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Comparison of selected physical fitness parameters between collegiate long distance runners, basketball players and weight lifters/power lifters

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Abstract

Physical Fitness and abilities vary from sport to sport. For the purposes of differentiation with regard to physiological and physical characteristics sport can be classified as team sport, individual sport and power sport. Various Studies have been done as to the physiological requirements in different sports. This study aims to throw light on the selected physical fitness parameters namely, aerobic capacity, flexibility and Anaerobic power in long distance runners (individual events), basketball players (team events) and weight/power lifters (power events) at the collegiate level. Standardised tests such as Cooper test (Cardiovascular fitness), Sit and Reach test (flexibility) and Vertical Jump test (Anaerobic power) have been used to assess the abilities. Statistical techniques like ANOVA has been applied find out the differences between the sports. The findings indicate that the athletes dominate in aerobic capacity while the basketball players and weight/power lifters dominate in anaerobic power. Basketball players indicate less flexibility than the other groups.

Keywords: cardiovascular fitness, VO₂ max, flexibility, anaerobic power, sit and reach test, coopers test, vertical jump test, team sport, individual sport

Introduction

Physical fitness is a general state of health and well-being or specifically the ability to perform aspects of sports or occupations. Physical fitness is generally achieved through correct nutrition, exercise and rest. It is a set of attributes or characteristics that people have or achieve that relates to the ability to perform physical activity. All these tests were evaluated the level of fitness from aspect agility, speed, endurance of cardiovascular, power of leg and flexibility. Physical fitness is a required element for all the activities in our society. Health related physical fitness of an individual is mainly dependent on lifestyle related factors such as daily physical activity levels. It was believed that the low physical fitness level of an individual is associated with higher mortality rate. Physical fitness is also considered as the degree of ability to execute a physical task under various ambient conditions. The purpose of this study is to experiment, measure and evaluate the level of physical fitness among Nitte Education Trust College Male sportspersons. There were 3 activities in this test which were 12 minute run & walk for Aerobic fitness, sit & reach test for flexibility, vertical jump for anaerobic power. Regular physical activity is an important component of a healthy lifestyle and helps to keep the body fit. Physical activity is any bodily movement produced by skeletal muscle that results in energy expenditure. Physical fitness is required not only by athletes for better performance, but also by non-athletes for maintenance of a healthy body and healthy mind. The following criterion variables Anaerobic power, Flexibility and Cardiovascular fitness (VO₂ Max) were selected for the purpose of the study. The above criterion variables were assessed by vertical jump, sit and reach test, Coopers twelve minutes run and walk test.

Materials and Methods

Selection of subjects: Twenty sports persons each from Long distance running, Basketball and Weight Lifting/Power Lifting were the subjects selected for the purpose of the study.

Tests

12 minute Run (cooper Test)

Cardiovascular fitness was assessed using 12 minute run test. Place markers at set intervals around the track to aid in measuring the completed distance. Participants were made to run for 12 minutes, and the total distance covered was recorded. Walking was allowed. The resulting distance covered in metres was converted to VO₂ max by applying the formula: (Distance covered in metres - 504.9) ÷ 44.73 [1].

Sit and Reach Test

Flexibility was assessed using Sit and reach test. The equipment required for this test is a sit and reach box or a

ruler and a box. This test involves sitting on the floor with bare feet and soles placed against the box. Knees should be locked. With thighs maintaining contact with the floor, the subject extends his hands, palms held on top of each other and palms facing downward, as far as possible along the measuring line. The nearest centimetre reached is the score for the subject [2].

Vertical Jump Test (3)

Anaerobic Power was assessed using Vertical Jump test. The vertical displacement was converted to power (watts) by applying the Lewis formula:

$$\text{Average Power (Watts)} = \sqrt{4 \cdot 9 \times \text{body mass (kg)}} \times \sqrt{\text{jump} - \text{reach score (mts.)}} \times 9.81 \text{ [3]}$$

Results and Discussion

The following are the results from the study:

Table 1: Mean values of different parameters of the three groups

Groups	Vo2 Max	Anaerobic Power	Flexibility
Athletes	70.69 ± 2.35a	857.36±82.27 ^b	16.1±1.45 ^{ab}
Power Athletes	46.48±3.57c	1198.87±157.82 ^a	18.1±5.2 ^a
Basketball players	56.12±1.81b	1122.66±119.36 ^a	12.5±1.96 ^b

Note: The data was collected from 20 subjects. The values sharing the same subscript do not differ significantly. The data was analysed by applying ANOVA in SPSS and Scheffes

post hoc test was adopted. The data was analysed at .05 level of significance.

