

Development of Norms of Selected Body Composition Components of All India Inter University Level Volleyball Players**Researcher****Mr. Sujan Barman**

M.P. Ed.

Supervisor**Dr. Avinash C. Shahare**

M. P. Ed., Ph.D.

Shri Nashikrao Tirpude College of
Physical Education, Nagpur**1.0 Introduction**

Volleyball is a popular sport that is played professionally, as well as in recreational leagues, on school teams, in backyards, at local, national and international levels. The game of volleyball can be enjoyed virtually anywhere a net can be set up and hence, has a wide following. Volleyball in India is a popular sport that is played in various regions of India and several reputed Volleyball. The performance of the volleyball players in various tournaments is critical for their professional development and career advancement in this field. Hence, in order to develop new mechanisms for the physical development of the players as well as ensuring their optimum performance, it is necessary to know their body composition status.

The search for valid methods of measuring body composition that are practical and inexpensive is an ongoing process for exercise scientists and sports coaches along with the nutritionists. In view of the popularity of the volleyball game, it is apparent that the players should be in proper shape to carry out various activities during the game. These actions primarily involves repeated jumping, blocking, spiking, power hitting, and setting which require a proper body shape as well as high level of strength and power. In addition, a detailed information about the body composition of volleyball players can provide valuable information about their health and metabolic status. Hence, a systematic study was carried out for volleyball players as the game is popular and played throughout the world. Hence, in the background of above information researcher decided to select above mentioned topic for study. In this study only male volleyball players who have participated in the All India Inter University

Volleyball tournaments were selected. Also, the selected body composition parameters include

2.0 Research Methodology**2.1 Selection of Subjects**

In this study a total of 300 volleyball players participating in the All India Inter University tournament were selected as subjects. The age group of the subjects ranged between 18 and 28 years.

2.2 Criterion Measures**2.2.1 Body Composition**

The following measurements were taken for these variables:

1) Height

The subjects were asked to stand erect, bare-footed on a plane horizontal surface against a wall, with their heels, back of the shoulders and head touching the wall. The measurement was recorded from the anthrop meter's eye correct up to 0.1 cm.

2) Body Weight

The subjects were asked to stand erect in the centre of the platform of a portable weighing machine with equal pressure on both the feet. Weight was measured in Kgs.

3) Arm Length

Arm length was measured with the standard steel tape. The subjects were asked to stand erect with their feet together. The measurement was taken from point of the shoulder to the tip of the middle finger. The readings were recorded to the nearest centimeter.

4) Leg Length

The leg length of the subjects was measured with standard steel tape. The subjects were asked to stand erect with their feet together. The measurements were taken from the outside edge of the centre of the foot to the upper edge of the greater trichinae.

Readings were recorded to the nearest centimeters.

5) Biceps Girth

The subjects were asked to stand erect with equal weight on both the feet and with hands hanging freely. The biceps girth was measured on the left naked upper arm. The measurements were taken with a steel tape at the level of halfway between the tip of acromion and colcannon in centimeters.

6) Upper Thigh Girth

The subjects were made to stand with their feet slightly apart and with their weight equally distributed on both the legs. The tape was placed around the thigh between the points trochantorion and tibia. The girth was recorded in centimeters.

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 and body composition parameters.

3.0 Analysis of the Data and Results of the Study

3.1 Height - Descriptive Statistics

Table 1: Height of the volleyball players

	Statistics	Height in meters
Descriptive Statistics	Mean	1.76
	Standard Deviation	±0.06
	Standard Error	0.00
	Minimum	1.62
	Maximum	1.93
	Skewness	.241
	Kurtosis	-.529
N = 300		

The descriptive statistics (**Table 1**) revealed that the height of the volleyball players is 1.76±0.06 meters while standard error was 0.00. However, total variation in the height of the volleyball players was observed between 1.62 and 1.93 meters and skewness and kurtosis values are .241 and -.529 respectively. Overall, the skewness and kurtosis values indicated that the data is consistent and the techniques used for data generation are reliable.

