

## Comparative physiological profile of basketball and volleyball players participating in regular training at BKSP, Bangladesh

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### ABSTRACT

Certain physiological properties exert influence on athlete's performance abilities in games like basketball or volleyball. Therefore, this study was conducted with the objective of comparing physiological profile between basketball and volleyball players in BKSP, Bangladesh. A cross-sectional study was carried out to assess the physiological profile and to compare between the two selected sport groups. Subjects were selected by quota sampling method and data was collected using standardized tests and procedures on selected physiological variables. Independent sample t test was used to determine the significant differences between two groups. Significant differences were found in some variables between the two groups namely as height ( $p=0.01$ ), weight ( $p=0.002$ ), vital capacity, ( $p= <0.001$ ) and pulse rate ( $p=0.008$ ) while there was no difference reported for other variables such as BMI, body fat percentage, blood pressure and hemoglobin. Basketball players were relatively taller and heavier than volleyball players. Vital capacity and pulse rate were higher among the volleyball group than to the comparison group. The physiological profiles are evident among high level athletes in different games around the world. Its assessment and comparison can help to plan effective training strategies and future selection of talented athletes in basketball and volleyball games.

**Keywords:** Physiological profile, Physiological characteristics, Basketball, Volleyball, Sports training.

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## Introduction

Considerable widening is observed in the field of sports science in recent years. The subject area has expanded both academically and as professional practice. Coaches and players are concerned with the latest scientific approaches for training and competitions. Result of a game depends on the level of fitness of athletes. Optimum physiological profile is important for proper coaching of elite athletes as well as selecting talented sports person (1). Physiological characteristics also determines the successful performance of many sports (2).

Volleyball and basketball are popular and played professionally in every nation across the world. Technical and tactical skills are important, but suitable anthropometric and physiological characteristics are also important prerequisite to become successful in these sports. Physical and physiological properties influence the performance of a player and strategy of a team because experts suggest that the ball games required repeated maximum exertion e.g. dashing and jumping (3) which are also important for basketball and volleyball players to achieve optimum level of performance.

Basketball and volleyball players are usually taller than the other players of different games (4) as these games required to handle the ball above their head. Greater height is an advantage for these games (5). Anaerobic capacity such as quick change of direction, acceleration, deceleration and jumping are some of the important elements for basketball players (6, 7, 8). Demand of physiological profile for volleyball players are similar to that of basketball players (9). Long height, lean body and low-fat percentage are some of the good markers of high level volleyball players (10). Similarly, the physique of basketball players is one of the essential factors for success in events (11). Moreover, relevant information on physical and physiological profile of a sports person participating in any game can help the professional for instance, trainers,

coaches etc. for planning of long term program in order to improve the quality of training (12). Systematic and scientific training program will bring desirable changes in physical and physiological variables such as resting pulse rate, blood pressure, vital capacity, hemoglobin and others.

Physiological profiling of sportspersons was not a common practice in Bangladesh before. Things are changing with the expansion in the field of sports science. Therefore, our study aims to compare the physiological characteristics of basketball and volleyball players participating in regular training at BKSP, Bangladesh.

## Materials and Methods

A cross-sectional study was carried out towards the objective of the study. Data were collected from Exercise Physiology Department of Bangladesh Krira Shikkha Pratishtan (BKSP) which is the prominent institute of sports in Bangladesh having large number of students in different departments. The subjects of our study were basketball and volleyball players selected by quota sampling method. The players came from different parts of the country possessing well developed physique and all of them were participating in training on a regular basis in their respected group of games. Players having less than one-year period of training were excluded from the study. Ethical consideration was fulfilled by the approval from the department of exercise physiology. All the subjects were given clear explanation about the study and consent were taken from the coaches of the corresponding games.

## Procedures

The physiological variables chosen for the study were measured by standardized tests and procedures. Height were measured in centimeter using stadiometer and weight were measured in kilograms using weighing machine. After measuring height and weight, calculation of BMI

(Body Mass Index) was done using appropriate formula. Body fat percentage was assessed by skinfold caliper taken from four sites (Biceps, triceps, subscapular and suprailiac) using Harpenden skinfold caliper (Holtain Ltd, Crosswell, Crymych, UK) to the nearest 0.2 mm, and using the Durnin and Rahaman (1967) skinfold equation (13). Forced Vital Capacity were measured for lung function using ventilometer from the laboratory expressed in liters. Subjects were asked to rest for few minutes then measurement of blood pressure (mm.Hg) and resting heart rate (beats/min) were taken by sphygmomanometer and pulse oximeter respectively. Blood was drawn by taking appropriate precaution to analyze haemoglobin percentage expressed as mg/dl by chlorometer test in the laboratory. The whole data collection procedures were completed by trained and qualified experts available at the department of exercise physiology and pathology.

