

Delineation of the Aerobic Capacity Norms of All India Inter University level Volleyball Players

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1.0 Introduction

The main advantage of sports for people is that they help people be healthy, and be fit. Moreover, the overall health of the sports person is a very good indicator about his/her ability to perform well in the tournaments conducted at different levels like, University level tournaments. In addition to above, the knowledge of the health status can help the coaches to design the training schedules in such a way that maximum effectiveness of the same (i.e. training) can be achieved. Also, the better performance of the players can be a real boost to their careers in the respective sports fields. All in all, one can state that there are several advantages and benefits of knowing health status of the sportspersons. However, this study has been carried out with focus on volleyball players.

Physical capacity of volleyball players is an important element of success in sports achievements at tournaments organized at various levels. Aerobic capacity has been accepted as its (physical capacity) major component. Maximal oxygen uptake ($VO_2\max$) has been regarded by majority of authors as the best indicator of aerobic capacity of an individual, and at the same time, the best indicator of an sportsperson's physical capacity. In view of the above, this study has been carried out to delineate the norms for volleyball players participating in University level tournaments with respect to their aerobic capacity and some physiological parameters.

1.1 Delimitations of the Study

1. The study was delimited to All India Inter University Volley Ball Players.
2. This study was further delimited to the All India Inter University Volley Ball Players belonging to age group between 18 and 28 years.

3. The study only considered 300 male volleyball players for delineating the norms.
4. The study was delimited to the following Aerobic capacity parameters, such as Heart Rate, Blood Pressure and Lung Capacity.

1.2 Limitations of the Study

1. Lack of control over the environmental factors was a limitation.
2. Lack of control over the socio-economic status of the volleyball players was a limitation.
3. No incentive was offered to the volleyball players for providing data.

2.0 Research Methodology

2.1 Selection of Subjects

Three Hundred (300) volleyball players participating in the All India Inter University tournament were selected as subjects for the purpose of this study.

2.2 Criterion Measures

The criteria measures chosen for collection of the data with respect to assessment of the aerobic capacity of the volleyball players are as follows:

1) Resting Pulse Rate

When the subjects reported for the testing, they were asked to rest themselves for 15 minutes down the line. The pulse rate was counted by palpating the left radial artery with the fingertips to count the pulse per minute using stopwatch.

2) Resting Blood Pressure

A sphygmomanometer and a stethoscope were used to measure the blood pressure (systolic and diastolic) of the subjects. Each subject was asked to lie relaxed on a bed. Extreme care was taken so that the subjects achieve a comfortable position. These measurements were recorded as the systolic and diastolic measures denoting the resting blood pressure.

3) Lung Capacity

Lung capacity is the amount of air that can be forcibly expired after the deepest possible

imputation, lung capacity, sometimes called vital capacity, is related to one's size and, to a lesser extent, the strength of one's respiratory muscles. It was measured with the help of Wet-Spirometer.

2.3 Design of the Study

A random group design was used for the study.

2.4 Statistical procedure employed

The collected data was analysed statistically with the use of mean, standard deviation, standard error, skewness, kurtosis, etc. The percentiles were also determined for the various aerobic capacity parameters.

3.0 Analysis of the Data and Results of the Study

In this chapter of the thesis all the results obtained after critical analysis of the data are presented. The results are presented by using appropriate tables and graphs.

3.1 Pulse rate - Descriptive Statistics

Table 1: Pulse rate of the volleyball players

	Statistics	Pulse Rate
Descriptive Statistics	Mean	67.4
	Standard Deviation	±4.4
	Standard Error	0.25
	Minimum	56
	Maximum	78
	Skewness	.022
	Kurtosis	-.395
N = 300		

The descriptive statistics (**Table 1**) revealed that the pulse rate of the volleyball players is 67.4±4.4 beats per minute (bpm) while standard error was 0.25. However, total variation in the pulse rate of the volleyball players was observed between 56 and 78 bpm and skewness and kurtosis values are .022 and -.395 respectively. Overall, the skewness and kurtosis values indicated that the data is consistent and the techniques used for data generation are reliable.

