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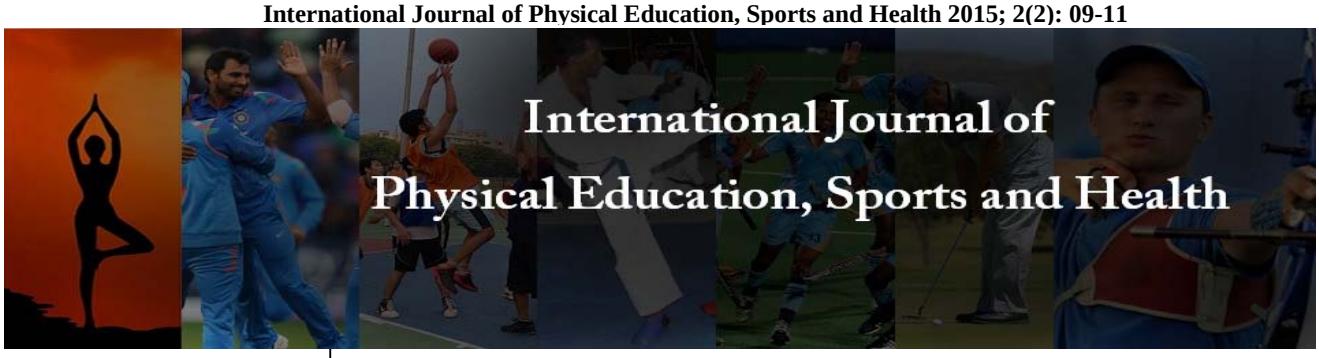

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Aerobic and anaerobic capacity of track and field athletes: A comparative study

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Abstract
The purpose of the present investigation was to compare Aerobic Capacity and Anaerobic Capacity of Male Players of Track and Field events (Sprinters, Jumpers and Throwers). To achieve the set objective, sixty (90) Players (Sprinters =30, Jumpers =30 and Throwers =30) of individual games were selected from Department of physical education Punjab University Chandigarh. The age of the student ranged from 19 to 24 years. Total two variables Aerobic and Anaerobic were selected. Anaerobic Capacity was measured by the performance of 50 meter dash in second. Aerobic Capacity was measured by the performance of 9 min run/walk test on standard track with the help of stop watch in second/minute. The data were analysis by 'F' ratio to compare the aerobic capacity and anaerobic capacity among different individual sports. In this section data were analyzed through descriptive analysis and one way analysis of variance (ANOVA) for male and female separately.

Keywords: Aerobic capacity, anaerobic capacity, Punjab University, Track and Field.

Introduction
The world of sports and games has crossed many a milestones through sustained scientific research and application of research findings to human performance. The competitive sports have come to be valid in society towards the attainment of top performance. The physical educationists and coaches are trying to bring new innovation as they are deeply involved in the preparation of sportsman for the present and future. Physical education and sports have now become integral part of the total education process as it prepares an individual for real life.

Aerobic capacity is the ability to mobilize energy for continuous performance of specific movement for prolonged time i.e. capacity for prolonged physiological functioning under continuous supply of required oxygen under conditions of required oxygen completely available.

The glucose molecule is completely broken down to CO2 and H20, and energy is made available as needed. Anaerobic capacity is the ability to mobilize energy during activities of intensive nature i.e. executing intensive work with explosive action in short duration of time, such as, kicking the football faster and for explosive take off in jumps, maximum rate for about two to three minutes under water swimming. The physiological systems of the body interact to accomplish a variety of tasks. There inter dependence can be linked to a symphony orchestra whose different musical instrument represent various organ systems and whose conductor represents the higher Brain center.

The capacity for prolonged physiological functioning demanding cardiovascular endurance depend upon Aerobic capacity i.e. energy metabolism under continuous supply of oxygen to the organism. Intensive burst of activities i.e. executing high load of work with explosive action and of short duration of time, such as kicking the football faster and far, explosive take off in jumps, throwing an implement etc. depend upon Anaerobic capacity i.e. efficiency in energy production in the absence of oxygen supply, though the oxygen would be taken up later during the recovery period after the cessation of activity.

Both Aerobic and Anaerobic capacities play an important role in influencing the performance in various games and sports. In activities which involve working with maximal intensity for shorter period of time, such as, Sprinting, Weight lifting, kicking of Football fast, explosive jumping etc. Where anaerobic capacity play an important role in games and sports where a sportsman has to resist fatigue relatively for longer period without effecting skill proficiency, for example, long distance running, swimming, cycling, rowing and even some team sports

such as football and hockey, Aerobic capacity of individual plays an important role.

Objective: The purpose of this study was to compare the Aerobic and Anaerobic capacity of track and field athletes.
1. The study was confined to 18-25 years male athletes of Inter-collegiate level.
2. The study was further confined to the Sprinters, Jumpers and Throwers of Track and Field.