### Statistical analysis

Data were entered and analyzed using SPSS Version 22.0 (Statistical Package for the Social Sciences, SSPS Inc, Chicago, IL, USA). Descriptive data were expressed using mean and standard deviation (SD). Independent sample t test were used to determine the significance level of mean difference between the selected groups. P values < 0.05 were considered as the level of significance.

### Results

A total number of 28 sports trainee (Basketball=14, Volleyball=14) who are participating in regular training more than 1 year were included in this study. All participants in this study were male with

the mean ( $\pm$  SD) age of  $16 \pm 1.68$  (Basketball:  $15.85 \pm 1.51$ , Volleyball:  $16.14 \pm 1.87$ ) ranged from 13-20 years.

After the analysis of other physiological variables, we found significant difference in some variables. The mean height of the basketball players was 184.57 cm while the figure was 178.85 cm for volleyball players and the difference was statistically significant (**p= 0.01**). Our study also reveals that the basketball players were significantly superior in weight compared to volleyball players in this cohort (**p=0.002**). But the mean difference of BMI between the basketball players and volleyball players was not found statistically significant (P=0.29). Regarding the measurement of skinfold thickness width, we found significant difference in two measurement sites only (biceps, **p=0.02** and triceps **p=0.02**) but for total width (p=0.39) there was no significant difference of mean between the two groups. Similarly, body fat percentage was also not significantly varied among the players between the two groups (p=0.22).

Regarding other physiological characteristics, Basketball players were found to have significantly lower levels of vital capacity compared to volleyball players (**p= <0.001**). Pulse rate among basketball players were also found to be lower than that of volleyball players (**p=0.008**) in this selected groups. Other variables such as systolic and diastolic blood pressure and hemoglobin, the differences in the mean between the two groups have not been found to be statistically significant.

**Table 1: Physiological profile data of Basketball and Volleyball sports trainee**

Variable	Mean $\pm$ Standard Deviation		Mean difference	Standard Error of Mean	t ratio
	Basketball	Volleyball			
Height (cm)	184.57 $\pm$ 4.69	178.85 $\pm$ 6.15	5.71	2.05	<b>2.77*</b>
Weight (kg)	68.77 $\pm$ 3.88	62.51 $\pm$ 5.33	5.95	1.76	<b>3.37*</b>
BMI	20.19 $\pm$ 1.14	19.63 $\pm$ 1.59	0.57	0.52	1.08
Skinfold width					
Biceps	4.21 $\pm$ 0.72	3.54 $\pm$ 0.73	0.67	0.27	<b>2.45*</b>
Triceps	6.97 $\pm$ 1.44	5.80 $\pm$ 1.80	1.17	0.50	<b>2.32*</b>
Subscapularis	8.32 $\pm$ 0.68	8.70 $\pm$ 2.70	-0.37	0.69	-0.54
Suprailiac	5.24 $\pm$ 0.93	4.47 $\pm$ 1.82	0.77	0.55	1.40
Total	24.11 $\pm$ 3.03	22.57 $\pm$ 5.93	1.54	1.78	0.86
Body Fat %	11.01 $\pm$ 1.67	9.99 $\pm$ 2.52	1.02	0.81	1.27
FVC	3.27 $\pm$ 0.77	4.48 $\pm$ 0.70	-1.21	0.28	<b>-4.35*</b>
Pulse rate	57.28 $\pm$ 3.42	64.42 $\pm$ 8.67	-7.14	2.49	<b>-2.86*</b>
Systolic BP	111.07 $\pm$ 6.84	108.57 $\pm$ 13.50	2.50	4.04	0.62
Diastolic BP	69.64 $\pm$ 5.70	69.28 $\pm$ 8.28	0.36	2.69	0.13
Hemoglobin %	14.10 $\pm$ 0.58	13.82 $\pm$ 0.64	0.27	0.23	1.19

cm= centimeter, kg=Kilogram, BMI=Body Mass Index, BF%=Body Fat Percentage, BP=Blood Pressure, \*Level of significance  $P < 0.05$

## Discussion

The assessments and comparison of physiological profile between the selected sport groups gave an overview regarding the status of physique possessed by them. Physiological profile in relation to their performance between basketball and volleyball players was not the main focus in this study, therefore, we compared with each other thus indicating the difference does exist. The result in this study provided the most comprehensive comparison between trainee athletes of the selected groups in Bangladesh so far.

