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## A comparative analysis of physiological variables between athletes and non-athletes

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### Abstract

The purpose of the study was to find out the comparative analysis of Physiological Variables (Peak Flow Rate, Pulse Rate and Blood Pressure) between athletes and non-athletes. The study has been conducted on 120 students (males and females) which were divided into four groups with 30 students in each group. The subjects were students of Panjab University, Chandigarh. The age of the subjects ranged between 20-25 years. The study was restricted to only physiological variables which were Peak Flow Rate, Pulse Rate and Blood Pressure. The data was collected through Peak Flow Meter for Peak Flow Rate, Automatic Digital Blood Pressure Monitor for Blood Pressure and for Pulse Rate with the help of stopwatch. To find out significant difference among the group independent 't'-test was used with the help of SPSS Software. The level significance chosen was 0.05. After the analysis, it was revealed that there were significant differences obtained on peak flow, pulse rate and diastolic blood pressure between male athletes and non-athletes and also between female athletes and non-athletes of Panjab University Campus. No significant differences were found on systolic blood pressure between male athletes and non-athletes and also between female athletes and non-athletes. Both male and female athletes of Panjab University Campus performed significantly better on peak flow, pulse rate and diastolic blood pressure than their counterparts.

**Keywords:** Peak flow rate, pulse rate, blood pressure, athletes, non-athletes

### Introduction

Aerobic is a form of exercise that increases the burden of the heart and lungs, making them to exert greater efforts than at rest (e.g., walking, jogging, running, skipping, dancing, swimming, bicycling, etc.). It is possible that better lung function is related to activity induced bronchodilator. Such dilatatory effects predominate at brief episodes and at reasonable levels of physical activity in everyday life. Regular exercise leads to numerous and varied physiological changes, which improves the quality of life. In general, pulmonary functions are estimated by the strength of the respiratory muscles, amenability of the thoracic cavity, airway resistance, and elastic recoil of the lungs (Bassi *et al.*, 2015). As Peak expiratory flow rate (PEFR) analyses how quick a person can breathe out (exhale) air, it is one of the many tests that measure how well your airways work. A widely acknowledged fact is that people with more physical activity inclined to possess greater degree of fitness and that physical activity can enhance cardiorespiratory health and pulmonary function in healthy sedentary people. The American College of Sports Medicine (ACSM) defines aerobic exercise as "any activity that uses large muscle groups, can be maintained continuously, and is rhythmic in nature."

When the finger is placed on any part of the body where an artery is located near the surface, as, for example, on the radial artery near the wrist, there is felt an intermittent pressure, throbbing with every beat of the heart. This movement, frequently visible to the eye, is the result of the alternate expansion of the artery by the wave of the blood, and the recoil of the arterial walls by the elasticity. In other words, it is the wave produce by throwing a mass of blood into the arteries already full. The blood wave strikes upon the elastic wall of the artery, causing an increase distinction, followed at once by contraction. This regular dilatation and rigidity of the elastic artery answering to the beats of the heart, is known as the pulse (Blaisdall and Albart, 1998). The pulse rate is a measurement of the heart rate, or the number of times the heart beats per minute. As the heart pushes blood through the arteries, the arteries expand and

contract with the flow of the blood. The normal pulse for healthy adult ranges from 60 to 100 beats per minute. The pulse rate may fluctuate and increase with exercise, illness, injury, and emotions. Females ages 12 and older, in general, tend to have faster heart rates than males. Athletes, such as runners, who do a lot of cardiovascular conditioning, may have heart rates near 40 beats per minute and experience no problems (www.hopkinsmedicine.org.) Most importantly, getting fitter lowers the heart rate, by making heart muscles work more efficiently. A well-trained athlete may have a resting heart rate of 40 to 60 beats per minute, according to the American Heart Association (AHA).

Blood Pressure is essential for life and every person has blood pressure to a certain degree. Blood Pressure is the pressure exerted by circulating blood upon the walls of the blood vessels and is one of the principal vital signs. The amount of pressure depends upon the strength and rate of the heart's contraction, the volume of blood in the circulatory system, and the elasticity of the arteries. During each heartbeat, blood pressure varies between a maximum (systolic) and a minimum (diastolic) pressure. The mean blood pressure, due to pumping by the heart and resistance to flow in blood vessels, decreases as the circulating blood moves away from the heart through arteries. Blood pressure drops rapidly along the small arteries and arterioles, and continue to decrease as the blood moves through the capillaries and back to the heart through the veins. Gravity, valves in veins, and pumping from contraction of skeletal muscles, are some others influences on blood pressure at various places in the body. Blood pressure is measured with an instrument called a sphygmomanometer.

