performed at great speed. Though these individual skills are very important but it should not be forgotten that it is a team game and the players have to work together in offence or defense. Therefore a player must develop his skills and understanding for his contribution as per the demands of the game. The game of football contains physical challenges. Though two players may be equal in their skills but because of different physical and mental response, there can be much difference in their performance. A player must be quick in assessing a situation and in his response. A forward has to decide between pass and shot, defender between marking and covering and a goalkeeper whether to defend, keep standing at the goal or to run forward or sideways.

At present, track & field consist of running, hurdling, jumping and throwing events held between individuals and teams at indoor and outdoor meets. The running and hurdling competitions make up the track events, while the jumping and throwing contests comprise the field events. In many countries the sports as a whole is called athletics. Running races are the most prominent track events; the range in length from the indoor 50 meter dash to the outdoor marathon.

Sprinting is the act of running over a short distance at (or near) top speed. It is used in many sports that incorporate running, typically as a way of quickly reaching a target or goal, or avoiding or catching an opponent.

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Human physiology dictates that a runner's near-top speed cannot be maintained for more than 30–35 seconds due to the depletion of Phosphocreatine stores in muscles, and perhaps secondarily to excessive Metabolic acidosis as a result of Anaerobic glycolysis (<https://thea.com/Sprint-Running/>).

Middle-distance events include "races" of 800, 1500 and 3000 meters. Middle-distance runners use a combination of speed and endurance. They must stay in competition but also regulate their speed carefully to avoid tiring too quickly. Some middle-distance runners change their speed several times during the race, while others maintain an even pace throughout the race. Nurmi, who dominated track and field in the 1920, carried a stopwatch during races as a means of checking on his pace. An important element of middle distance races is the kick, a sprint for the finish line on the last lap. Running form for middle-distance event greatly differs from that of sprints. Knee action is much less pronounced, the stride is shorter and the forward lean is less extreme in middle-distance events.

Long-distance running, or endurance running, is a form of continuous running over distances of at least three kilometres (1.86 miles). Physiologically, it is largely aerobic in nature and requires stamina as well as mental strength. (Grine, Frederick E. et al. – 2006) Among mammals, humans are well adapted for running significant distances, and particularly so among primates. The endurance running hypothesis suggests that running endurance in the *Homo* genus arose because travelling over large areas improved scavenging opportunities and allowed persistence hunting (**Humans hot, sweaty, natural-born runners** – 2007). The capacity for endurance running is also found in migratory ungulates and a limited number of terrestrial carnivores, such as dogs, wolves and hyenas (*Science Week*: 2004-2005).

Body composition is the proportion of the lean body mass and depot fat. body composition is concerned with different kinds of tissues and consist of measured variables such as biceps, triceps, sacroiliacs and sub-scapular skin fold measurements and estimated variables like, lean body mass percentage of fat and fat weight. Body composition is an important aspect of fitness and can be predicted from anthropometric measures. It is also important to the game of badminton as excess fat is disadvantageous in moving quickly across court and in leaping to hit the shuttle (**Reilly et al., 1991**).

The Physiological and Anthropometrical factors limiting one's performance in sports are well known. It is the understanding of interaction of all these factors that helps in designing the way for selecting the children for appropriate game. The author desires a scientific basis of selection of athletes and sportsmen. One may not take it guaranteed that every child can be trained to be an Olympian, for there are a few persons who have a combination of the development of each requisite factor of the highest degree. The idea is to put the interested individual in a game or event in such a way so that he gives out the best of his abilities.

Significance of study

This study will help to assess the possible body composition of the various runners and footballers. As without assessing appropriate anthropometrical,





psychological and physiological qualities in the athletes there are no positive results from training.

PROCEDURE

Selection of subjects

For the purpose of this study **60 male runners** (20 each of Sprints, Middle Distance Running, and Long Distance Running) were randomly selected from 25th U. P. State Open Athletics Championship 2017 held on 5th to 7th May 2017 held at Obara in Sonbhadra. **20 Football players** who represent Uttar Pradesh Universities at North Zone Intersarsity Tournament held at Kurukshetra University, Kurukshetra on dated 6th to 11th Febuary 2017 were randomly selected.

Tools and instruments

The following instruments were used for collecting the data

1. Skin fold caliper

During skin fpld measurements, the result of measurement was ensured to be more reliable by using the sliding caliper so as to apply as much pressure as possible to the soft tissue. (Tamer, 2000). Each measurement was performed twice.