Age profile between the two groups were very similar. Taller athletes tend to have more weight. In

our present study we found basketball players were heavier and taller than volleyball players. Similar findings were noted in some other study conducted in Spain and India (1,14). It is also reported that basketball players have greater level of body fat percentage and skin fold measurements than volleyball athletes by other study (14). In our study we found the similar results but the difference was not significant statistically. But regarding the percentage of fat of the players, the result of our study is in accordance with the finding of other study where they suggested that the approximate range of fat value among basketball and volleyball players should be within 6-15% (15). Higher fat percentage is harmful for basketball and volleyball

players because of the activity demanded by those games as additional fat adds weight to the body without contributing to its force and energy production abilities (14).

In this study we found higher level of vital capacity and heart rate in volleyball players than that of basketball players. Type of regular physical exercise and training in volleyball players might be attributed to this fact. Both games required repeated short bouts of high intensity exercise followed by a certain low-intensity exercises(16). As a result well developed aerobic and anaerobic capacity is important for both groups. Regarding vital capacity our finding is supported by other study, reported that athletes participating in regular sports campaign had higher vital capacity (17). Other variables such as blood pressure, hemoglobin were within the normal range and did not differ significantly between basketball and volleyball players. Therefore, role of measuring those variables and their effect on performance in these games is important to reveal.

No particular study was done previously in Bangladesh in this regard, therefore, it was very hard to compare our result with others. Small sample size was the limitation of this study.

Subjects including large numbers and compared with the elite athletes in a particular group may give a new outline.

### Conclusion

Marked differences were found in height, weight, vital capacity and heart rate between the selected groups in this study. Information on assessment and comparison of those physiological characteristics can be helpful for the coaches and trainers in designing quality training strategies as well as talented athlete identification in future. Moreover, research should be done to find out the effect of those variables on the performance of sports persons will open a new dimension in the field of sports science in Bangladesh.

### References

- Peña J, Moreno-Doutres D, Coma J, Cook M, Buscà B** (2016). Anthropometric and fitness profile of high-level basketball, handball and volleyball players. *Revista Andaluza de Medicina del Deporte*.
- Kreighbaum and Barthels**, (1985). *Biomechanics, a Qualitative Approach for Studying Human Movement and Education*, Macmillan 52-64.
- Tsunawake N, Tahara Y, Moji K, Muraki S, Minowa K, Yukawa K** (2003). Body composition and physical fitness of female volleyball and basketball players of the Japan inter-high school championship teams. *Journal of physiological anthropology and applied human science*. 22(4):195-201.
- Rahmawati NT, Budiharjo S, Ashizawa K** (2007). Somatotypes of young male athletes and non-athlete students in Yogyakarta, Indonesia. *Anthropological Science*.115(1):1-7.
- Kansal DK, Gupta N, Gupta AK** (1986). A study of intrasport differences in physique of Indian University football players. *Perspectives in kinanthropometry, human kinetics publishers, champaign*.
- Abdelkrim NB, Castagna C, Jabri I, Battikh T, El Fazaa S, El Ati J** (2010). Activity profile and physiological requirements of junior elite basketball players in relation to aerobic-anaerobic fitness. *The Journal of Strength & Conditioning Research*. 24(9):2330-42.
- Ostojic SM, Mazic S, Dikic N** (2006). Profiling in basketball: physical and physiological characteristics of elite players. *The Journal of Strength & Conditioning Research*. 20(4):740-4.
- Terrados N, Calleja-González J, Schelling X** (2011). Bases fisiológicas comunes para deportes de equipo.
- Sheppard JM, Gabbett TJ, Stanganelli LC** (2009). An analysis of playing positions in elite

men's volleyball: considerations for competition demands and physiologic characteristics. The Journal of Strength & Conditioning Research. 23(6):1858-66.

**Nikolic J, Davolovic B, Zlatkovic J, Dordevic SS, Plavsic J** (2008). Anthropometric profile of the elite Serbian male volleyball players. Med Sport:14.

**Ostojic SM, Mazic S, Dikic N** (2003). Antropomorphological characteristics of elite Serbian Basketball players. Sportska Med.3:83.

**Ziv G, Lidor R** (2009). Physical attributes, physiological characteristics, on-court performances and nutritional strategies of female and male basketball players. Sports Medicine. 39(7):547-68.

**Durnin JV, Rahaman MM** (1967). The assessment of the amount of fat in the human body from measurements of skinfold thickness. British Journal of Nutrition. 21(03):681-9.

**Gaurav V, Singh S** (2010). Anthropometric characteristics, somatotyping and body composition of volleyball and basketball players. Journal of Physical Education and Sport Management. 1(3):28-32.

**WILMORE J, COSTIL D** (1999). Physiology of sports and exercise. 2<sup>ed</sup>. Champaign: Human Kinetics.

**Künstlinger U, Ludwig HG, Stegemann J** (1987). Metabolic changes during volleyball matches. International Journal of Sports Medicine.8(05):315-22.

**Sodhi HS** (1991). Sports anthropometry. ANOVA Publications, Mohali.