**Objectives of the study**

1. To compare the physiological components (peak flow rate, pulse rate and blood pressure) between male athletes and non-athletes.
2. To determine the physiological components (peak flow rate, pulse rate and blood pressure) between female athletes and non-athletes.

**Materials and Methods**

The study has been conducted on 120 students (males and females) which were divided into four groups with 30 students in each group. The subjects were students of Panjab University, Chandigarh. The age of the subjects ranged between 20-25 years. The study was restricted to only physiological variables which were peak flow rate, pulse rate and blood pressure. The data was collected through peak flow meter for peak flow rate, automatic digital blood pressure monitor for Blood Pressure and for Pulse Rate with the help of stopwatch. For analysing the data, descriptive statistic for mean and standard deviation was used and to find out significant difference among the group independent 't'-test was used with the help of SPSS Software. The level of significance chosen was 0.05.

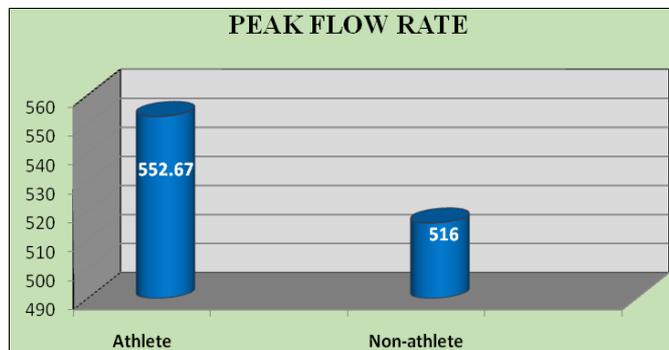
**Findings:** The comparisons of Peak Flow Rate (PFR) between male athletes and non-athletes are presented in Table-1.

**Table 1:** Comparison of Scores on Peak Flow Rate between Male Athletes and Non-Athletes

Variable	Group	N	Mean	SD	SEM	MD	SED	t-value
Peak Flow Rate	Athletes	30	552.67	65.65	6.67	36.6	13.72	2.67*
	Non-Athletes	30	516.00	36.54	11.98			

\*Significance at .05 level 't'<sub>0.05</sub> (58) = 1.67

A perusal of inside of table-1 pertaining to male athletes and non-athletes the variable Peak Flow Rate had shown that the first group i.e., athlete group had secured the mean and SD values of 552.67 and 65.65 respectively. On the other hand, non-athlete group had secured mean and SD values of 516.00 and 36.54. The t-value was found to be statistically significant as the value obtained was 2.673 whereas the tabulated value was 1.67 which 58 degrees of freedom at 0.05 level of significant. Mean scores of male athletes and non-athletes on peak flow rate are depicted graphically in figure- 1.



**Fig 1:** The Graphical Representation of Mean Scores of Male Athletes and Non-Athletes on Peak Flow Rate

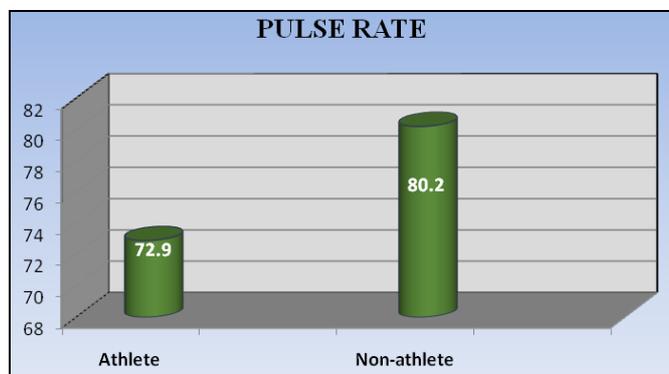
The comparison of Pulse Rate between male athletes and non-athletes are represented in Table-2.

**Table 2:** Comparison of Scores on Pulse Rate between Male Athletes and Non-Athletes

Variable	Group	N	Mean	SD	SEM	MD	SED	t-value
Pulse Rate	Athletes	30	72.90	12.45	2.87	7.30	3.66	1.99*
	Non-Athletes	30	80.20	15.74	2.27			

\*Significance at .05 level 't'<sub>0.05</sub> (58) = 1.67

A glance at the results depicted in table-2 would show that with regard to athletes mean score and SD values of 72.90 and 12.45 as compared to their values, non-athlete group had obtained the mean and SD value of 80.20 and 15.74 respectively. The t-value was found to be statistically significant as the value obtained was 1.99 whereas the tabulated value was 1.67 which 58 degrees of freedom at .05 level of significant. Mean scores of male athletes and non-athletes on pulse rate are depicted graphically in figure-2.



