

## A Comparative Study Of Physiological Performance Between Rajasthan State Schools & CBSE Schools Players

Chouhan VS<sup>1\*†</sup>, Sisodiya AS<sup>2†</sup>


DOI: <https://doi.org/10.55968/ijems.v14i01.414>

<sup>1\*†</sup> Virendra Singh Chouhan, Research Scholar, Dept of Physical Education, Jnv University, Jodhpur, Rajasthan, India.

<sup>2†</sup> Aman Singh Sisodiya, Department of Physical Education, Jnv Univ Jodhpur, Jodhpur, Rajasthan, India.

The purpose of the study was to compare physiological Performance between Rajasthan state schools & CBSE schools players. For the purpose of the study total 60 players out of which 30 Rajasthan state schools and 30 CBSE schools players who participated in School National championship, were selected as the subject for the study. The age of the subjects was ranging from 14 to 18 years. The study was taken on the basis of available literature on physiological variables and further, keeping in the mind about specific purpose of the study, selected Physiological Variables were systolic blood pressure, diastolic blood pressure, resting heart rate and vital capacity. To explicate the study, certain criterion measure adopted for the study was as follow: Blood pressure was assessed by automatic blood pressure monitor developed by Omron healthcares in Singapore. Resting heart rate was assessed manually in the morning hours from 6 to 8 a.m and the heart rate counts in beats/min. Vital Capacity was assessed by dry spirometer and the reading was noted in millimeters. Further, to see the value of minimum, maximum mean, standard error, standard deviation, variance, skewness and kurtosis, the descriptive statistic was used. To compare the difference between physiological variables of Rajasthan state schools & CBSE schools player, t-test was used and the level of significance was set at 0.05 by using SPSS-17 version. The result of study has shown significant difference found in physiological variable between Rajasthan state schools & CBSE schools players. CBSE schools player had shown better efficiency of heart.

**Keywords:** Systolic Blood Pressure, Diastolic Blood Pressure, Resting Heart Rate, Vital Capacity

Corresponding Author	How to Cite this Article	To Browse
Virendra Singh Chouhan, Research Scholar, Dept of Physical Education, Jnv University, Jodhpur, Rajasthan, India. Email: <a href="mailto:virendrasinghchouhan15.11@gmail.com">virendrasinghchouhan15.11@gmail.com</a>	Chouhan VS, Sisodiya AS. A Comparative Study Of Physiological Performance Between Rajasthan State Schools & CBSE Schools Players. <i>ijems</i> . 2025;14(01):52-58. Available From <a href="https://ijems.net/index.php/ijem/article/view/414/">https://ijems.net/index.php/ijem/article/view/414/</a>	

Manuscript Received	Review Round 1	Review Round 2	Review Round 3	Accepted
2024-01-04	2024-02-04	2024-03-14	2024-04-04	2024-04-24
Conflict of Interest	Funding	Ethical Approval	Plagiarism X-checker	Note
Authors state no conflict of interest.	Non Funded.	The conducted research is not related to either human or animals use.	11	All authors have accepted responsibility for the entire content of this manuscript and approved its submission.



## INTRODUCTION

There are several Sports Science subjects, which have revolutionized the standard of sports in modern times, which include several subjects such as medical science, sports physiology, sports psychology, training science, kinesiology and biomechanics, anthropometry, sports nutrition and other allied sciences. All the subjects specialties have their own contribution to the final exceptional performance of an athlete. In broader sense the main sport disciplines also could be considered as sports sciences. Execution of technique, skill and tactics of any sports requires human body action with physical and psychological aspects. None of these specialties can by itself lead to the final performance. There has to be concerted effort of all sports science disciplines including the main sport concerned.

