International Journal of Physiology, Health and Physical Education
www.physiologyjournals.com
Online ISSN: 2664-7273; Print ISSN: 2664-7273
Received: 03-11-2018; Accepted: 04-12-2018; Published: 04-01-2019
Volume 1; Issue 1; 2019; Page No. 08-13

Relationship between skills performance and physiological characteristics of Yemeni junior volleyball players

Dr. Wadah Ahmed Saif Abdo[1], Dr. RK Badwanay[2]
[1] Faculty of Physical Education, Sana'a University, Yemen
[2] Assistant. Professor, MSM's College of Physical Education, Aurangabad, Maharashtra, India

Abstract
The present study aims to determine the relationship between skills performance and physiological characteristics among Yemeni junior volleyball players. The study sample included 30 junior volleyball players (14-20) years, who played in clubs and schools at Sana'a city, Yemen. The descriptive method used in this study through the conducting skills performance tests and physiological measurements. There is no correlation coefficient between attack and all physiological characteristics. There is no correlation coefficient between forearm pass and physiological characteristics. There is correlation coefficient between repeat pass the ball to the wall and only test of pulse rate at rest, while there is no correlation coefficient between repeat pass the ball to the wall and other physiological characteristics. There is no correlation coefficient between serve and all physiological characteristics. There is correlation coefficient between pass farthest distance and some physiological characteristics, test of pulse rate at rest, and test of Vo2max 30 Sec), but there is no correlation coefficient between pass farthest distance and other physiological characteristics.

Keywords: skills performance, physiological characteristics, junior volleyball players

Introduction

Volleyball is an excellent all-around team sport, in which each team has six players standing in two rows with three players in each. In a match, every player should change their position in turn, which means every player should be possess fitness and physical performance that allow them to play their roles most effectively (Kumar S., & Singh K., 2013) [14].

Volleyball does not mean simply putting together six players, but working hard to create a team, also when the team consists of junior players (Vute R., 2009) [29].

Although it's global nature and history dating back to more than 100 years, there are still several dimensions regarding techniques and tactics (João P. *et al*, 2010) [10]. So there are still some ambiguities in the planning of the training process to improve performance in the competition (Silva M. *et al*, 2016) [26].

Volleyball is an intermittent sport. It requires players to participate in frequent short bouts of high-intensity exercise, followed by periods of low-intensity activity. Its match depends on both energy systems aerobic and anaerobic, so the volleyball players require well-developed speed, agility, upper-body and lower body muscular power, and maximal aerobic power (Koley S., & Bijwe V., 2013) [12].

Volleyball game, like many other ball games, depends on technical and tactical skills, in addition to high level of physical fitness (Marques M. *et al*, 2006) [20] (Marques C. *et al*, 2009) [19].

Modern volleyball includes repeated bouts of intensive activities such as jumping, diving, and lateral movement. These activities are required to very high speed of reaction and agility throughout match duration. These qualities are the main axis during training process (Marques C. *et al*, 2009) [19] (Sheppard J. *et al*, 2008) [25].

Several researchers demonstrated that the motor abilities, agility and explosive strength, side by beside with human body build, are essential characteristics for successful volleyball performance (Fattahi A. *et al*, 2014) [4].

Selecting junior players must depends on predictive standards. It takes into consideration the physical, physiological, and anthropometric measurements that are related directly to the level of performance of junior players, so the focus should be on these measurements to achieve the best results and reach to high levels (Al-Dewan L., 2011) [1] (Fleck S. *et al*, 2012) [5].

The performance of top-class volleyball players is the result of interaction of a number of factors which includes physical, physiological and anthropometric demands, such factors are evident when we witness a superior display of skill by a player in one occasion and then, on a separate occasion see that same player makes an effort after an error (Ramesh N., 2011) [23].

Several studies have investigated the relationships between anthropometric and physiological characteristics of volleyball players. Results of these studies have indicated that asserting the anthropometric characteristics are advantageous to the volleyball players, including greater height greater vertical jump distance, greater upper body strength, and lower body fat percent. (Fry A. *et al*, 1991) [6] (Koley S. *et al*, 2010) [13].

Respective studies about volleyball players emphasized the relationship of some physical, physiological, and anthropometric measurements with level of performance skills for male and female volleyball players, but still, we can state that very few studies predicted the level of performance skills in terms of some of the physiological characteristics among junior volleyball players.

Objective of Study
The present study aims to determine the relationship between skills performance and physiological characteristics among Yemeni junior volleyball players.

Hypothesis of Study
There is a significant relationship between skills performance and physiological characteristics among Yemeni junior volleyball players (14-20) years.

Methodology
The present study was used the descriptive method to investigate the relationship between skills performance and physiological characteristics among Yemeni junior volleyball players (14-20) years through the conducting skills performance tests and some physiological measurements.

