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## Assessment of aerobic and anaerobic capacity among female 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 female Players of Track and Field events (Sprinters, Jumpers and Throwers). To achieve the set objective, one hundred and twenty (120) Players (Sprinters =40, Jumpers =40 and Throwers =40) of individual games were selected from Department of physical education Punjab University Chandigarh, Department of physical education K.U.K and Department of physical education C.D.L.U. Sirsa. 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 and Descriptive analysis.

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

### Introduction

Aerobic capacity of athletes is an important element of success in sports achievements. Physiologically, it is a functional capacity of an organism to increase the level of metabolic process in keeping with the requirement of physical effort being exposed to. Metabolic process in this sense means the transformation of Chemical energy into mechanical one. VO<sub>2</sub>max (maximum oxygen uptake) refers to the intensity of aerobic process and actually denotes the Maximum capacity to transport and utilize oxygen during exercise done at increasing intensity. "It is highest rate of oxygen consumption attainable during maximal/exhaustive exercise." It reflects the physical fitness of an individual having athletic capacity

**Objective:** The purpose of this study was to compare the Aerobic and Anaerobic capacity of female track and field athletes.

### Methodology

The subjects for this study were female athletes among sprints, jumps and throwing events randomly selected from Inter-collegiate and district level Athletic Competition. A total number of 90 female 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 9-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 the Aerobic and Anaerobic capacity of Sprinters, Jumpers and Throwers. The analysis of variance was used at .05 level of significance.

### Statistical Procedure

In this section data were analyzed through descriptive analysis and one way analysis of variance (ANOVA) among female athletes.

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**Result and Discussion**

**Table 1:** Descriptive Analysis of Aerobic Capacity of female Players of sprinters, jumpers and throwers of Haryana

Game	Mean	S.D	Minimum	Maximum	Range
Athletic (sprinters)	2.63	4.5	1.70	3.40	1.90
Athletic (jumpers)	2.40	4.3	1.60	3.10	1.50
Athletic (throwers)	2.91	3.1	2.30	3.60	1.50

**Table-1** appears that Aerobic capacity comparison among female Sprinters, Jumpers and Throwers. Indicates descriptive analysis of female track, field and throw (individual sports). Mean, standard deviation, minimum, maximum and range are described in details. For female sprinters mean, standard deviation, minimum, maximum and range is 2.63, 4.5, 1.70, 3.40, and 1.90 respectively. For female jumpers players mean, standard deviation, minimum, maximum and range is 2.40, 4.3, 1.60, 3.10 and 1.50 respectively. In case of female throwers mean, standard deviation, minimum, maximum and range is 2.91, 3.1, 2.30, 3.60, and 1.50 respectively. Graphical representation of the above table is made in fig. no. 1

**Table 2:** One way analysis of variance of aerobic capacity among female sprinters, jumpers and throwers of Haryana

Source of treatment	df	Sum of squares	Mean squares	F ratio	Significant
Between group	12	1.313	0.131	0.501	0.852
Within Group	27	1.917	0.213		
Total	17	1.782	1.78		

Significant at 0.05 level

The mean square value of the aerobic capacity in case of female sprinters, jumpers and throwers of Haryana is 0.131, 0.213 and 1.78 respectively. The obtained sum of squares between the groups is 1.313, 1.917 and 1.782 respectively. The obtained f-ratio value among the female sprinters, jumpers and throwers of Haryana is 0.501. The obtained significant value of table is 0.852s at the significance level of 0.05 levels. It appears from the table-4 that significant difference was found for aerobic capacity, i.e. among sprinters, jumpers and throwers female players of Haryana as the calculated value 1.288 was found less than the tabulated value 2.42 at 0.05 levels.

**Table 3:** Descriptive Analysis of Anaerobic Capacity among female sprinters, jumpers and throwers

Game	Mean	S.D	Minimum	Maximum	Range
Athletic (sprinters)	2.92	0.30	2.20	3.60	1.40
Athletic (jumpers)	2.99	0.34	2.30	3.60	1.30
Athletic (throwers)	2.71	0.36	1.80	3.40	1.60

Table no.3 It appears that anaerobic capacity comparison between female 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 female sprinters mean,

standard deviation, minimum, maximum and range is 2.92, 0.30, 2.20, 3.60 and 1.40 respectively. For female jumpers players mean, standard deviation, minimum, maximum and range is 2.99, 0.34, 2.30, 3.60 and 1.30 respectively. In case of female throwers mean, standard deviation, minimum, maximum and range is 2.71, 0.36, 1.80, 3.40 and 1.60 respectively. Graphical representation of the above table is made in fig. no.3

**Table 4:** One way analysis of variance of anaerobic capacity among sprinters, jumpers and throwers of Haryana

Source of treatment	df	Sum of square	Mean squares	F ratio	significant
Between group	12	0.501	0.42	1.288	0.281
Within Group	27	3.114	0.115		
Total	39	4.690	0.142		

Significant at 0.05 level

The mean squares value of the anaerobic capacity in case of female sprinters, jumpers and throwers of Haryana is 0.42, 0.115 and 0.142 respectively. The obtained sum of squares between the groups is 0.501, 3.114 and 4.690 respectively. The obtained f-ratio value among the female sprinters, jumpers and throwers of Haryana is 1.288. The obtained significant value of table is 0.281 at the significant level of 0.05 level. It appears from the table-4 that significance difference were found for anaerobic capacity i.e. among sprinters, jumpers and throwers female players of Haryana as the calculated value 1.288 was found less than the tabulated value 2.42 at 0.05 level.

**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 the 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 an 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 an almost similar type of aerobic training and endurance workout during base creation phase, so they all possess 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 possess almost similar anaerobic capacity. This difference can be attributed to the nature of the activity done by these groups.

The sprinters and jumpers have continuously performed the activity with high explosiveness for pretty long 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 the anaerobic type of muscular activity. This might be the reason for the 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 between sprinters, jumpers and throwers in relation to anaerobic capacity.

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