The term physiology literally means "knowledge of nature." Aristotle (384-322 B.C.) used the word in this broad sense to describe the functioning of all living organisms, not just of the human body. However, Hippocrates (460 - 377 B.C.), considered the father of medicine, used the word physiology to mean "the healing power of nature", and the field became closely associated with medicine. By the sixteenth century in Europe, physiology had been formalized as the study of the vital functions of the human body, although today the term is again used to refer to the study of the functions of all animals and plants. In contrast, anatomy is the study of structure, with minimum emphasis on function. Despite this distinction, anatomy and physiology cannot truly be separated. The function of a tissue or organ is closely tied to its structure, and the structure of an organism presumably evolved to provide an efficient physical base for its function.

As a sub-discipline, exercise physiology is one of the largest and most popular areas of study within the realm of physical education, exercise science and sport. It has one of the richest traditions; interest in the effects of exercise on the body can be traced to ancient times. Today the depth and breadth of knowledge in exercise physiology is growing rapidly because of the proliferation of research, which is facilitated by increasingly sophisticated technology and by the widespread interest of professionals in this field.

Physiological fitness

Must be developed accordingly to bring out the best possible performance of a team or athlete. Coaches and physical education teachers appear to have difficulty in understanding how to interpret the physiological of energy sources and how to use this information to improve the physical conditioning of their athletes and students.

In training it is essential to understand and to apply the principles of physiological system that governs the development of fitness. Robert (1989) states that physiology is the branch of biology and is concerned with the mechanism of functional operation and the co-ordination. Physiology is the study of functional normal human body. The physiological traits depend upon the race geographical and climatic conditions of human beings- Therefore it receiving sport light attention the time. When we focus upon the performance of the players ,there are many physiological parameters by which we can access the physiological standard of the player. In human body blood pressure, heart rate , vital capacity etc are some physiological parameters and their explanation is given below:

Blood pressure(BP), sometimes referred to as arterial blood pressure, is the pressure exerted by circulating blood upon the walls of blood vessels, and is one of the principal vital signs. When used without further specification, "blood pressure" usually refers to the arterial pressure of the systemic circulation. During each heartbeat, blood pressure varies between a maximum (systolic) and a minimum (diastolic) pressure. The blood pressure in the circulation is principally due to the pumping action of the heart. Differences in mean blood pressure are responsible for blood flow from one location to another in the circulation. The rate of mean blood flow depends on the resistance to flow presented by the blood vessels. Mean blood pressure decreases as the circulating blood moves away from the heart through arteries and capillaries due to viscous losses of energy. Mean blood pressure drops over the whole circulation, although most of the fall occurs along the small arteries and arterioles. Gravity affects blood pressure via hydrostatic forces (e.g., during standing), and valves in veins, breathing, and pumping from contraction of skeletal muscles also influence blood pressure in veins.

Blood pressure without further specification

Usually refers to the systemic arterial pressure measured at a person's upper arm is a measure of the pressure in the brachial artery, the major artery in the upper arm. A person's blood pressure is usually expressed in terms of the systolic pressure over diastolic pressure and is measured in millimeters of mercury (mm Hg), for example 120/80. It is also expressed as the amount over normal atmospheric pressure (760 mm Hg), so a blood pressure of 120 mm Hg would actually be 880 mm Hg of true pressure.

Secondly, the heart rate is the number of ventricular beats per minute. Heart is usually determined from pulse rate. The number of pressure waves per minute along the carotid artery at the neck or the radial artery at the wrist, is normal in individuals. The time period from one heart beat to the next is the interval between cardiac cycles. Control of Heart Rate at rest and during work is maintained by the blood entering the heart by the autonomic nervous system. Stimulation of the vagus nerves to the heart slows down (bradycardia) Heart Rate whereas, stimulation of the sympathetic nerves speeds up Heart Rate (tachycardia).

At rest, Heart Rate is about 75 for non-athlete and 53 for athletes who train primarily aerobically. The decreased heart rate at rest for athlete is a consequence of physical training that are carried out continuously and over a long time span. The cause of resting bradycardia is related to the effects of training on the autonomic nervous system that are particularly reflected in the vagus nerves (parasympathetic division) to the heart. Training may either increase parasympathetic stimulation, or affect both. The present research findings indicate that resting bradycardia is primarily the result of inhibition of heart rate by increased stimulation of the parasympathetic fibers.