3.2 Height

Table 2: Percentile scores of Volleyball players for height measurement

S.N.	Percentile	Height
1	10 th	1.68
2	20 th	1.71
3	30 th	1.72
4	40 th	1.73
5	50 th	1.74
6	60 th	1.78
7	70 th	1.80
8	80 th	1.82
9	90 th	1.84
10	99 th	1.93

In view of the study results, the data for height measurement was further analyzed to determine the percentile scores with respect to height of volleyball players. The 10th to 99th percentile scores for height of volleyball players were determined from the collected data. The results are provided in above **Table 2**. The 99th percentile value for the height was 1.93 meters, while that of 90th, 80th, 70th, 60th and 50th percentile, it was 1.84, 1.82, 1.80, 1.78 and 1.74 meters respectively, furthermore, for the 40th, 30th and 20th percentile score was 1.73, 1.72 and 1.71 meters respectively and for 10th percentile it was 1.68 meters. The overall spread of data shows that the difference between the height of volleyball player at 99th percentile and 10th percentile is of 0.25 meters.

3.3 Weight - Descriptive Statistics

Table 3: Weight of the volleyball players

	Statistics	Weight in Kg
Descriptive Statistics	Mean	64.9
	Standard Deviation	±8.3
	Standard Error	0.48
	Minimum	47.0
	Maximum	88.0
	Skewness	.277
	Kurtosis	-.394
	N = 300	

The descriptive statistics (**Table 3**) revealed that the weight of the volleyball players is 64.9±8.3 kg while standard error was 0.48. However, total variation in the weight of the volleyball players was

observed between 47.0 and 88.0 kg and skewness and kurtosis values are .277 and -.394 respectively. Overall, the skewness and kurtosis values indicated that the data is consistent and the techniques used for data generation are reliable.

3.4 Weight

Table 4 : Percentile scores of Volleyball players for weight measurement

S.N.	Percentile	Weight
1	10 th	54.0
2	20 th	58.0
3	30 th	59.0
4	40 th	63.0
5	50 th	65.0
6	60 th	66.0
7	70 th	67.7
8	80 th	74.9
9	90 th	75.9
10	99 th	88.0

In view of the study results, the data for weight measurement was further analyzed to determine the percentile scores with respect to weight of volleyball players. The 10th to 99th percentile scores for weight of volleyball players were determined from the collected data. The results are provided in above **Table 4**. The 99th percentile value for the weight was 88.0 kg, while that of 90th, 80th, 70th, 60th and 50th percentile, it was 75.9, 74.9, 67.7, 66.0 and 65.0 kg respectively, furthermore, for the 40th, 30th and 20th percentile score was 63.0, 59.0 and 58.0 kg respectively and for 10th percentile it was 54.0 kg. The overall spread of data shows that the difference between the weight of volleyball player at 99th percentile and 10th percentile is of 34 kg. The low variations in weight values show that all the volleyball players have suitable weight for the game.

3.5 Arm Length - Descriptive Statistics

Table 5 : Arm Length of the volleyball players

	Statistics	Arm length in cm
Descriptive Statistics	Mean	58.1
	Standard Deviation	±3.6
	Standard Error	0.21
	Minimum	50.0
	Maximum	69.0
	Skewness	.511
	Kurtosis	.319
	N = 300	

The descriptive statistics (**Table 5**) revealed that the arm length of the volleyball players is 58.1±3.6 cm while standard error was 0.21. However, total variation in the arm length of the volleyball players was observed between 50.0 and 69.0 cm and skewness and kurtosis values are .511 and .319 respectively. Overall, the skewness and kurtosis values indicated that the data is consistent and the techniques used for data generation are reliable.

3.6 Arm Length

Table 6 : Percentile scores of Volleyball players for arm length measurement

S.N.	Percentile	Arm Length
1	10 th	54.0
2	20 th	55.0
3	30 th	56.0
4	40 th	56.5
5	50 th	58.0
6	60 th	59.0
7	70 th	60.0
8	80 th	61.0
9	90 th	63.5
10	99 th	69.0

In view of the study results, the data for arm length measurement was further analyzed to determine the percentile scores with respect to arm length of volleyball players. The 10th to 99th percentile scores for arm length of volleyball players were determined from the collected data. The results are provided in above **Table 6**. The 99th percentile value for the arm length was 69.0 cm, while that of 90th, 80th, 70th, 60th and 50th percentile, it was 63.5, 61.0, 60.0, 59.0 and 58.0 cm respectively, furthermore, for the 40th, 30th and 20th percentile score was 56.5, 56.0 and 55.0 cm respectively and for 10th percentile it was 54.0 cm. The overall spread of data shows that the difference between the arm length of volleyball player at 99th percentile and 10th percentile is of 15 cm. The high variations in arm length values show that all the volleyball players have suitable arm length for the game.

