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A descriptive study on selected anthropometric variables in national volleyball players

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Abstract

Aim: The purpose of the study was to determine the Anthropometric characteristics National Volleyball Players.

Methods: The study was conducted on sixty volleyball players from various states which participated in National Volleyball Championship. Twenty subjects from each team (i.e. Spiker, Setter and Libro) were selected for the present study. The age of the subjects ranged from 18 to 25 years.

Variables: The following Anthropometric variables were selected for the purpose of this study: Standing Height, Body Weight, Leg Length, Arm Length, Forearm Length, Trunk Length, Upper Arm Girth, Hand Length, Thigh Length, Thigh girth, Calf Girth.

Statistics: To characterize Volleyball players by their selected anthropometrical variables to standard human performance measures, descriptive statistics was used.

Conclusions: Spikers were taller and heavier than set-upper and Libero whereas Libero are most shortest player in a team.

Keywords: Anthropometric, Volleyball

Introduction

Sports and games are no longer just sports games. They are big business all over the world. The boom in Prize Money and the practice of internationally renowned sportsman signing on the product has made sports, big business. Sports lover shall over the World are happy that reputed sportsman are no longer obliged to follow a regime of high thinking and low living. Sports by their nature are enjoyable, challenging and absorbing, and require a certain amount of skills and physical condition (Seten 1956). In the order of human values conquest in field of sports hold a unique plane. It is the combination of success, victory, triumph and domination of mover other team mates and friends. The sublimity of competition is in the loser's acclaim for the winners, which along with the friends and shake acknowledge both defeat and triumph (Rieckehoff, 1977).

Change and challenges are the twin laws of nature as they affect every aspect of human life. Changes are taking place all around and because of these changes new challenges present themselves. Man is constantly trying to meet these challenges and excel his previous performance every time (panner 1981).

Anthropometrics measurements were central concerns of the first phase of the scientific era of measurements, which have been began in the 1860's current interest in anthropometrics measurements focus in three areas, girth measures, body type and body composition. The assess of such measures include classification, prediction of growth patterns and prediction of success in motor activities as well as assessment of ability (Philips 1979).

Anthropometric measurement consists of objective measurements of structure and functions of the body. The measurement of the structure includes items such as weight, total height and width, the depth and the circumferences of the chest etc. The measurements of functions includes such items as pulse rate arterial and venous, blood pressure, muscles strength, basal metabolic rate, estimate from cardio-vascular posture and breathing capacity (Sundarajan 1972).

Objective of the study

The purpose of the study was to determine the Anthropometric & Physiological characteristics of National Volleyball Players.

The study was conducted on sixty volleyball players from various states which participated in National Volleyball Championship. Twenty subjects from each team (i.e. Spiker, Setter and Libro) were selected for the present study. The age of the subjects ranged from 18 to 25 years. Based on literary evidence and scholar's own understanding the following variables were selected for the purpose of this study: Anthropometric Characteristics Standing Height, Body Weight, Leg Length, Arm Length, Forearm Length, Trunk Length, Upper Arm Girth, Hand Length, Thigh Length, Thigh girth, Calf Girth.

It was hypothesized that means Anthropometrical and Physiological variable of National Volleyball Players will be not distinct in nature.

At the beginning, the investigator gathered all the subjects of volleyball (spiker, set-upper and libero) of and explained the purpose of the present study to them. The required data in

different components was collected during the course of three days in the volleyball field of (Raipur, Senior National 2007). The coaches and subjects were consulted personality and their sincere co-operation was solicited. Respondents were called to a common place when they were not busy and had enough time to spare for testing. Necessary instructions were given to the subjects before the administration of each test.

The criterion measures chosen were: Height, Arm Length, Forearm Length, Trunk Length, Upper Arm girth, Hand Length, Leg length, Thigh Girth, Calf Girth, Standing height, Body weight and Thigh length was measured with the help of flexible steel tape and score was recorded nearest to half centimeter.

To find the characteristics of selected anthropometrical variables of Spikers, Setuppers and Libero, Descriptive statistics has been applied. Moreover, in order to compare the selected anthropometrical among spikers, setuppers and libero, ANOVA (One way Analysis of Variance) has been applied. The above statistical technique was performed by using SPSS version 11.5.