Thirdly, we come to vital capacity; it is the volume of air that can be removed out of the lungs after a maximum inspiration is called vital capacity. It comprises tidal volume, inspiratory reserve volume, and expiratory reserve volume. Thus, vital capacity equals 500 ml. (tidal volume) plus 5,000 ml. (expiratory reserve volume) plus approximately 3,000ml. (inspiratory reserve volume) for a total of 4500ml. or 4.5l. Even after a maximal expiration, some air still remains in the lungs and is called the residual volume (approximately 1000 ml.)

Vital capacity which is related to age, body weight, height, and body surface area, lung capacity for the normal. Healthy female is approximately 10 percent smaller than that of her male counterpart of similar size and age. This difference may be due, in part to the female's lower metabolic rate, which demands less oxygen. On the other hand, some authorities in the area feel that since women generally have a higher per minute respiratory rate than most men, the difference in lung capacity is not due to the female's lower metabolic rate. Other authorities have suggested that the difference may be explained by the male's more developed respiratory musculature. It is well known that man, on the average, have a tendency to breathe somewhat slower and deeper with their abdominal and diaphragm muscles than women. At the same time, women tend to breathe faster and higher up in their chest region using the intercostal muscles.

Vital capacity has been used in the past as a measure of physical fitness because it is related to VO<sub>2</sub> max. When VO<sub>2</sub> max was related to vital capacity among 190 individuals from the ages of 7 to 30 years, there was a relatively linear relationship. This occurred because vital capacity is highly related to body size and age, and both are related to VO<sub>2</sub> max. When vital capacity is expressed per unit of body weight, no apparent relationship exists between vital capacity and cardiovascular efficiency. Consequently, vital capacity adds little to the assessment of physical fitness.

## PROCEDURE

### Selection of Subjects

For the purpose of this study, there were 60 Rajasthan state schools & CBSE schools players were selected as subjects for this study. The player's age were ranged from 15 to 18 years.

### Selection of Variables

The research scholar reviewed the available scientific literature pertaining to the "Physiological Profile of Rajasthan state schools & CBSE schools Players". In the present study the following variables were evaluated for the purpose of comparison between Rajasthan state schools & CBSE schools players.

### Physiological Variables

01. Blood Pressure

01. Resting Heart Rate

02. Vital Capacity

**Criterion Measures**

Variables	Tests	Units of measurement
Blood Pressure	OMRON - Automatic Blood Pressure Monitor	mm Hg
Resting Heart Rate	Manual method	Beats/min
Vital Capacity	Dry-spirometer	Milliliters

**Collection of data**

Data was collected by administration of standard tests for physiological variables. The tests and questionnaire was administered on National Level Players of Rajasthan state schools & CBSE schools.

**Administrations of Tests**

**Physiological Variables**

**Resting Heart Rate**

**Objective:** To Measure the resting heart rate of each subject per minute

**Equipments:** Stop watch.

**Procedure:** The resting heart rate of all the subjects was recorded in a sitting position, before taking heart rate the subjects was asked to relax for about 10 minutes in the morning at 8 a.m. The instruction was given before taking heart rate to the player. The stopwatch holds by me itself and counts the beats for 30 seconds. The resting heart rate of each subject was recorded by palpation of the carotid artery.

**Scoring:** The Number of resting heart rate per minute was recorded as the Scores.

**Blood Pressure**

**Objective:** To measure the diastolic and systolic blood pressure of the subject

**Equipment required:** OMRON-Automatic Blood Pressure Monitor (HEM-7111)

Manufactured by Omron Healthcare Private Limited at Singapore

**Measurement Method:** Oscillometric Method

**Procedure:** The medium arm cuff was placed on a brachial artery in the cubical fossa according to the given instruction in the manual. Blood pressure

Was recorded after the subject has rested quietly for 5 minutes. The subject was seated with the arm resting on the bench, the elbow approximately at the level of the heart. The cuff was fixed on the upper arm and start button was pressed, then the pressure increased to approximately 180 mm Hg and after reaching that value the pressure was automatically released at a rate of approximately 2 mm per second. The systolic and diastolic blood pressure was shown on the display in numeric form. All the subjects were given two repetitions as it was for accuracy.