3.2 Percentile scores of resting pulse rate

Table 2: Percentile scores of Volleyball players for resting pulse rate test

S.N.	Percentile	Pulse rate
1	10 th	63
2	20 th	63

3	30 th	64
4	40 th	66
5	50 th	68
6	60 th	68
7	70 th	70
8	80 th	72
9	90 th	72
10	99 th	78

In view of the study results, the data for pulse rate test was further analyzed to determine the percentile scores with respect to pulse rate of volleyball players, which is indicative of the health of heart. The 10th to 99th percentile scores for pulse rate of volleyball players were determined from the collected data. The results are provided in above **Table 2**. The 99th percentile value for the pulse rate was 78 beats per minute (bpm), while that of 90th, 80th, 70th, 60th and 50th percentile, it was 72, 72, 70, 68 and 68 bpm respectively, furthermore, for the 40th, 30th and 20th percentile score was 66, 64 and 63 bpm respectively and for 10th percentile it was 63 bpm. The overall spread of data shows that the difference between the pulse rate of volleyball player at 99th percentile and 10th percentile is of 15 bpm. The low variations in pulse rate values show that all the volleyball players have a fit heart.

3.3 Blood Pressure - Systolic - Descriptive statistics

3.4

Table 3: Systolic Blood Pressure of the volleyball players

	Statistics	Blood pressure in mm of Hg
Descriptive Statistics	Mean	115.8
	Standard Deviation	±7.7
	Standard Error	0.44
	Minimum	100
	Maximum	135
	Skewness	-.003
	Kurtosis	-.216
N = 300		

The descriptive statistics (**Table 3**) revealed that the systolic blood pressure of the volleyball players is 115.8±7.7 mm of Hg while standard error was 0.44. However, total variation in the systolic blood pressure of the volleyball players was observed between 100 and 135 mm of Hg and skewness and kurtosis values are -.003 and -.216

respectively. Overall, the skewness and kurtosis values indicated that the data is consistent and the techniques used for data generation are reliable.

3.4 Blood Pressure – Systolic

Table 4: Percentile scores of Volleyball players for systolic blood pressure test

S.N.	Percentile	Blood Pressure - Systolic
1	10 th	105
2	20 th	110
3	30 th	110
4	40 th	114
5	50 th	118
6	60 th	118
7	70 th	120
8	80 th	121
9	90 th	125
10	99 th	135

In view of the study results, the data for blood pressure test was further analyzed to determine the percentile scores with respect to systolic blood pressure of volleyball players, which is indicative of the health of heart. The 10th to 99th percentile scores for systolic blood pressure of volleyball players were determined from the collected data. The results are provided in above **Table 4**. The 99th percentile value for the systolic blood pressure was 135 mm Hg, while that of 90th, 80th, 70th, 60th and 50th percentile, it was 125, 121, 120, 118 and 118 mm Hg respectively, furthermore, for the 40th, 30th and 20th percentile score was 114, 110 and 110 mm per Hg respectively and for 10th percentile it was 105 mm Hg. The overall spread of data shows that the difference between the systolic blood pressure of volleyball player at 99th percentile and 10th percentile is of 30 mm Hg.

3.5 Blood Pressure - Diastolic- Descriptive Statistics

Table 5: Diastolic blood pressure of the volleyball players

	Statistics	Blood pressure in mm of Hg
Descriptive Statistics	Mean	77.2
	Standard Deviation	±6.4
	Standard Error	0.37

Minimum	63
Maximum	93
Skewness	-.028
Kurtosis	-.086
N = 300	

The descriptive statistics (**Table 5**) revealed that the diastolic blood pressure of the volleyball players is 77.2±6.4 mm of Hg while standard error was 0.37. However, total variation in the diastolic blood pressure of the volleyball players was observed between 63 and 93 mm Hg and skewness and kurtosis values are -.028 and -.086 respectively. Overall, the skewness and kurtosis values indicated that the data is consistent and the techniques used for data generation are reliable.

3.6 Blood Pressure – Diastolic

Table 6: Percentile scores of Volleyball players for diastolic blood pressure test

S.N.	Percentile	Blood Pressure - Diastolic
1	10 th	69
2	20 th	70
3	30 th	74
4	40 th	76
5	50 th	78
6	60 th	79
7	70 th	80
8	80 th	82
9	90 th	85
10	99 th	93

In view of the study results, the data for blood pressure test was further analyzed to determine the percentile scores with respect to diastolic blood pressure of volleyball players, which is indicative of the health of heart. The 10th to 99th percentile scores for diastolic blood pressure of volleyball players were determined from the collected data. The results are provided in above **Table 6**. The 99th percentile value for the diastolic blood pressure was 93 mm Hg, while that of 90th, 80th, 70th, 60th and 50th percentile, it was 85, 82, 80, 79 and 78 mm Hg respectively, furthermore, for the 40th, 30th and 20th percentile score was 76, 74 and 70 mm Hg respectively and for 10th percentile it was 69 mm Hg. The overall spread of data shows that the difference between the diastolic blood pressure of volleyball player at 99th percentile and 10th percentile is of 24 mmHg.

