



E-ISSN: 2707-7020
P-ISSN: 2707-7012
JSSN 2022; 3(2): 184-187
Received: 14-07-2022
Accepted: 16-08-2022

Dr. PK Senthilkumar
Associate Professor, Head i/c,
Department of Exercise
Physiology and Nutrition,
Tamil Nadu Physical
Education and Sports
University, Chennai, Tamil
Nadu, India

A comparative study of selected anthropometry and body composition profiles between volley ball and Basketball players

Dr. PK Senthilkumar

DOI: <https://doi.org/10.33545/27077012.2022.v3.i2c.120>

Abstract

The purpose of the study was to compare and analyze the selected anthropometry and body composition parameters between volleyball and basketball players. To achieve the purpose of the study, 15 volleyball players and 15 basketball players were selected from Tamilnadu Physical Education and Sports University, Chennai. The age of the subjects ranged between 18 to 25 years. The variables selected for the study under Anthropometry profile were Body mass, Stature, Arm length, Leg length, upper arm girth, fore arm girth, thigh girth and calf girth, body composition profile such as fat mass, lean body mass and percentage of body fat. To determine the significant difference between the mean scores of subjects belonging to volleyball and basketball players on selected anthropometry and body composition parameters. Data was analyzed using SPSS version 25.0 and the descriptive statistics were expressed as a mean (SD) for each variables' ratio was also employed, the level of significance chosen at 0.05. The results of the present study indicate that the volleyball players were found to have significantly higher in Stature, Arm length, Leg length, Thigh girth and Calf girth ($p < 0.05$) than basketball players, whereas basketball players had significantly lower Percentage of Body fat ($p < 0.05$) as compared to volleyball players. Further, in body mass, upper arm girth, fore arm girth, Fat Mass and Lean Body Mass shows there was no significant difference between volleyball and basketball players.

Keywords: Body mass, stature, arm length, leg length, upper arm girth, fore arm girth, thigh girth, calf girth, fat mass, lean body mass and percentage of body fat

Introduction

Anthropometry is defined as "the scientific procedures and processes of acquiring surface anatomical dimensional measurements such as lengths, breadths, girths and skinfolds of the human body by means of specialist equipment" (Stewart 2010). Specific anthropometry and body composition parameters are needed to be successful in certain sporting events. It is also important to note that there are some differences in body structure and composition of sports persons involved in individual and team sports. Physical characteristics and body composition have been known to be fundamental to excellence in athletic performance (Mathur & Salokun, 1985) [14]. Specific athletic events require different body types and weights for maximal performance (American Dietetic Association, 1987) [1]. Today it has been widely accepted by the experts that top performance in sports is achieved if an athlete possesses the basic anthropometric characteristics suitable for the event. There are numerous factors which are responsible for the performance of a sportsman. The physique and body composition, including the size shape and form are known to play a significant role in this regard. At present, sportsman for superior performance in any sports is selected on the basis of physical structure and body size. Structural measurement include anthropometric measurements which consist of objective measurement of structures such as height, weight, width, depth and the circumference of the various part of body. Stature plays an important role in the success of any sport event. Body composition refers to the body's relative amounts of fat and lean body tissue or fat-free mass (Casperse, Powell, and Christenson, 1985) [4]. Body weight can be subdivided simply into two components: fat weight and fat free weight. Percent body fat, the percentage of total weight represented by fat weight, is the preferred index used to evaluate a person's body composition. Assessing body composition in the course of a sports season provides valuable information that can help sports professionals assess and monitor the success of training programs (Stapff 2000; Drinkwater *et al.* 2008) [21,8] and also monitor the health status of athletes (Matzkin *et al.* 2015; Tenforde

Corresponding Author:
Dr. PK Senthilkumar
Associate Professor, Head i/c,
Department of Exercise
Physiology and Nutrition,
Tamil Nadu Physical
Education and Sports
University, Chennai, Tamil
Nadu, India

et al. 2016) [15, 23].

It is generally accepted that a lower relative body fat is desirable for successful competition in most of the sports. This is because additional body fat adds to the weight of the body without contributing to its force production or energy producing capabilities, which means a decrease in relative strength. It is obvious that an increased fat weight will be detrimental in sporting activities where the body is moved against gravity (e.g. volleyball spiking action). Vertical jump test as a simple indirect measure of leg power, while the power of arm was tested by medicinal ball throw. Jumping is a fundamental movement pattern to volleyball. Volleyball players who have higher vertical jump score have better performance (Ziv & Lidor: 2010) [25] because vertical jumping abilities improved the height of spike jump (Sheppard et al.: 2008) [19] and also arm length, leg length, arm girth, thigh and calf girth also influence the blocking and spiking ability of the volleyball players. It is known, Basketball and volleyball players are usually taller than the other players of different games as these games required to handle the ball above their head. Greater height is an advantage for these games. While body weight, the percentage of fat and lean body mass can be changed a lot, and other factors, contribute to the optimal routine of exercise and performance. Hence, the purpose of the study was to compare the dormant anthropometry and body composition profile which contribute to significant differences and better comprehension between volleyball and basketball players.