**Measurement:** Blood pressure was recorded in the units of millimeters of mercury (mm Hg).

**Vital Capacity**

**Objective:** To measure vital capacity of subjects.

**Equipments:** Dry Spiro-meter, Nose Clip

**Procedure:** Vital capacity was measured in milliliters by using Dry-Spiro meter. One trial was given to each player for better performance. The Spiro meter was brought in to zero position. The subject performed maximum inspiration and after closing the nose, the air was blown intensely in the mouth piece of the spirometer. Then the amount of expired air was read directly from the calibrated scale and that was the score of vital capacity.

**Scoring:** The amount of expired air was read directly from the calibrated scale and that was the score of vital capacity and was recorded in milliliters.

**Statistical Technique**

The data was collected from 60 Rajasthan state schools & CBSE schools players on the selected physiological variables. To analyze the data and to see the significant difference among Rajasthan state schools & CBSE schools players the descriptive statistics and t- test was applied using SPSS. The level of significance was set at 0.05.

**ANALYSIS OF DATA AND RESULTS OF THE STUDY**

The data collected for the present study were statistically analyzed and the results and findings (Physiological variables) are presented from table no. 01-16. Physiological variable includes ; Blood Pressure (Systolic and Diastolic), Resting Heart Rate and Vital capacity. The data collected were calculated using descriptive statistics and further,

To compare the difference between Physiological variables of Rajasthan state schools & CBSE schools players, t-test was used and the level of significance was set at 0.05.

Further, the descriptive analysis of selected Physiological variables of Rajasthan state schools players are presented in the table No. 1

Table- 1

Descriptive Analysis of Selected Physiological Variables of Rajasthan state schools Players

Physiological Variables	Units	Min.	Max.	Mean	Std. Error	Std. Dev	Variance	Skewness	Kurtosis
Systolic	mmHg	107.00	132.00	120.21	1.249	6.850	47.01	.010	-.810
Dystolic	mmHg	67.00	87.00	77.547	1.210	6.635	44.05	.224	-1.350
Resting_HR	Beats/min	62.00	75.00	70.756	1.601	3.280	10.85	-.38	-.46
Vital_Capacity	ml	2201.00	3901.00	3135.70	3.044	404.555	1.644	-.20	-.36

Table-1 describes various statistical Parameters of Rajasthan state schools Players in relation to Physiological variables. The average values for different Physiological variables of Rajasthan state schools players were: Systolic Blood Pressure at rest was 120.21mmHg±6.850, Diastolic Blood Pressure at rest was 77.547±6.635mmHg, Resting Heart Rate measures 70.756±3.280 b.min, and Vital Capacity of Rajasthan state schools players were 3135.70±404.555 ml.

In the same age categories, the minimum and maximum value for Physiological variables were: Resting Heart Rate 62;00 b/min , Systolic Blood Pressure 107;132 mmHg, Diastolic Blood Pressure 67;00 mmHg, Vital Capacity 2201;3901 ml ,

The variables like Resting Heart Rate, Vital Capacity, were negatively skewed, whereas, Systolic Blood Pressure and Diastolic Blood Pressure were positively skewed. Negatively skewed distribution shows that most of the data is on the higher side whereas; positively skewed distribution shows that, the most of the data is on the lower side. Since the value of Kurtosis was negative in all the variables, which indicates higher data variability than that to normal distribution.