3.7 Leg Length - Descriptive Statistics

Table 7: Leg Length of the volleyball players

	Statistics	Leg length in cm
Descriptive Statistic	Mean	94.7
	Standard Deviation	±5.9
	Standard Error	0.34

Minimum	70.5
Maximum	108.0
Skewness	-1.488
Kurtosis	3.413
N = 300	

The descriptive statistics (Table 7) revealed that the leg length of the volleyball players is 94.7 ± 5.9 cm while standard error was 0.34. However, total variation in the leg length of the volleyball players was observed between 70.5 and 108.0 cm and skewness and kurtosis values are -1.488 and 3.413 respectively. Overall, the skewness and kurtosis values indicated that the data is consistent and the techniques used for data generation are reliable.

3.8 Leg Length

Table 8: Percentile scores of Volleyball players for leg length measurement

S.N.	Percentile	Leg Length
1	10 th	87.5
2	20 th	91.0
3	30 th	93.5
4	40 th	95.0
5	50 th	96.0
6	60 th	97.0
7	70 th	97.5
8	80 th	99.0
9	90 th	101.0
10	99 th	108.0

In view of the study results, the data for leg length measurement was further analyzed to determine the percentile scores with respect to leg length of volleyball players. The 10th to 99th percentile scores for leg length of volleyball players were determined from the collected data. The results are provided in above Table 8. The 99th percentile value for the leg length was 108.0 cm, while that of 90th, 80th, 70th, 60th and 50th percentile, it was 101.0, 99.0, 97.5, 97.0 and 96.0 cm respectively, furthermore, for the 40th, 30th and 20th percentile score was 95.0, 93.5 and 91.0 cm respectively and for 10th percentile it was 87.5 cm. The overall spread of data shows that the difference between the leg length of volleyball player at 99th percentile and 10th percentile is of 20.5 cm. The high variations in leg

length values show that all the volleyball players have suitable leg length for the game.

3.9 Biceps Girth - Descriptive Statistics

Table 9 : Biceps Girth of the volleyball players

Statistics	Biceps girth in cm
Mean	30.4
Standard Deviation	± 1.9
Standard Error	0.11
Minimum	26.0
Maximum	103.0
Skewness	.188
Kurtosis	-.342
N = 300	

The descriptive statistics (Table 9) revealed that the biceps girth of the volleyball players is 30.4 ± 1.9 cm while standard error was 0.11. However, total variation in the biceps girth of the volleyball players was observed between 26 and 103 cm and skewness and kurtosis values are .188 and -.342 respectively. Overall, the skewness and kurtosis values indicated that the data is consistent and the techniques used for data generation are reliable.

3.10 Biceps Girth

Table 10 : Percentile scores of Volleyball players for biceps girth measurement

S.N.	Percentile	Biceps Girth
1	10 th	28.0
2	20 th	29.0
3	30 th	29.0
4	40 th	30.0
5	50 th	30.0
6	60 th	31.0
7	70 th	31.0
8	80 th	32.0
9	90 th	33.0
10	99 th	35.0

In view of the study results, the data for biceps girth measurement was further analyzed to determine the percentile scores with respect to biceps girth of volleyball players. The 10th to 99th percentile scores for biceps girth of volleyball players were determined from the collected data. The results are provided in above Table 10. The 99th percentile value for the biceps girth was 35.0 cm, while that of 90th, 80th, 70th, 60th and 50th percentile, it was 33.0, 32.0, 31.0, 31.0 and 30.0 cm respectively, furthermore, for the 40th, 30th and 20th percentile

score was 30.0, 29.0 and 29.0 cm respectively and for 10th percentile it was 28.0 cm. The overall spread of data shows that the difference between the biceps girth of volleyball player at 99th percentile and 10th percentile is of 7 cm. The high variations in biceps girth values show that all the volleyball players have suitable biceps girth for the game.