**Fig 2:** The Graphical Representation of Mean Scores of Male Athletes and Non-Athletes on Pulse Rate

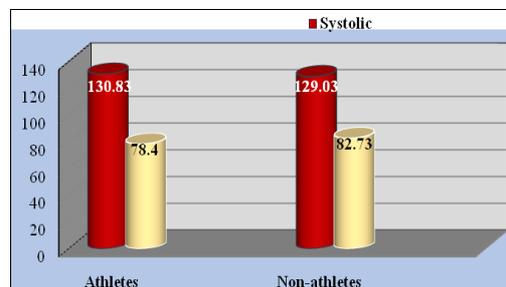
The comparisons of blood pressure (Systolic and Diastolic) between male athletes and non-athletes are presented in Table-3

**Table 3:** Comparison of Scores on Blood Pressure between Male Athletes and Non-Athletes

Variable	Group	N	Mean	SD	SEM	MD	SED	t-value
Systolic Blood Pressure	Athletes	30	130.83	5.90	1.90	1.80	2.19	.82
	Non-Athletes	30	129.03	10.42	1.07			
Variable	Group	N	Mean	SD	SEM	MD	SED	t-value
Diastolic Blood Pressure	Athletes	30	78.40	6.97	1.41	4.33	1.90	2.28*
	Non-Athletes	30	82.73	7.75	1.27			

\*Significance at .05 level 't'<sub>0.05 (58)</sub> = 1.67

A perusal of inside of table-3 pertaining to male athletes and non-athletes on the variable blood pressure (systolic and diastolic) would show that the first group i.e., athlete students had secured the mean and SD values of systolic 130.83 and 5.89 and diastolic 78.40 and 6.97 respectively. On the other hand, non-athlete group had secured mean and SD values of systolic 129.03 and 10.42 and diastolic 82.73 and 7.74. The t-value of systolic pressure was not found to be statistically significant as the value obtained was .82 but 't' value of diastolic pressure was statistically significant as the value obtained was 2.28 whereas, the tabulated value was 1.67 which 58 degrees of freedom at .05 level of significant. Mean scores of male athletes and non-athletes on blood pressure are depicted graphically in figure-3.



**Fig 3:** The Graphical Representation of Mean Scores of Male Athletes and Non-Athletes on Blood Pressure

The comparison of Peak Flow Rate between female athletes and non-athletes is presented in Table-4.

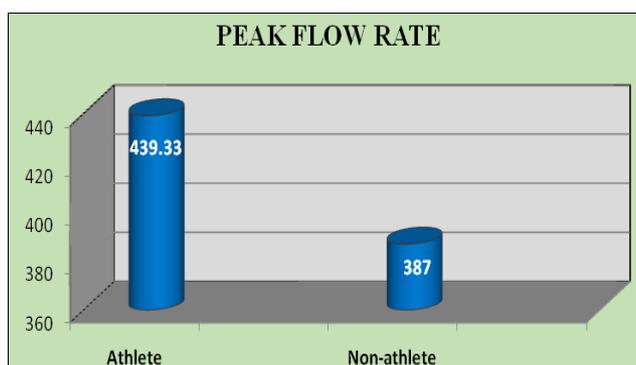
**Table 4:** Comparison of Scores on Peak Flow Rate between Female Athletes and Non-Athletes

Variable	Group	N	Mean	SD	SEM	MD	SED	t-value
Peak Flow Rate	Athletes	30	439.33	64.70	11.19	52.33	16.27	3.21*
	Non-thletes	30	387.00	61.32	11.81			

\*Significance at .05 level 't'<sub>0.05 (58)</sub> = 1.67

A perusal of inside of table-4 pertaining to female athletes and non-athlete on the variable Peak Flow Rate would show that the first group i.e., athlete group had secured the mean and SD values of 439.33 and 64.70 respectively. On the other hand, non-athlete group had secured mean and SD values of 387.00

and 61.32. The t-value was found to be statistically significant as the value obtained was 3.22 whereas; the tabulated value was 1.67 which 58 degrees of freedom at .05 level of significant. Mean scores of female athletes and non-athletes on peak flow rate are depicted graphically in figure-4.



**Fig 4:** The Graphical Representation of Mean Score of Female Athletes and Non-Athletes on Peak Flow Rate

The comparison of pulse rate between female athletes and non-athletes is presented in Table-5.