The data in the form of criterion measure of study described above were collected through the following methods-

1. **BICEPS SKIN FOLD** Vertical skin fold was measured at the anterior aspect of the right arm with arms hanging relaxed at the sides with right palm directed interiorly. The jaws of the calipers were applied to the fold and after waiting for 2 to 3 seconds the reading was taken. One more reading was taken in the same way and average of the two was the final score.
2. **TRICEPS SKIN FOLD:** The mid acromiale-radiale line on the posterior surface of the right arm was marked and the skin fold about one centimeter above marked level was picked up and jaws of the calipers were applied to the fold and after waiting for 2-3 seconds the reading was taken. One more reading was taken in the same way and average of the two was the final score.
3. **SUB SCAPULAR SKIN FOLD:** A point below the right scapula was marked. The skin fold about one centimeter below marked level was picked up and jaws of the caliper were applied to the fold and after waiting for 2 - 3 seconds the reading was taken. One more reading was taken by the same procedure and average of the two was the final score.
4. **SUPRAILIAO SKIN FOLD:** A point above the anterior superior iliac spine on the line to the anterior auxiliary's boarder of right side was marked. The skin fold about 2 to 5 centimeter above marked level was picked up, the caliper was applied to the fold and after waiting for 2 - 3 seconds the reading was taken. One more reading was taken by the same procedure and average of the two was considered.

BODY COMPOSITION:

1. Total body weight was recorded in kg. by using standard weighing machine.
2. Body composition is calculated in terms of fat percentage mass by using Durnin and Womersley (1974) method of finding Body Density i.e.



- a. Body density (kg/m³) for 17-19 years male =
1.1620-0.063 log (biceps + triceps + sub scapular + suprailliac)
- c. Body density (kg/m³) for 20-29 years male =
1.1631-0.0632 log (biceps + triceps + sub scapular + suprailliac)
- d. Body density (kg/m³) for 30-39 years male =
1.1422-0.0544 log (biceps + triceps + sub scapular + suprailliac)
- e. Body density (kg/m³) for 40-49 years male =
1.1620-0.0700 log (biceps + triceps + sub scapular + suprailliac)
- f. Body density (kg/m³) for above 50 years =
1.1715-0.0779 log (biceps + triceps + sub scapular + suprailliac)
3. Fat percentage was calculated by using Brozek et. al. (1963) method i.e.

$$\text{Body Fat \%} = \left(\frac{4.570}{\text{Body Density}} - 4.142 \right) \times 100$$

Statistical Procedure

Reiterating the objective of the study, we have to point out that we intend to investigate the body composition among Sprinters, Middle distance runners, Long Distance Runners and Football Players. Thus we had used analysis of variance to find out the significant difference among the Sprinters, Middle Distance Runners, Long distance Runners and Football players. Where the difference was significant, we had used L.S.D. test to analyses, which groups mean was greater than other. The differences in the body composition of sprinters, middle distance runners, and long distance runners and football players were tested at 0.05 level of Significance.

Table - 01 Body Composition in term of Fat Percentage

| Source of Variance | DF | SS | MSS | F VALUE |
|--------------------|----|----------|----------|-----------|
| Treatment | 3 | 44.49705 | 14.83235 | 3.069864* |
| Error | 76 | 367.2015 | 4.831599 | |

*Significant at .05 level

Tab F_{.05} (3, 76) = 2.72

Since calculated F value is greater than tabulated F value, the hypothesis is accepted and we conclude that significant difference is existing in the mean fat percentage of Sprinter, Middle distance Runner, Long Distance Runners and Football players. To further find out which group mean fat percentage is greater than the other, pair wise means analysis is done through LSD test.