Methodology

To achieve the purpose of the study, 15 volleyball players and 15 basketball players were selected from Tamilnadu

Physical Education and Sports University, Chennai. The age of the subjects ranged between 18 to 25 years. The variables selected for the study under Anthropometry profile were Body mass, Stature, Arm length, Leg length, upper arm girth, fore arm girth, thigh girth and calf girth, body composition profile such as fat mass, lean body mass and percentage of body fat. All the selected anthropometric and body composition were taken in each subject in the exercise physiology laboratory. The Stature of subjects were measured by means of a stadiometer (In body-BSM 170, South Korea), which is the instrument used for measuring stature with a sliding head which is usually attached to a stand and could be brought into contact with the most superior point on the subject’s head, to the nearest 0.1 centimeter. An electronic weighing scale (Inbody270, South Korea) was used for measuring Body mass to the nearest 0.1 kg. An anthropometric tape, with millimeter gradations as recommended, was used to measure the Arm length, Leg length, upper arm girth, fore arm girth, thigh girth and calf girth. A standard skinfold caliper with millimeter gradations as recommended was used to measure the biceps, triceps, subscapular and suprailiac skinfold thickness. The skinfold thickness measurements were taken on the right side of the body. Every, girth and skinfold thickness variables was taken two times by the measurer, and the mean value was recorded for calculation. All statistical analysis tests were performed with statistical package for social sciences (SPSS) version 25.0 (SPSS Inc., Chicago, IL, USA). Difference between selected anthropometry and body composition profile among volleyball and basketball players were checked by applying parametric unpaired Student’s ‘t’-test. The level of significance chosen was 0.05.

Table 1: Comparison of selective anthropometric and body composition profile of the subjects

| Variables | Volleyball Players | | Basketball Players | | T |
|----------------------------|--------------------|--------|--------------------|---------|-------|
| | Mean | SD | Mean | SD | |
| Body Mass(kg) | 70.78 | 3.55 ± | 69.84 | 3.58 ± | 1.19 |
| Stature (cm) | 177.22 | 4.19 ± | 171.66 | 4.05 ± | 6.10* |
| Arm length(cm) | 86.33 | 2.62 ± | 84.78 | 2.59 ± | 2.69* |
| Leg length(cm) | 99.19 | 7.99 ± | 92.28 | 10.92 ± | 3.26* |
| Upper arm girth(cm) | 31.00 | 2.22 ± | 30.44 | 1.76 ± | 1.27 |
| Fore arm girth(cm) | 27.34 | 1.17 ± | 26.66 | 2.48 ± | 1.60 |
| Thigh girth (cm) | 57.63 | 2.78 ± | 55.41 | 3.21 ± | 3.34* |
| Calf girth(cm) | 38.03 | 2.91 ± | 35.91 | 1.99 ± | 3.86* |
| Fat Mass (kg) | 9.92 | 0.81 ± | 9.35 | 0.72 ± | 2.03 |
| Lean Body Mass(kg) | 58.65 | 2.52 ± | 58.12 | 2.76 ± | 0.55 |
| Percentage of Body Fat (%) | 14.45 | 0.61 ± | 13.85 | 0.66 ± | 2.59* |

*Significant at 0.05, 2.048

Results of the study

The comparison of various selected anthropometry and body composition profiles between volleyball and basketball players is presented in Table I. The volleyball players were found to have significantly higher in Stature, Arm length, Leg length, Thigh girth and Calf girth (p<0.05) than

basketball players, whereas basketball players had significantly lower Percentage of Body fat (p<0.05) as compared to volleyball players. In body mass, upper arm girth, fore arm girth, Fat Mass and Lean Body Mass there was no significant difference between volleyball and basketball players.