3.7 Lung capacity - Descriptive Statistics

Table 7: Lung capacity of the volleyball players

	Statistics	Lung capacity
Descriptive Statistics	Mean	6520
	Standard Deviation	±468.4
	Standard Error	69.4
	Minimum	5100
	Maximum	7880
	Skewness	1.004
	Kurtosis	-.0647
N = 300		

The descriptive statistics (Table 7) revealed that the Lung capacity of the volleyball players is 6520±468.4 ml while standard error was 69.4. However, total variation in the Lung capacity of the volleyball players was observed between 5100 and 7880 ml and skewness and kurtosis values are 1.004 and -.0647 respectively. Overall, the skewness and kurtosis values indicated that the data is consistent and the techniques used for data generation are reliable.

3.8 Percentile scores of Lung capacity

Table 8: Percentile scores of Volleyball players for Lung capacity test

S.N.	Percentile	Lung capacity
1	10 th	5110
2	20 th	5520
3	30 th	5970
4	40 th	6230
5	50 th	6590
6	60 th	6880
7	70 th	7060
8	80 th	7200
9	90 th	7540
10	99 th	7880

In view of the study results, the data for Lung capacity test was further analyzed to determine the percentile scores with respect to Lung capacity of volleyball players, which is indicative of the health of heart. The 10th to 99th percentile scores for Lung capacity of volleyball players were determined from the collected data. The results are provided in above Table 8. The 99th percentile value for the Lung capacity was 7880 ml, while that of 90th, 80th, 70th, 60th and 50th percentile, it was 7540, 7200, 7060, 6880 and 6590 ml respectively, furthermore, for the

40th, 30th and 20th percentile score was 6230, 5970 and 5220 ml respectively and for 10th percentile it was 5110 ml. The overall spread of data shows that the difference between the Lung capacity of volleyball player at 99th percentile and 10th percentile is of 2770 ml (Fig.8).

4.0 Conclusions

4.1 Conclusions related to delineation of norms for aerobic capacity parameters

The percentile norms of 12 selected test items indicate that the distribution of scores of almost all the test-items resides in the normal range of a probability curve. The final norms obtained for all the test items are presented hereunder

4.1.1 Pulse Rate - Norms for the Volleyball Players

- On the basis of the study results, it is concluded that the overall spread of data for the pulse rate shows that the difference between the volleyball player at 99th percentile and 10th percentile is of 15 bpm.

4.1.2 Norms for the pulse rate of Volleyball Players

S.N.	Performance	Percentile	Pulse rate (nos.)
1	Excellent	<40 th	<66
2	Good	40 th to 70 th	66 to 70
3	Average	70 th to 90 th	70 to 72
4	Below Average	>90	Above 72

4.1.3 Blood Pressure – Systolic- Norms for the Volleyball Players

- On the basis of the study results, it is concluded that the overall spread of data for the systolic blood pressure shows that the difference between the volleyball player at 99th percentile and 10th percentile is of 30 bpm.

4.1.4 Norms for the blood pressure – systolic rate of Volleyball Players

S.N.	Performance	Percentile	BP mm of Hg
1	Excellent	<40 th	<114
2	Good	40 th to 70 th	114 to 120
3	Average	70 th to 90 th	120 to 125
4	Below Average	>90	Above 135

4.1.5 Blood Pressure – Diastolic- Norms for the Volleyball Players

- On the basis of the study results, it is concluded that the overall spread of data for the diastolic blood pressure shows that the difference

between the volleyball player at 99th percentile and 10th percentile is of 24 bpm

4.1.6 Norms for the blood pressure – diastolic of Volleyball Players

S.N.	Performance	Percentile	BP mm of Hg
1	Excellent	<40 th	<76
2	Good	40 th to 70 th	76 to 80
3	Average	70 th to 90 th	80 to 85
4	Below Average	>90	Above 85

5.0 Bibliography

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