Sample of Study
Study sample was randomly selected to include 30 male volleyball players with ages between 14 and 20 years and mean was (16.7) years, from clubs and schools at Sana'a city, Yemen.

Table 1: Characteristics of study sample (N =30)

Variables	Unit	Mean	S. D	Skewness
Age	Year	16.7	1.34	-0.56
Height	Cm	168.6	7.03	-0.02
Weight	Kg	57.2	12.21	0.10

The table (1) shows that there is no significant difference in demographic characteristics (age, height, weight). All skewness values clearly indicated to homogeneity of sample, thus the sample acceptable to conduct this study.

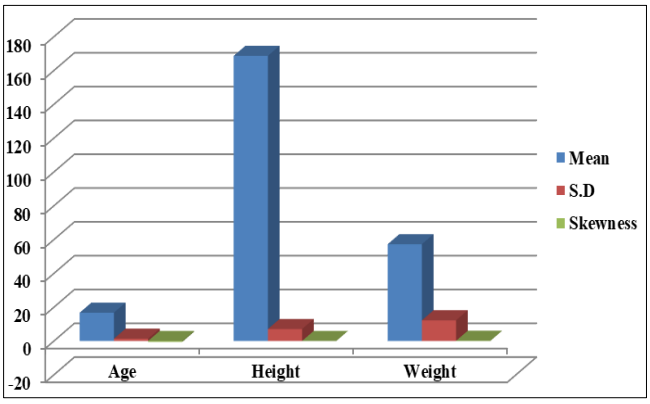

Fig 1: Mean, S.D, and skewness of study sample characteristics

Tools and Means of Measurements (Materials Used)
- Stadiometer to measure the height (cm).
- Electronic weighing machine to measure the weight (kg).
- Sphygmomanometer to measure the blood pressure. (cm).
- Digitalized heart rate monitor.

Statistical Analysis
The obtained data analyzed by applying appropriate statistical analyses. Correlation coefficient between skills performance (dependent variable), and physiological variables (independent), by computing Pearson's product moment coefficient of correlation i.e. the statistical parameters, like Beta Coefficients and the percentage contribution of each independent variable. In all the cases 0.05 level of significance fixed to test the hypothesis.

Results and Discussion

Table 2: Descriptive statistics on physiological variables of volleyball players

Sr. No.	Physiological Variables	Mean	SD	Min	Max
1	Test of pulse rate after effort (30 Sec)	108.53	22.564	67	150
2	Test of pulse rate at rest	72.33	13.976	50	93
3	Prediastolic	67.93	14.999	34	98
4	Presystolic	113.10	13.202	89	144
5	Postdiastolic	78.23	13.135	58	104
6	Postsystolic	126.30	12.938	103	154
7	Test of Vo2max(30Sec)	42.29	17.455	17.02	79.85

The table (2) showed that the descriptive statistics values of physiological measurements volleyball players in Republic of Yemen.

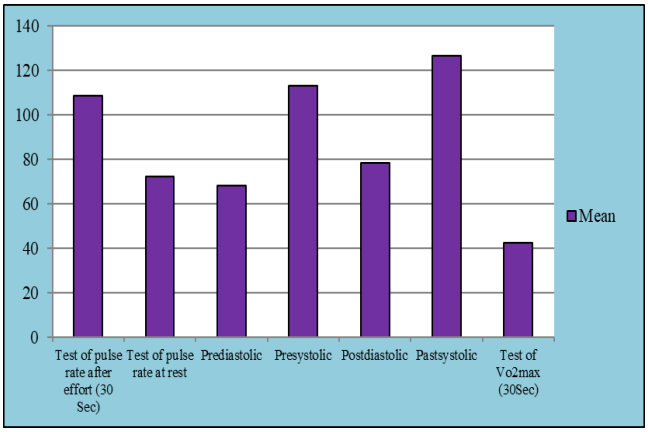

Fig 2: Mean of physiological variables (N=30)

Correlation coefficient between physiological variables and attack

Table 3: Pearson correlation between attack and physiological variables among volleyball players (N=30)

Sr. No.	Physiological Variables	Attack
1	Test of pulse rate after effort (30 Sec)	-0.06
2	Test of pulse rate at rest	-0.07
3	Prediastolic	-0.15
4	Presystolic	-0.18
5	Postdiastolic	-0.28
6	Postsystolic	-0.24
7	Test of Vo2max(30Sec)	-0.12

*Significant at 0.05 level with df 28 is 0.361.