Further, the descriptive analysis of selected Physiological variables of CBSE schools players are presented in the table No. 2

Table- 2

Descriptive Analysis of Selected Physiological Variables of CBSE schools Players

Physiological Variables	Units	Min.	Max.	Mean	Std. Error	Std. Dev	Variance	Skewness	Kurtosis
Systolic	mmHg	103.00	125.00	116.15	1.114	6.113	37.40	-.63	-.08
Dystolic	mmHg	52.00	85.00	71.130	1.785	9.785	95.77	-.57	-.68
Resting_HR	Beats/min	55.00	78.00	67.832	1.170	6.405	41.04	-.26	-.73
Vital_Capacity	ml	2785.00	4490.00	3439.70	3.588	390.925	1.535	.635	.67

Table -2 describes various statistical Parameters of CBSE schools Players in relation to Physiological variables. The average value for different Physiological variables of CBSE schools players were: Systolic Blood Pressure at rest was 116.15mmHg±6.113, Diastolic Blood Pressure at rest was 71.130±9.785 mmHg, Resting Heart Rate 67.832±6.405 b.min and Vital Capacity was 3439.7±390.925 ml.

In the same age categories, the minimum and maximum value for Physiological variables were: Resting Heart Rate was 55.00 b.min , Systolic Blood Pressure was 103;125 mmHg, Diastolic Blood Pressure was 52;00 mmHg and Vital Capacity measures 2785.00; 4490.00 ml.

The variables like Resting Heart Rate, Systolic Blood Pressure and Diastolic Blood Pressure, were negatively skewed, whereas, Vital Capacity were positively skewed. Negatively skewed distribution shows that, most of the data is on the higher side whereas; positively skewed distribution shows that the most of the data is on the lower side. Since the value of Kurtosis was negative in all the variables except Vital Capacity, which indicates higher data variability than that to normal distribution.

The data were further analyzed with the help of means of Rajasthan state schools & CBSE schools using t- test to find out significant difference through two tailed test in relation to Systolic Blood Pressure and the results pertaining to the same are presented in the table-3

Table- 3

**Analysis of t-ratio in relation to Systolic blood pressure of Rajasthan state schools & CBSE schools Players**

Groups	Mean	SD	MD	t-ratio	Sign. (two tailed)
Rajasthan state schools	118.122	6.212	4.147	2.478*	.017
CBSE schools	120.190	6.785			

\*Significant at 0.05 level, t 0.05 (58) = 1.960

The above table revealed that, there is significant difference between the means of Rajasthan state schools & CBSE schools Players in relation to their Systolic Blood Pressure as the calculated value is 2.478 as compared to the tabulated value of 1.960 with 58 degree of freedom at 0.05 level of significant

The data were further analyzed with the help of means of Rajasthan state schools & CBSE schools players using t- test to find out significant difference through two tailed test in relation to Diastolic Blood Pressure and the results pertaining to the same are presented in the Table-4

Table- 4

**Analysis of t-ratio in relation to Diastolic Blood Pressure of Rajasthan state schools & CBSE schools Players**

Groups	Mean	SD	MD	t-ratio	Sign. (two tailed)
Rajasthan state schools	73.1347	9.77899	5.30000	2.471*	.015
CBSE schools	76.6543	6.65432			

\*Significant at 0.05 level t 0.05 (58) = 1.960

The above table revealed that, there is significant difference between the means of Rajasthan state schools & CBSE schools Players in relation to their Diastolic Blood Pressure as the calculated value is 2.471 as compared to the tabulated value of 1.960 with 58 degree of freedom at 0.05 level of significant

The data were further analyzed with the help of means of Rajasthan state schools & CBSE schools players using t- test to find out significant difference through two tailed test in relation to Resting Pulse Rate and the results pertaining to the same are presented in the table-5.