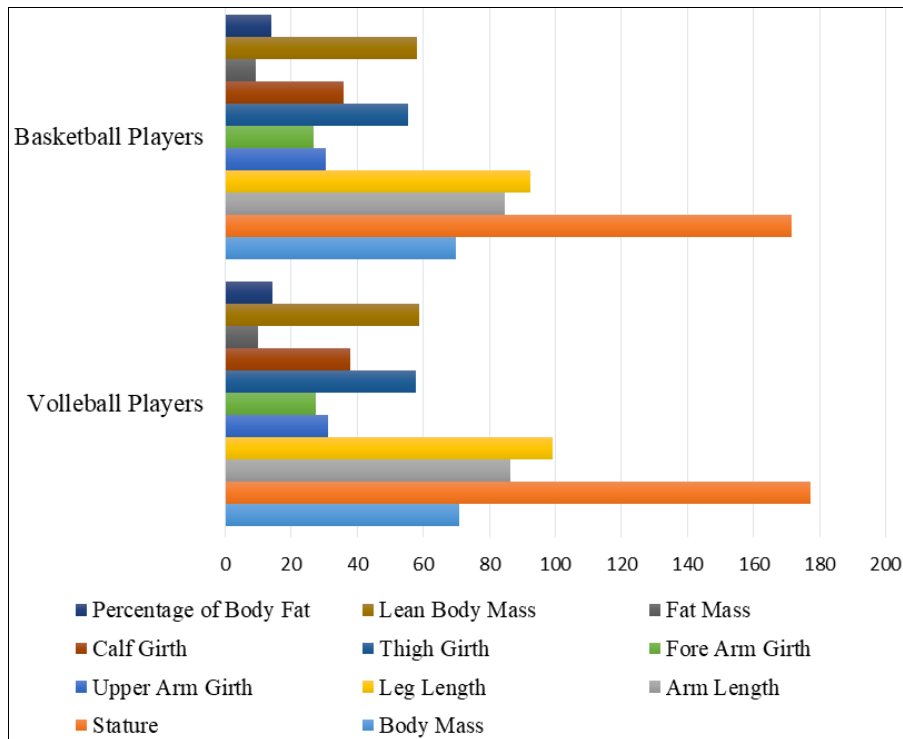


Fig 1: The graphic showed the Anthropometry and Body Composition Profiles between Volley Ball and Basketball Players

Discussion of Findings

The results of the present study indicate volleyball and basketball players did not differ much on selected anthropometry and body composition profiles. Statistical analysis of the data reveals that volleyball players Stature, Arm length, Leg length, Thigh girth and Calf girth are better than basketball players. Probably the reason in case of volleyball players has some advantages in Stature, Arm length, Leg length, Thigh girth and Calf girth these factors are enhance the playing ability such as blocking and spiking skills. On realizing the advantages of body structure, the Players select volleyball as their main sports. This means that tallness is great advantage in these sports, right from the reason that these sports require from their players handling a ball above their heads (Gaurav *et al.*, 2010) ^[10] and their height helps them to reach toward the basket or the top of the net as well as defend the ball against the opponents. In case of body mass, upper arm girth, fore arm girth, Fat Mass and Lean Body Mass were not significant. It may be due to the training effect the volleyball and basketball players developed these variables equally. Furthermore, it is interesting that volleyball and basketball players were almost equal their body mass was not significantly different. In other words, successful participation in both, volleyball and basketball games, next to the high level of technical and tactical skills, also requires from each player suitable anthropometrical and body composition profile. Therefore, many previous studies have evaluated ideal anthropometric profile of successful basketball and volleyball player (Gabbett, 2008; Marques & Marinho, 2009; Sallet, *et al.*, 2005) ^[9, 13, 18] that provide insights into the requirements for competing at top level in particular sports. The evaluation of the composition of human body in terms of fat mass and fat free mass is one of the most important anthropometric tasks, because of the relationship between body composition and both sport performance and human health. In fact, in most cases, a low body fat/fat free mass ratio improves physical performances, while the opposite ratio diminishes them

(Claessens *et al.* 1994, Crawford *et al.* 2011, Haakonssen *et al.* 2013, Manchado *et al.* 2013, Nikolaidis 2013) ^[6, 7, 11, 16]. In particular, excessive adiposity is negatively correlated to performance in sports which require to run or jump, which are instead improved by increased muscle mass (Sporis *et al.* 2011, Takai *et al.* 2013) ^[20, 22]. The conclusion is that anthropometry and body composition profiles in this sport are very important for achieving success. The results of the current study on multiple anthropometric traits indicate that the most physically active individuals show to the complexity of this sport. In particular, the basketball player have lower% F than less volleyball player.