Table - 02 LSD Test of Fat Percentage

| Footballers | Middle Distance | Sprinters | LDR | Mean Difference | CD Mean |
|-------------|-----------------|-----------|----------|-----------------|----------|
| 9.675022 | 9.871033 | | | 0.19601 | 1.376292 |
| 9.675022 | | 10.63768 | | 0.96266 | |
| 9.675022 | | | 8.552503 | 1.122519 | |
| | 9.871033 | 10.63768 | | 0.76665 | |
| | 9.871033 | | 8.552503 | 1.31853 | |
| | | 10.63768 | 8.552503 | 2.085177* | |

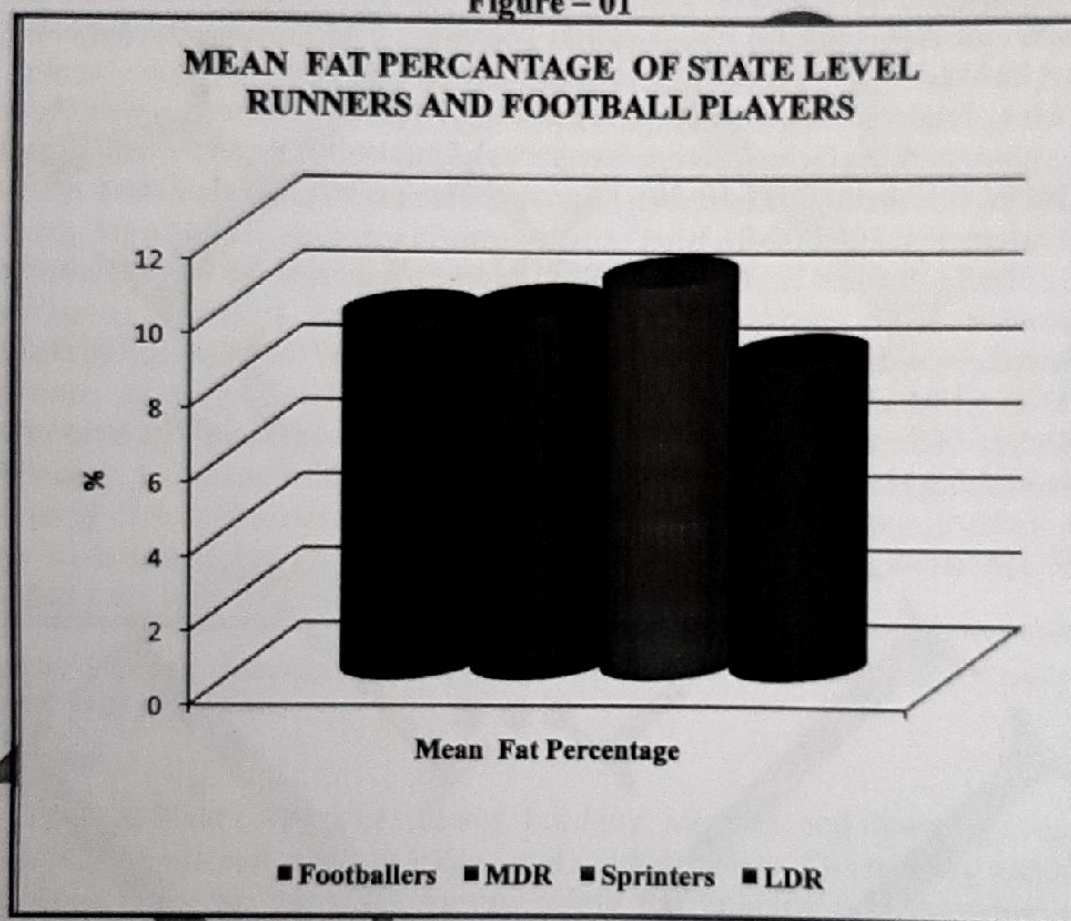
*Significant at 5% level





Comparing the pair wise mean difference with critical difference we are able to conclude that mean fat percentage of sprinter is significantly greater than mean fat percentage of long distance runners. Whereas the mean fat percentage of footballers and middle distance runners are insignificantly different than mean fat percentage of long distance runners. And the mean calf muscle girth of middle distance runners and sprinters are insignificantly greater than mean calf muscle girth of long distance runners. The mean calf muscle girth of middle distance runners is also insignificantly greater than the mean calf girth muscle of sprinters.

Figure – 01



Discussion of findings

The mean fat percentage of sprinter is significantly greater than mean fat percentage of long distance runners. Whereas the mean fat percentage of footballers and middle distance runners are insignificantly different than mean fat percentage of long distance runners. And the mean calf muscle girth of middle distance runners and sprinters are insignificantly greater than mean calf muscle girth of long distance runners.

Lesser the fat percentage signifies the greater leanness in long distance runners, which provides the lesser the body weight to long distance runners which is also advantageous to all players including footballers.



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