The table (3) showed that correlation between attack and physiological measurements (7 variables).
The degrees of freedom for data are 28. Therefore, the test value for Pearson's correlation coefficient is 0.361 at 0.05 level of significance. So, if is greater than 0.361, then there is significant difference. In above table we observe that there no significant correlation of attack with physiological measurements (6 variables).

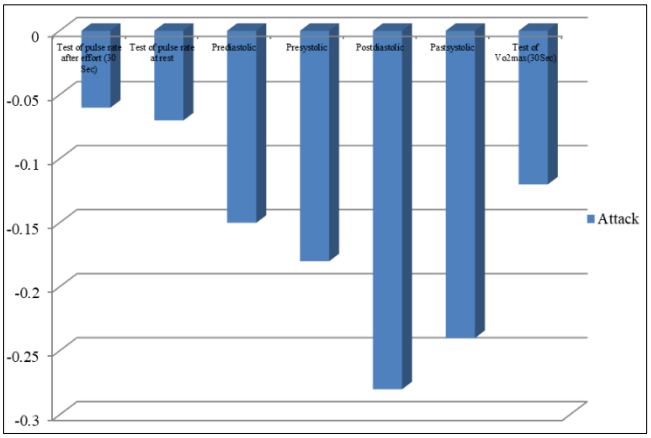

Fig 3: Correlation between physiological variables and attack (N=30)

Correlation coefficient between physiological variables and forearm pass

Table 4: Pearson correlation between forearm pass and physiological variables among volleyball players (N=30)

Sr. No.	Physiological Variables	Forearm Pass
1	Test of pulse rate after effort (30 Sec)	-0.07
2	Test of pulse rate at rest	-0.23
3	Prediastolic	0.10
4	Presystolic	0.01
5	Postdiastolic	0.24
6	Postsystolic	0.19
7	Test of Vo2max (30Sec)	0.09

*Significant at 0.05 level with df 28 is 0.361.

The table (4) showed that correlation between forearm pass and physiological measurements (7 variables).
The degrees of freedom for data are 28. Therefore the test value for Pearson's correlation coefficient is 0.361 at 0.05 level of significance. So, if more than 0.361, then there is significant difference. In above table we observe that there no significant correlation of forearm pass with physiological measurements (6 variables).

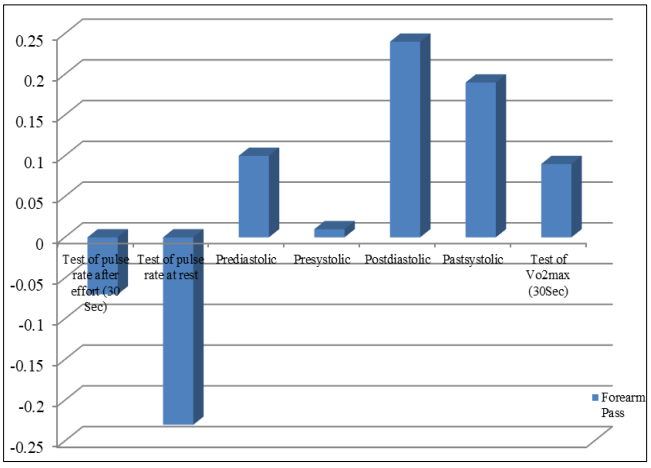

Fig 4: Correlation between physiological variables and forearm pass (N=30)

Correlation coefficient between physiological variables and repeat pass

Table 5: Pearson correlation between repeat pass and physiological variables among volleyball players (N=30)

Sr. No.	Physiological Variables	Repeat Pass
1	Test of pulse rate after effort (30 Sec)	0.18
2	Test of pulse rate at rest	0.45*
3	Prediastolic	-0.03
4	Presystolic	-0.11
5	Postdiastolic	0.04
6	Postsystolic	0.08
7	Test of Vo2max (30Sec)	0.29

*Significant at 0.05 level with df 28 is 0.361.

The table (5) showed that the correlation between repeat pass the ball to the wall (30 Sec) and physiological measurements (7 variables).
The value of test pulse rate at rest is greater than 0.361. So, we say that there is significant correlation between repeat pass the ball to the wall (30 Sec) and test pulse rate at rest. In other physiological measurements there is no significant correlation with repeat pass the ball to the wall (30 Sec). As all values are less than 0.361.