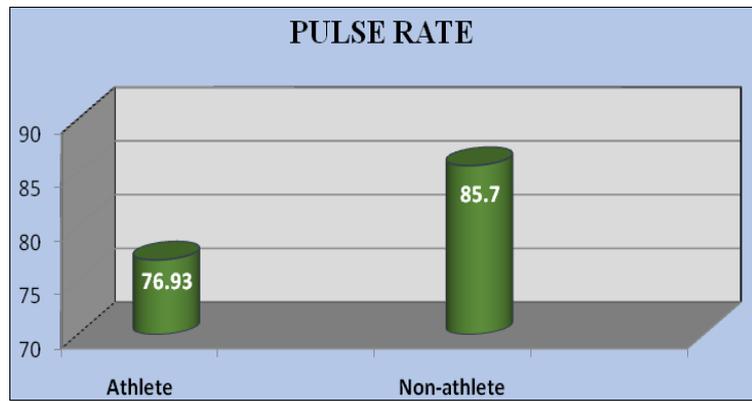
**Table 5:** Comparison of Scores on Pulse Rate between Female Athletes and Non-Athletes

Variable	Group	N	Mean	SD	SEM	MD	SED	t-value
Pulse Rate	Athletes	30	76.93	11.44	1.93	8.77	2.85	3.08*
	Non-Athletes	30	85.70	10.61	2.08			

\*Significance at .05 level 't'<sub>0.05 (58)</sub> = 1.67

A glance at the results depicted in table-5 would show that with regard to female athletes mean score and SD values of 76.93 and 11.44 as compared their values, non-athlete group had obtained the mean and SD value of 85.70 and 10.61 values, respectively. The t-value was found to be statistically

significant as the value obtained was 3.08, whereas the tabulated value was 1.67 which 58 degrees of freedom at .05 level of significant. Mean scores of female athletes and non-athletes on pulse rate are depicted graphically in figure-5.



**Fig 5:** The Graphical Representation of Mean Scores of Female Athletes and Non-Athletes on Pulse Rate

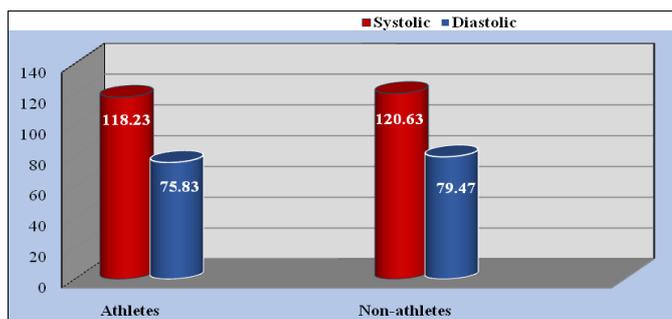
The comparisons of blood pressure (Systolic and Diastolic) between female athletes and non-athletes are presented in Table-6.

**Table 6:** Comparison of Scores on Blood Pressure (Systolic and Diastolic) Between Female Athletes and Non-Athletes

Variable	Group	N	Mean	SD	SEM	MD	SED	t-value
Systolic Blood Pressure	Athletes	30	118.23	7.72	1.41	2.40	2.05	1.17
	Non-Athletes	30	120.63	8.19	1.49			
Variable	Group	N	Mean	SD	SEM	MD	SED	t-value
Diastolic Blood Pressure	Athletes	30	75.83	6.06	1.54	3.63	1.90	1.91*
	Non-Athletes	30	79.47	8.45	1.10			

\*Significance at .05 level  $t'_{0.05}(58) = 1.67$

A perusal of inside of table-6 pertaining to female athletes and non-athletes on the variable blood pressure (systolic and diastolic) would show that the first group i.e., athlete students had secured the mean and SD values of systolic 118.23 and 8.19 and diastolic 75.83 and 6.06 respectively. On the other hand, non-athlete group had secured mean and SD values of systolic 120.63 and 7.72, and diastolic 79.47 and 8.45. The t-value was found to be statistically significant as the value obtained was 2.387 (diastolic blood pressure) whereas, the tabulated value was at .05 level of significant. Mean scores of female athletes and non-athletes on blood pressure are depicted graphically in figure-6.



**Fig 6:** The Graphical Representation of Mean Scores of Male Athletes and Non-Athletes on Blood Pressure

**Conclusions**

In the light of the findings and limitations of the present study the following conclusions were drawn:

1. No significant differences were found on systolic blood pressure between male athletes and non-athletes and also between female athletes and non-athletes of Panjab University Campus.
2. Significant differences were obtained on peak flow, pulse rate and diastolic blood pressure between athletes & non-athletes of Panjab University Campus.
3. Both male and female athletes of Panjab University Campus performed significantly better on peak flow,

pulse rate and diastolic blood pressure than their counterparts.

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