Table 1: Descriptive Analysis in Selected Anthropometrical Variables for Spikers (n=20)

| Anthropometrical Variables | Standing Height | Body weight | Arm Length | Fore Arm Length | Trunk Length | Upper Arm Girth | Hand Length | Leg Length | Thigh Girth | Calf Girth | Thigh Length |
|----------------------------|-----------------|-------------|------------|-----------------|--------------|-----------------|-------------|------------|-------------|------------|--------------|
| Mean | 189.4 | 82.24 | 80.8 | 32.8 | 78.16 | 29.6 | 23.2 | 111.4 | 58.7 | 42.8 | 60.2 |
| S.D | 2.07 | 3.917 | 1.85 | 1.65 | 2.082 | 1.61 | 1.32 | 2.477 | 6.2 | 1.64 | 5.78 |
| Median | 190 | 84 | 80 | 33 | 78.5 | 30 | 23 | 111 | 60 | 43 | 61 |
| Mode | 188 | 84 | 80 | 34 | 75 | 30 | 23 | 109 | 59 | 44 | 61 |
| Sample Variance | 4.285 | 15.34 | 3.43 | 2.73 | 4.335 | 2.58 | 1.73 | 6.135 | 38.4 | 2.7 | 33.4 |
| Kurtosis | -0.113 | -0.81 | 0.12 | 0.37 | -1.26 | 0.03 | -1.01 | -1.46 | 16.1 | -0.75 | 13.5 |
| Skewness | -0.321 | -0.53 | 0.82 | -0.29 | -0.31 | -0.4 | -0.11 | 0.213 | -3.89 | -0.64 | -3.41 |
| Range | 8 | 13 | 7 | 7 | 6 | 6 | 4 | 7 | 29 | 5 | 27 |
| Minimum | 185 | 75 | 78 | 29 | 75 | 26 | 21 | 108 | 34 | 40 | 38 |
| Maximum | 193 | 88 | 85 | 36 | 81 | 32 | 25 | 115 | 63 | 45 | 65 |
| Standard Error | 0.475 | 0.899 | 0.42 | 0.38 | 0.478 | 0.37 | 0.3 | 0.568 | 1.42 | 0.38 | 1.33 |

Table - 1 describes various statistics of Volleyball Players in relation to Anthropometrical variables. The mean and Standard deviation of Anthropometrical variables of Spikers were: Standing Height (cm.) (189.4± 2.07), Body weight (kg.) (82.24± 3.917), Arm Length (cm.) (80.8±1.85), Fore Arm Length (cm.) (32.8± 1.65), Trunk Length (cm.) (78.16± 2.082), Upper Arm Girth (cm.) (29.6±1.61), Hand Length (cm.) (23.2± 1.32), Leg Length (cm.) (111.4± 2.477), Thigh Girth (cm.) (58.7±6.2), Calf Girth (cm.) (42.8± 1.64), Thigh Length (cm.) (60.2±5.78) respectively.

In the same age categories, the minimum and maximum values for Anthropometrical variables were: Standing Height (185;193 cm.), Body weight (75; 88 kg.), Arm Length (78; 85 cm.), Fore Arm Length (29; 36 Cm), Trunk Length (75; 81 cm.), Upper Arm Girth (26; 32 cm.), Hand Length (21; 25 cm.), Leg Length (108; 115 cm.), Thigh Girth (34; 63 cm.), Calf Girth (40; 45 cm.), Thigh Length (38; 65 cm.) respectively.

The variables like Standing Height, Body weight, Fore Arm Length, Trunk Length, Upper Arm Girth, Hand Length, Thigh Girth, Calf Girth, Thigh Length were negatively skewed, whereas variables like Arm Length and Leg Length 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 almost all the variables, except Arm Length, Fore Arm Length, Upper Arm Girth, Thigh Girth and Thigh Length it shows that the data on these variables, except Arm Length, Fore Arm Length, Upper Arm Girth, Thigh Girth and Thigh Length were more variable than that of normal distribution. On looking at the value of coefficient of variance it was found that the maximum variability was 38.4 in relation to Thigh Girth whereas minimum variability of 1.73 was noticed in Hand Length.