Methodology
The subjects for this study were athletes of sprints, jumps and throwing events randomly selected from Inter-collegiate Athletic Competition. A total number of 90 male athletes, 30 each from sprints, jump and throws were selected. The age of the subject range from 18-25 years. The selected variables were aerobic capacity and anaerobic capacity. Aerobic capacity was measured by 12-minute cooper run and walk test. The scoring will be in meters and nearest to 25 meters. Anaerobic capacity was measured by 50-meter dash. The score was that time elapsed in the nearest 1/10th of a second. To compare Aerobic and Anaerobic capacity of Sprinters, Jumpers and Throwers. The analysis of variance was used at .05 level of significance.

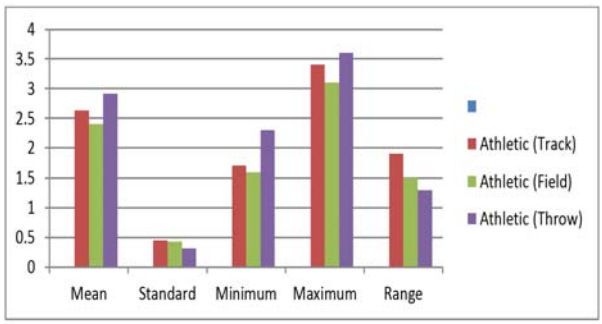
Statistical Procedure
The data were analysis by 'F' ratio to compare the aerobic capacity and anaerobic capacity among different individual sports. In this section data were analyzed through descriptive analysis and one way analysis of variance (ANOVA) for male and female separately.

Result and Discussion

Table 1: Descriptive Analysis of Aerobic Capacity of Male Players

Individual Sports	Mean	Standard Deviation	Minimum	Maximum	Range
Athletic (Track)	2.63	.45	1.70	3.40	1.90
Athletic (Field)	2.40	.43	1.60	3.10	1.50
Athletic (Throw)	2.91	.31	2.30	3.60	1.30

Table-1 appears that Aerobic capacity comparison between Sprinters, Jumpers and Throwers. Indicates descriptive analysis of track, field and throw (individual sports). Mean, standard deviation, minimum, maximum and range are described in details. For sprinters mean, standard deviation, minimum, maximum and range is 2.63, .45,1.70,3.40, and .190 respectively. For jumpers players mean, standard deviation, minimum, maximum and range is 2.40,.43,1.60,3.10 and 1.50 respectively. In case of throwers mean, standard deviation, minimum, maximum and range is 2.91,.31,2.30,3.60,and 1.50 respectively. Graphical representation of above table is made in fig. no. 1



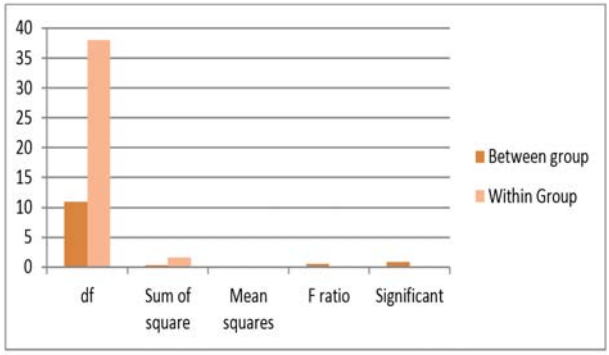
Graph 1: Graphical representation of Descriptive Analysis of Aerobic Capacity of Male Players

Table 2: One way analysis of variance of aerobic capacity of sprinters, jumpers and throwers

Source of treatment	df	Sum of square	Mean squares	F ratio	Significant
Between group	11	.388	.055	.564	.840
Within Group	38	1.615	.135		

Significant at 0.05 level

It appears from the table-2 that Aerobic capacity comparison between Sprinters, Jumpers and Throwers. Which was not significant as 'f' ratio was found to be .564 is less than the tabulated 'f' value 0.05 level.

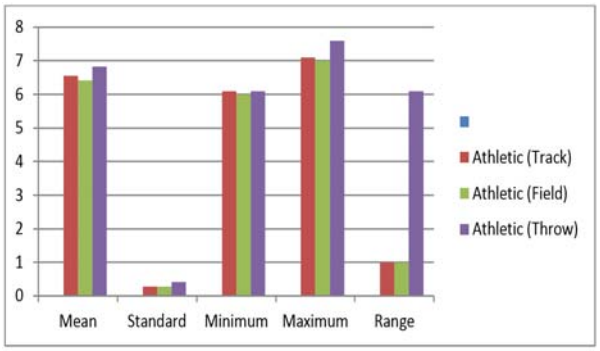


Graph 2: Graphical representation of one way analysis of variance of aerobic capacity among sprinters, jumpers and throwers