Table-5

**Analysis of t-ratio in relation to Resting Heart Rate of Rajasthan state schools & CBSE schools Players**

Groups	Mean	SD	MD	t-ratio	Sign. (two tailed)
--------	------	----	----	---------	--------------------

Rajasthan state schools	66.8345	6.5001	2.8979	2.237*	.030
CBSE schools	71.75689	3.2902			

\*Significant at 0.05 level, t 0.05 (58) = 1.960

The above table revealed that, there is significant difference between the means Rajasthan state schools & CBSE schools Players in relation to their Resting Heart Rate as the calculated value is 2.237 as compared to the tabulated value of 1.960 with 58 degree of freedom at 0.05 level of significant

The data were further analyzed with the help of means of Rajasthan state schools & CBSE schools players using t- test to find out significant difference through two tailed test in relation to Vital Capacity and the results pertaining to the same are presented in the table-6

Table- 6

**Analysis of t-ratio in relation to Vital Capacity of Rajasthan state schools & CBSE schools Players**

Groups	Mean	SD	MD	t-ratio	Sign. (two tailed)
Rajasthan state schools	3409.7	390.9500	309.000	3.014*	.004
CBSE schools	3140.7	406.5001			

\*Significant at 0.05 level t 0.05 (58) = 1.960

The above table revealed that, there is significant difference between the means of Rajasthan state schools & CBSE schools Players in relation to their Vital Capacity as the calculated value is 3.014 as compared to the tabulated value of 1.960 with 58 degree of freedom at 0.05 level of significant.

**Discussion of findings**

The result of study has shown significant difference found in systolic and diastolic blood pressure between Rajasthan state schools & CBSE schools players. This may be attributed to the functional capacity of the human being that no player or individual can perform better either in high blood pressure or low blood pressure. In the result of this study significant difference found in systolic blood pressure and it was also supported by **Kaleeswaran (2000)** and the result of the study shows that there was significant difference in systolic blood pressure between men Rajasthan state schools & CBSE schools players.

Significant difference was found between Rajasthan state schools & CBSE schools players in relation to resting heart rate. It shows that the CBSE schools players had the lowest mean (67.833) value in comparison of Rajasthan state schools players (70.766). Further, CBSE schools Players player had shown better efficiency of heart and it was supported by **Upton and sagar (1983), Pattnayak (2005) , Pattanayak (2005) and Rajkumar (2013)** who concluded that basketball group had the lowest resting rate in compare to handball players.

Significant difference was found between Rajasthan state schools & CBSE schools players in relation to vital capacity and it was also supported by **Thirumalaisami(1990)** was concluded that the soccer players had lesser pulse rate, greater vital capacity, and breathe holding time, cardio respiratory endurance than volleyball and basketball players.

### Discussion of Hypotheses

It was hypothesized that, there may be significant difference on Physiological variables of Rajasthan state schools & CBSE schools Players. Therefore, the hypothesis is accepted since significant difference was found among the mean of difference of physiological variables of Rajasthan state schools & CBSE schools players.

### References

Bernard, M. Babior & Thomas, P. Stossel (1994). Hematology - A Path physiological Approach. *New York: Churchill Livingstone.Pg.65 [Crossref][Google Scholar]*

Deborah, A. Wuest & Charles, A. Bucher (2010). Foundations of Physical Education, Exercise Science, and Sport. *United States: McGraw-Hill.P-123 [Crossref][Google Scholar]*

Www. wikipedia. org. . *United States: McGraw-Hill.P-123 [Crossref][Google Scholar] [Crossref][Google Scholar]*

Richard, A. Berger, (1982) Applied Exercise Physiology. Philadelphia: Lea and Febiger. Pg. 136 *[Crossref][Google Scholar]*

David, H. Clarke (1975). Exercise Physiology. United States: Prentice Hall PTR. *Pg.263 [Crossref][Google Scholar]*

Yogendra (2018) "Physiological, Psychological and Haematological profile of Netball and Basketball Players"- A Comparative study. PhD Dissertation BHU Varanasi. . United States: Prentice Hall PTR. *Pg.263 [Crossref][Google Scholar] [Crossref][Google Scholar]*

Disclaimer / Publisher's NoteThe statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of Journals and/or the editor(s). Journals and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.