Table 2: Descriptive Analysis in Selected Anthropometrical Variables for Set-upper (n=20)

| Anthropometrical Variables | Stand Height | Body weight | Arm Length | Fore Arm Length | Trunk Length | Upper Arm Girth | Hand Length | Leg Length | Thigh Girth | Calf Girth | Thigh Length |
|----------------------------|--------------|-------------|------------|-----------------|--------------|-----------------|-------------|------------|-------------|------------|--------------|
| Mean | 180.78 | 74.25 | 74.23 | 36.35 | 74.9 | 24.03 | 21.8 | 105.8 | 51.35 | 37.95 | 57.85 |
| S. D | 2.468 | 5.401 | 3.222 | 1.954 | 1.42 | 3.315 | 1.609 | 1.8806 | 2.084 | 2.282 | 2.277 |
| Median | 181 | 74.5 | 75 | 36.5 | 75 | 24 | 21 | 106 | 51 | 38 | 58.5 |
| Mode | 181 | 76 | 77 | 35 | 75 | 25 | 21 | 106 | 51 | 40 | 59 |
| Sample Variance | 6.091 | 29.17 | 10.38 | 3.818 | 2.016 | 10.99 | 2.589 | 3.5368 | 4.345 | 5.208 | 5.187 |
| Kurtosis | -0.633 | 2.496 | -0.816 | -0.5 | 2.563 | -1.42 | -0.99 | 1.4885 | -0.8 | -0.41 | -0.736 |
| Skewness | -0.148 | 1.161 | -0.467 | -0.36 | 0.991 | 0.161 | 0.529 | 0.69 | 0.294 | -0.37 | -0.211 |

| | | | | | | | | | | | |
|----------------|--------|-------|------|-------|-------|-------|------|--------|-------|------|-------|
| Range | 9 | 23 | 11 | 7 | 6.5 | 10 | 5 | 8 | 7 | 9 | 8 |
| Minimum | 176 | 67 | 68 | 32 | 72.5 | 19 | 20 | 102 | 48 | 33 | 54 |
| Maximum | 185 | 90 | 79 | 39 | 79 | 29 | 25 | 110 | 55 | 42 | 62 |
| Standard Error | 0.5519 | 1.208 | 0.72 | 0.437 | 0.317 | 0.741 | 0.36 | 0.4205 | 0.466 | 0.51 | 0.509 |

Table - 2 describes various statistics of Volleyball Players in relation to Anthropometrical variables. The mean and Standard deviation of Anthropometrical variables of Set-uppers were: Standing Height (cm.) (180.78± 2.4681), Body weight (kg.) (74.25± 5.401) Arm Length (cm.) (74.23± 3.222), Fore Arm Length (cm.) (36.35± 1.954), Trunk Length (cm.) (74.9± 1.42), Upper Arm Girth (cm.) (24.03± 3.315), Hand Length (cm.) (21.8± 1.609), Leg Length (cm.) (105.8± 1.8806), Thigh Girth (cm.) (51.35± 2.084), Calf Girth (cm.) (37.95± 2.282) and Thigh Length (cm.) (57.85± 2.277) respectively.

In the same age categories, the minimum and maximum values for Anthropometrical variables were: Standing Height (176; 185 cm.), Body weight (67; 90 kg.), Arm Length (68; 79 cm.), Fore Arm Length (32; 39 cm.), Trunk Length (72.5; 79 cm.), Upper Arm Girth (19; 29 cm.), Hand Length (20; 25 cm.), Leg Length (102; 110 cm.), Thigh Girth (48; 55 cm.),

Calf Girth (33; 42 cm.), Thigh Length (54; 62 cm.) respectively.

The variables like Standing Height, Arm Length, Fore Arm Length, Calf Girth and Thigh Length were negatively skewed, whereas variables like Body weight, Trunk Length, Upper Arm Girth, Hand Length, Leg Length and Thigh Girth 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 almost all the variables, except Body weight, Trunk Length and Leg Length it shows that the data on these variables, except Body weight, Trunk Length and Leg Length were more variable than that of normal distribution. On looking at the value of coefficient of variance it was found that the maximum variability was 29.17 in relation to Body weight whereas minimum variability of 2.016 was noticed in Trunk Length.

Table 3: Descriptive Analysis in Selected Anthropometrical Variables for Libero (n=20)