3.11 Upper Thigh Girth - Descriptive Statistics

Table 11 : Upper Thigh Girth of the volleyball players

	Statistics	Upper thigh girth in cm
Descriptive Statistics	Mean	54.5
	Standard Deviation	±3.8
	Standard Error	0.22
	Minimum	47.0
	Maximum	67.0
	Skewness	.963
	Kurtosis	1.286
	N = 300	

The descriptive statistics (Table 11) revealed that the upper thigh girth of the volleyball players is 54.5±3.8 cm while standard error was 0.22. However, total variation in the upper thigh girth of the volleyball players was observed between 47 and 67 cm and skewness and kurtosis values are .963 and 1.286 respectively. Overall, the skewness and kurtosis values indicated that the data is consistent and the techniques used for data generation are reliable.

3.12 Upper Thigh Girth

Table 12 : Percentile scores of Volleyball players for upper thigh girth measurement

S.N.	Percentile	Upper Thigh Girth
1	10 th	50.0
2	20 th	51.0
3	30 th	52.0
4	40 th	53.0
5	50 th	54.0
6	60 th	55.0
7	70 th	56.0
8	80 th	57.0
9	90 th	58.0
10	99 th	67.0

In view of the study results, the data for upper thigh girth measurement was further analyzed

to determine the percentile scores with respect to upper thigh girth of volleyball players. The 10th to 99th percentile scores for upper thigh girth of volleyball players were determined from the collected data. The results are provided in above Table 12. The 99th percentile value for the upper thigh girth was 67.0 cm, while that of 90th, 80th, 70th, 60th and 50th percentile, it was 58.0, 57.0, 56.0, 55.0 and 54.0 cm respectively, furthermore, for the 40th, 30th and 20th percentile score was 53.0, 52.0 and 51.0 cm respectively and for 10th percentile it was 50.0 cm. The overall spread of data shows that the difference between the upper thigh girth of volleyball player at 99th percentile and 10th percentile is of 17 cm. The high variations in upper thigh girth values show that all the volleyball players have suitable upper thigh girth for the game.

4.0 Conclusions

4.1 Conclusions related to quality of data generated in this study

4.1.1 Height

- On the basis of study results it is evident that, the overall spread of data shows that the difference between the height of volleyball player at 99th percentile and 10th percentile is of 0.25 meters.

4.1.2 Weight

- On the basis of study results it is evident that, the overall spread of data shows that the difference between the weight of volleyball player at 99th percentile and 10th percentile is of 34 kg.

4.1.3 Arm Length

- On the basis of the study results it is evident that, the overall spread of data shows that the difference between the arm length of volleyball player at 99th percentile and 10th percentile is of 15 cm.

4.1.4 Leg Length

- On the basis of the study results it is evident that, the overall spread of data shows that the difference between the leg length of volleyball player at 99th percentile and 10th percentile is of 20.5 cm.

4.1.5 Biceps Girth

- On the basis of the study results it is evident that, the overall spread of data shows that the

difference between the biceps girth of volleyball player at 99th percentile and 10th percentile is of 7 cm.

4.1.6 Upper Thigh Girth

- On the basis of the study results it is evident that, the overall spread of data shows that the difference between the upper thigh girth of volleyball player at 99th percentile and 10th percentile is of 17 cm.

4.2 Norms

The percentile norms of 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

4.2.1 Norms for the height of Volleyball Players

S.N.	Performance	Percentile	Height in meters
1	Excellent	>90	>1.84
2	Good	70 th to 90 th	1.80 to 1.84
3	Average	40 th to 70 th	1.73 to 1.80
4	Below Average	<40 th	Less than 1.73

4.2.2 Norms for the weight of Volleyball Players

S.N.	Performance	Percentile	Weight in Kg
1	Excellent	<40 th	<63
2	Good	40 th to 70 th	63 to 67.7
3	Average	70 th to 90 th	67.7 to 75.9
4	Below Average	>90	Above 75.9