Reference

1. American Dietetic Association. Position of the American Dietetic Association Nutrition for the physical fitness and athletic performance for adults. *Journal of American Dietetic Association*. 1987;76:437-443.
2. Amusa LO, Toriola AL. Leg power and physical performance measures of top national track athletes. *Journal of Exercise Science and Fitness*. 2003;1:1:61-67.
3. Blanksby BA, Bloomfield J, Ponchard M, Ackland TR. The relationship between anatomical characteristics and swimming performance in state age-group championship competitors. *Athletics, growth, and development in children*; c1986. p. 139-151.
4. Caspersen CJ, Powell KE, Christenson GM. Physical activity, exercise and physical fitness: Definitions and distinctions for health-related research. *Public Health Rep*. 1985;100:120-131.
5. Cissik JM. Technique and speed development for running. *NSCA's Performance Training Journal*. 2002;1(8):18-21.
6. Claessens AL, Hlatky S, Lefevre J, Holdhaus H. The role of anthropometric characteristics in modern pentathlon performance in female athletes. *J Sports Sci*.

- 1994 Aug; 12(4):391-401.
7. Crawford K, Fleishman K, Abt JP, Sell TC, Lovalekar M, Nagai T, *et al.* Less body fat improves physical and physiological performance in army soldiers. *Mil Med.* 2011 Jan; 176(1):35-43.
 8. Drinkwater EJDB, Pyne MJ, McKenna. Design and interpretation of anthropometric and fitness testing of basketball players. *Sports Med.* 2008;38:565-78.
 9. Gabbett TJ. Do skill-based conditioning games offer a specific training stimulus for junior elite volleyball players, *Journal of Strength & Conditioning Research?* 2008;22(2):509-517.
 10. Gaurav V, Singh M, Singh S. Anthropometric characteristics, somatotyping and body composition of volleyball and basketball players. *Journal of Physical Education and Sports Management.* 2010;1(3):28-32.
 11. Haakonssen EC, Martin DT, Burke LM, Jenkins DG. Increased lean mass with reduced fat mass in an elite female cyclist returning to competition: case study. *Int J Sports Physiol Perform.* 2013 Nov; 8(6):699-701.
 12. Manchado C, Tortosa-Martínez J, Vila H, Ferragut C, Platen P. Performance factors in women's team handball: physical and physiological aspects - a review. *J Strength Cond Res.* 2013 Jun; 27(6):1708-19.
 13. Marques MC, Marinho DA. Physical parameters and performance values in starters and non-starters volleyball players: A brief research note. *Motricidade,* 2009;5(3):7-11.
 14. Mathur DN, Salokun SO. Body composition of successful Nigerian female athletes. *Journal of Sports Medicine.* 1985;25:27-21.
 15. Matzkin EEJ, Curry K, Whitlock. Female athlete triad: Past, present, and future. *J Am Acad Orthop Surg.* 2015;23:424-32.
 16. Nikolaidis PT. Body mass index and body fat percentage are associated with decreased physical fitness in adolescent and adult female volleyball players. *J Res Med Sci.* 2013 Jan; 18(1):22-6.
 17. Norton K, Whit tingham N, Carter L, Kerr D, Gore C, Marfell-Jones M. Measurement techniques in anthropometry In K Norton & T Olds (Eds), *Anthropometrical: A textbook of body measurement for sports and health courses,* 25-73, Sydney, Australia: UNSW Press; c1996.
 18. Sallet P, Perrier D, Ferret JM, Vitelli V, Baverel G. Physiological differences in professional basketball players as a function of playing position and level of play. *Journal of Sports Medicine and Physical Fitness.* 2005;45(3)291-294.
 19. Sheppard JM, Cronin JB, Gabbett TJ, Mcgurgan MR, Erxeraria N, *et al.* Relative importance of strength, power, and anthropometric measures to jump performance of elite volleyball players. *J Strength Cond Res.* 2008;22(3):758-765.
 20. Sporis G, Jukić I, Bok D, Vuleta D Jr, Harasin D. Impact of body composition on performance in fitness tests among personnel of the Croatian navy. *Coll Antropol.* 2011 Jun; 35(2):335-9.
 21. Stapff A. Protocols for the physiological assessment of Basketball players. In *Physiological Tests for Elite Athletes,* edited by C. J. Gore, 224–37. Champaign, IL: Human Kinetics; c2000.
 22. Takai Y, Fukunaga Y, Fujita E, Mori H, Yoshimoto T, Yamamoto M, *et al.* Effects of body mass-based squat training in adolescent boys. *J Sports Sci Med.* 2013 Mar 1; 12(1):60-5.
 23. Tenforde AS, Barrack MT, Nattiv A, Fredericson M. Parallels with the female athlete triad in male athletes. *Sports Med.* 2016;46:171-82.
 24. US. Department of Health and Human Services. *Physical Activity and Health: A Report of the Surgeon General.* Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion; c1996.
 25. Ziv G, Lidor R. Vertical jump in female and male volleyball players: A review of observational and experimental studies". *Scand J Med Sci Sports.* 2010;20(4):556-67.