| Anthropometrical Variables | Standing Height | Body weight | Arm Length | Fore Arm Length | Trunk Length | Upper Arm Girth | Hand Length | Leg Length | Thigh Girth | Calf Girth | Thigh Length |
|----------------------------|-----------------|-------------|------------|-----------------|--------------|-----------------|-------------|------------|-------------|------------|--------------|
| Mean | 174.18 | 67.8 | 72.93 | 35.3 | 72.68 | 18.35 | 21 | 101.65 | 49.75 | 35.9 | 55.8 |
| Standard Deviation | 2.5919 | 3.942 | 1.592 | 1.895 | 2.066 | 2.498 | 2 | 2.9607 | 3.726 | 6.382 | 2.707 |
| Median | 175.25 | 67 | 73 | 35 | 73 | 19 | 21.5 | 102 | 50 | 34.5 | 55 |
| Mode | 176 | 64 | 72 | 35 | 73.5 | 20 | 22 | 100 | 50 | 32 | 53 |
| Sample Variance | 6.7178 | 15.54 | 2.534 | 3.589 | 4.27 | 6.239 | 4 | 8.7658 | 13.88 | 40.73 | 7.326 |
| Kurtosis | -1.4558 | -0.037 | -0.183 | -0.61 | 1.789 | 5.88 | -1.25 | -0.408 | -0.44 | 9.11 | -1.385 |
| Skewness | -0.3056 | 0.75 | -0.12 | 0.19 | -1.023 | -2.06 | -0.18 | 0.1098 | -0.45 | 2.605 | 0.2 |
| Range | 8 | 14 | 6 | 7 | 9 | 11 | 6 | 11 | 13 | 30 | 8 |
| Minimum | 170 | 62 | 70 | 32 | 67 | 10 | 18 | 96 | 42 | 29 | 52 |
| Maximum | 178 | 76 | 76 | 39 | 76 | 21 | 24 | 107 | 55 | 59 | 60 |
| Standard Error | 0.5796 | 0.881 | 0.356 | 0.424 | 0.462 | 0.559 | 0.447 | 0.662 | 0.833 | 1.427 | 0.605 |

Table - 3 describes various statistics of Volleyball Players in relation to Anthropometrical variables. The average values of Anthropometrical variables of Libero were: Standing Height (cm.) (174.18± 2.5919), Body weight (kg.) (67.8± 3.942), Arm Length (cm.) (72.93± 1.592), Fore Arm Length (cm.) (35.3± 1.895), Trunk Length (cm.) (72.68± 2.066), Upper Arm Girth (cm.) (18.35± 2.498), Hand Length (cm.) (21± 2), Leg Length (cm.) (101.65± 2.9607), Thigh Girth (cm.) (49.75± 3.726), Calf Girth (cm.) (35.9± 6.382), Thigh Length (cm.) (55.8± 2.707) respectively

In the same age categories, the minimum and maximum values for Anthropometrical variables were: Standing Height (170; 178 cm.) Body weight (62; 76 kg.) Arm Length (70; 76 cm.) Fore Arm Length (32; 39 cm.) Trunk Length (67; 76 cm.) Upper Arm Girth (10; 21 cm.) Hand Length (18; 24 cm.) Leg Length (96; 107 cm.) Thigh Girth (42; 55 cm.) Calf Girth (29; 59 cm.) Thigh Length (52; 60 cm.).

The variables like Standing Height, Arm Length, Trunk Length, Upper Arm Girth, Hand Length, Thigh Girth were negatively skewed, whereas variables like Body weight, Fore Arm Length, Leg Length, Calf Girth and Thigh Length 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 almost all the variables, except Trunk Length, Upper Arm Girth and Calf Girth, it shows that the data on these variables, except

Trunk Length, Upper Arm Girth and Calf Girth was more variable than that of normal distribution. On looking at the value of coefficient of variance it was found that the maximum variability was 40.73 in relation to Calf Girth. Whereas minimum variability was noticed in Arm Length.

Discussion of Findings

The present study reveals that significant difference was found in the mean of selected Anthropometrical variables and the playing position (i.e Spiker, Set-upper and Libero. The difference in anthropometrical variables can be attributed to the fact that in every game a specialized player is required for a specific task. For example the libero which act as best defender in volleyball, set-upper acts as a pivot and finally spiker which acts as a attacker. Thus we can assume that spiker needs to be taller in order to get the advantage in spiking. Whereas Libero can smaller because smaller Libero can maintain better C.G. Thus there are difference in the anthropometrical variables.

Testing of Hypothesis

It was hypothesized that the means of Anthropometrical variable will be not distinct in nature in respect to playing position was not accepted in a case of all the selected Anthropometrical variables.

Conclusions

1. Spikers were taller than set-upper and Libero whereas

- Libero are most shortest player in a team
2. Spikers are heavier in comparison to other players.
3. Arm length is greater in spiker in relation to other players.
4. Set-upper were having larger forearm length in comparison to other players
5. Spiker were having larger trunk length, upper arm girth, Hand length. Leg length, Thigh girth, Calf girth and Thigh length in comparison to other players.

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