4.2.3 Norms for the arm length of Volleyball Players

S.N.	Performance	Percentile	Arm length in cm
1	Excellent	>90	>63.5
2	Good	70 th to 90 th	60 to 63.5
3	Average	40 th to 70 th	56.5 to 60.0
4	Below Average	<40 th	Less than 56.5

4.2.4 Norms for the leg length of Volleyball Players

S.N.	Performance	Percentile	Leg length in cm
1	Excellent	>90	>101.0
2	Good	70 th to 90 th	97.5 to 101.0
3	Average	40 th to 70 th	95.0 to 97.5
4	Below Average	<40 th	Less than 95.0

4.4.5 Norms for the biceps girth of Volleyball Players

S.N.	Performance	Percentile	Biceps girth in cm
1	Excellent	>90	>33
2	Good	70 th to 90 th	31 to 33
3	Average	40 th to 70 th	30 to 31
4	Below Average	<40 th	Less than 30

4.2.6 Norms for the upper thigh girth

S.N.	Performance	Percentile	Upper thigh girth in cm
1	Excellent	>90	>58.0
2	Good	70 th to 90 th	56.0 to 58.0
3	Average	40 th to 70 th	53.0 to 56.0
4	Below Average	<40 th	Less than 53.0

5.0 Bibliography

- Kavazis, A. N and Wadsworth, D. D. (2014). Changes in Body Composition and Perceived Stress Scale-10 in National Collegiate Athletic Association Division I Female Volleyball Players, *Arch Exerc Health Dis.*, 4 (3), pp.320-325.
- Bankovic, V., Dopsaj, M., Terzic, Z., Nestic, G., Bankovic, V., Dopsaj, M., Terzic, Z and Nestic, G. (2018). Descriptive Body Composition Profile in Female Olympic Volleyball Medalists, *Int. J. Morphol.*, 36(2), pp. 699-708.
- Bayios, I. A., Bergeles, N. K., Apostolidis, N.G., Noutsos, K.S and Koskolou M.D.(2006). Anthropometric, body composition and somatotype differences of Greek elite female basketball, volleyball and handball players, *J Sports Med Phys Fitness*, 46(2), pp. 271-80.
- Bjelica, P. S., Jaksic, D and Hadzic, R. (2014). Comparative study of anthropometric measurement and body composition between elite soccer and volleyball players, *Int. J. Morphol*, 32(1), pp. 267-274.
- Brodie, D. A. (1988). Techniques of measurement of body composition Part II, *Sports Medicine*, 5, pp.74-98.
- Gil, S.M and Gil, J. (2007). Physiological and anthropometric characteristics of young soccer players according to their playing position: relevance for the selection process, *Journal of Strength and Conditioning Research*, 21 (2), pp. 438-445.

7. Jaiswal A. (2014). Anthropometric and Somatotyping Study among the Female Kho-Kho Players of Pondicherry: A Comparative Analysis, *J Glob Econ*, 2(4).
8. Kumari, S., Bhatnagar, B and Uppal, A. K. (2018). Comparison of Body Mass-Index and Nutrient Adequacy Ratio of Inter Collegiate and All India Interuniversity Male Volleyball Players, *Journal of Sports Science*, 6, pp.129-132.
9. Malá, L., Malý, T., Záhalka, F and Bunc, V.(2010). The Profile and Comparison of Body Composition of Elite Female Volleyball Players, *Kinesiology*, 42(1).
10. Martín-Matillas, M., Valadés, D., Hernández-Hernández, E., Olea-Serrano, F., Sjoström, M and Delgado-Fernández, M. (2013). Anthropometric, body composition and somatotype characteristics of elite female volleyball players from the highest Spanish league, *Journal of Sports Sciences*, 32(2), pp. 137-148.
11. Stefania, T and Francesco, C. (2018). Anthropometry and Functional Movement Patterns in Elite Male Volleyball Players of Different Competitive Levels, *The Journal of Strength & Conditioning Research*, 32(9),pp. 2601-2611.
12. Tan, S., Chen, C., Sui, M., Xue, L and Wang, J.(2017). Exercise Training Improved Body Composition, Cardiovascular Function, and Physical Fitness of 5-Year-Old Children With Obesity or Normal Body Mass, 29(2), pp. 245-253.