Table 3: Descriptive Analysis of Anaerobic Capacity of Male Players

Individual Sports	Mean	Standard Deviation	Minimum	Maximum	Range
Athletic (Track)	6.55	.28	6.10	7.10	1.00
Athletic (Field)	6.42	.28	6.00	7.00	1.00
Athletic (Throw)	6.83	.41	6.10	7.60	6.10

Table no.3 It appears that Anaerobic capacity comparison between Sprinters, Jumpers and Throwers. Indicates descriptive analysis of track, field and throw (individual sports). Mean, standard deviation, minimum, maximum and range are described in details. For sprinters mean, standard deviation, minimum, maximum and range is 6.55,.28,6.10,7.10 and 1.00 respectively. For jumpers players mean, standard deviation, minimum, maximum and range is 6.42,.28,6.00,7.00 and 1.00 respectively. In case of throwers mean, standard deviation, minimum, maximum and range is 6.83,.41,6.10,7.60 and 6.10 respectively. Graphical representation of above table is made in fig. no.3



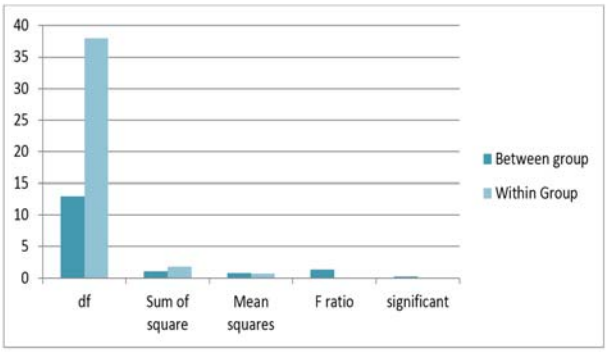
Graph 3: Graphical representation of Descriptive Analysis of Anaerobic Capacity of Male Players

Graph 4: One way analysis of variance of anaerobic capacity of sprinters, jumpers and throwers

Source of treatment	df	Sum of square	Mean squares	F ratio	significant
Between group	13	1.039	.80	1.361	.245
Within Group	38	1.782	.71		

Significant at 0.05 level

The table-2 Indicates Anaerobic Comparison between Sprinters, Jumpers and Throwers, which is not significant as calculated f-ratio 1.361 was greater than tabulated 'F'value 0.05 level.



Graph 4: Graphical representation of One way analysis of variance of anaerobic capacity of sprinters, jumpers and throwers

Discussion and finding

Aerobic capacity

The statistical findings of the present study revealed that there were no significant differences in Sprinters, Jumpers and Throwers in relation to Aerobic capacity. This can be attributed to the quantum of aerobic training done in preparatory phase. The aerobic training helps in improvement of oxygen supply to the muscles. It increases blood volume and raises the level of oxygen carrying hemoglobin in red blood cells. The improved delivery and use of oxygen results, increased energy production and so, the trained athletes of sprints, jumps and throws showed insignificant difference in relation to aerobic capacity. Also the increased lung volume of the sprinters, jumpers and throwers enhanced movement of oxygen from lungs to blood and aerobic training done by the groups' results in increased myoglobin content and oxidation of carbohydrates so; there is no significant difference among them. The Sprinters, Jumpers and Throwers undergo almost similar type of aerobic training and endurance workout during base creation phase, so they all posses almost same amount of aerobic capacity.

Anaerobic capacity

The statistical findings revealed that there were no significant differences among Sprinters, Jumpers and Throwers in relation to anaerobic capacity. It was found that there was no significant difference in anaerobic capacity of sprinters and throwers, jumpers and thrower. There was no difference between sprinters and jumpers as they posses almost similar anaerobic capacity. This difference can be attributed to the nature of the activity done by these groups. The sprinters and jumpers continuously perform the activity with high explosiveness for pretty longer period of time then throwers. The nature of the test 50m-dash was also favorable to sprinters and jumpers as they go for sprinting activities during their workout. Throwers normally don't run so much during their skill performance.

In general any activities from metabolic support point of view are classified as Aerobic and Anaerobic muscular activity. All the three groups come under anaerobic type of muscular activity. This might be the reason for statistical insignificant difference of the three experimental groups as far as their aerobic potentiality is concerned. But in case of experimental subjects used in the study though they are anaerobic based sprinters and jumpers require both speed endurance and explosive strength in specific, whereas the throwers requires strength. For which out of the various metabolic support first two groups are using both A.T.P/ CP system as well as partly lactic acid system. Whereas the throwers who are using their maximum strength and power in a quickest possible time are basically requiring high potentiality of utilizing of A.T.P/ CP only

Conclusions

1) In relation to aerobic capacity no significant difference was found between sprinters, jumpers and throwers.
2) There was no significant difference among sprinters, jumpers and throwers in relation to anaerobic capacity.

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