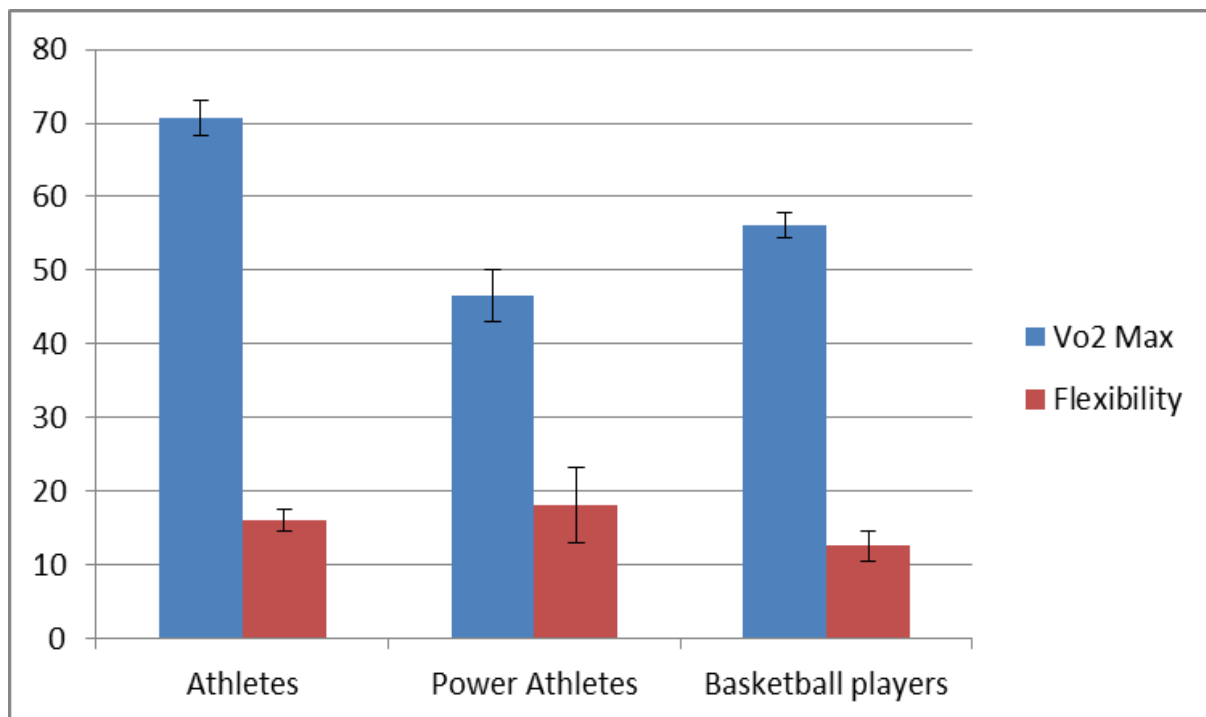


Fig 1: Aerobic power and flexibility

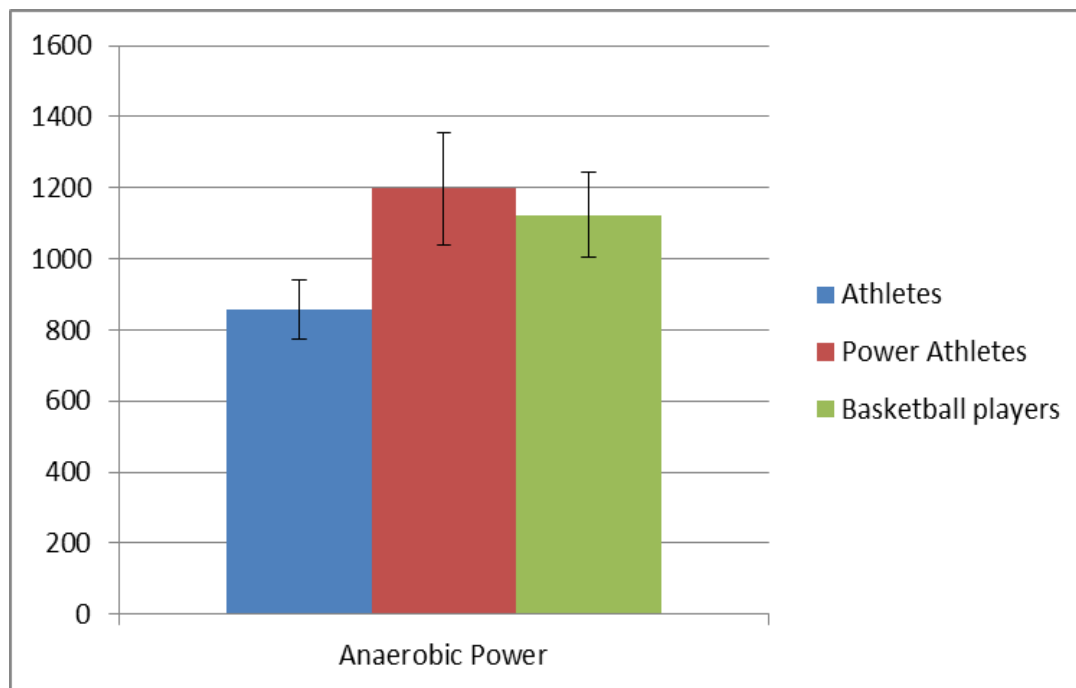


Fig 2: Anaerobic power

Table 2: ANOVA statistical values

		Sum of Squares	df	Mean Square	F	Sig.
Vo2max	Between Groups	2973.456	2	1486.728	207.403	.000
	Within Groups	193.544	27	7.168		
	Total	3167.000	29			
Anaerobic_power	Between Groups	642746.993	2	321373.496	20.994	.000
	Within Groups	413313.316	27	15307.901		
	Total	1056060.309	29			
Flexibility	Between Groups	161.067	2	80.533	7.339	.003
	Within Groups	296.300	27	10.974		
	Total	457.367	29			

Table 2 indicates that there is significant difference between all the three groups with regards to VO₂ max. This indicates that athletes due to the nature of the game has the highest VO₂ max followed by basketball players. Though VO₂ max is an indication of the aerobic power and can be developed by athletes of all events, in the following study it can be seen that the power athletes like weightlifters and power lifters have neglected the same. This indicates that the sport does not utilise this ability for its performance and most probably is neglected in the practice sessions. But it is interesting to note that though Basketball utilises the cardiovascular ability to a significant extent, there is not much difference between them and the power athletes.

In the anaerobic power test there is significant difference between all groups except between basketball players and power event athletes. This shows that though the nature of event in basketball and power events is different, the same motor ability of explosive power is used. Since the athletic event relies more on volumetric work rather than powerful contractions of muscles, they fall behind in this aspect.

In flexibility there is significant difference only among power event group and basketball group. It is surprising since flexibility is of paramount importance in basketball due to the nature of the game, but the findings suggest that basketball players are significantly less flexible in back flexibility as compared to power events group.

Conclusions

The following conclusions can be drawn from the Study:

1. It is obvious that due to the nature of the event the athletes have the highest VO₂ max followed by Basketball players and then power event athletes. So it is not surprising that there is significant differences among the athletes of different events.
2. In anaerobic power there is significant difference between the basketball players and the power event athletes. This is surprising because the basketball players involve a lot of similar activity in their games and power events is anaerobic in nature.
3. In flexibility the basketball players differ significantly from the power event athletes in terms of lower back flexibility, which might indicate that the athletes do not work on flexibility, whereas the athletes lie in between the two and do not differ significantly from the other groups.

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