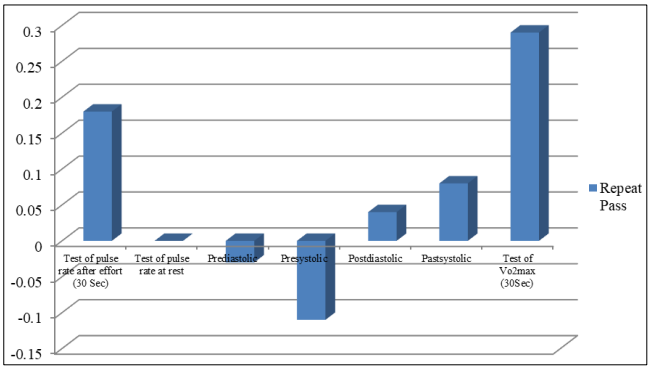

Fig 5: Correlation between physiological variables and repeat pass (N=30)

Correlation coefficient between physiological variables and serve

Table 6: Pearson correlation between serve and physiological variables among volleyball players (N=30)

Sr. No.	Physiological Variables	Serve
1	Test of pulse rate after effort (30 Sec)	-0.04
2	Test of pulse rate at rest	-0.23
3	Prediastolic	0.05
4	Presystolic	0.24
5	Postdiastolic	-0.25
6	Postsystolic	0.01
7	Test of Vo2max (30Sec)	-0.26

*Significant at 0.05 level with df 28 is 0.361.

The table (6) showed that correlation between serve (10 Time) and physiological measurements (7 variables).
The degrees of freedom for data are 28. Therefore the test value for Pearson's correlation coefficient is 0.361 at 0.05 level of

significance. So, if is greater than 0.361, then there is significant difference. In above table we observe that there no significant correlation of Serve (10 Time) with physiological measurements (6 variables).

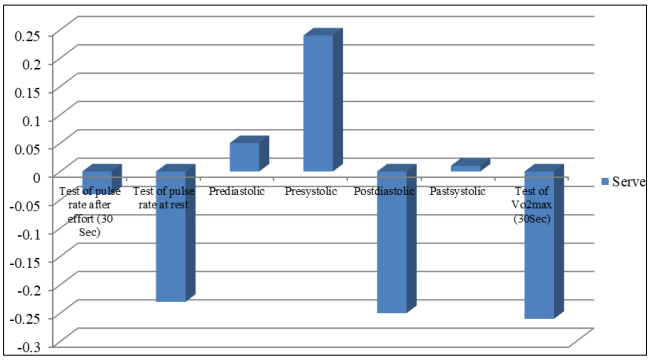

Fig 6: Correlation between physiological variables and serve (N=30)

Correlation coefficient between physiological variables and pass farthest distance

Table 7: Pearson correlation between pass farthest distance and physiological variables among volleyball players (N=30)

Sr. No.	Physiological Variables	Pass Farthest Distance
1	Test of pulse rate after effort (30 Sec)	0.46*
2	Test of pulse rate at rest	0.44*
3	Prediastolic	-0.23
4	Presystolic	-0.13
5	Postdiastolic	-0.28
6	Postsystolic	0.21
7	Test of Vo2max (30Sec)	-0.42*

*Significant at 0.05 level with df 28 is 0.361.

The table (7) showed that the correlation between pass farthest distance and physiological measurements (7 variables).
The value of Test Vo2max (30 Sec), test pulse rate after effort (30 Sec) and test pulse rate at rest are greater than 0.361. So, we say that there is significant correlation between pass farthest distance and above stated measurement. All remaining physiological measurements there is no significant correlation with pass farthest distance. As all values are less than 0.361.

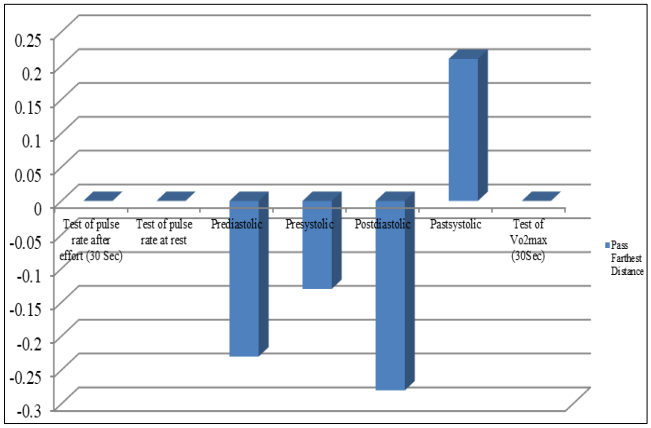

Fig 7: Correlation between physiological variables and pass farthest distance (N=30)

The results of this study in tables (2, 3, 4, 5, 6, and 7) respectively showed that the there is no correlation coefficient between attack (25 times) and all physiological measurements (7variables). There is no correlation coefficient between forearm pass (5 times-A & 5 times-B) and physiological measurements (7 variables). There is correlation coefficient between repeat pass the ball to the wall (30 Sec) and only test of pulse rate at rest, while there is no correlation coefficient between repeat pass the ball to the wall (30 Sec) and other physiological measurements (6 variables). There is no correlation coefficient between serve and all physiological measurements (7 variables). There is correlation coefficient between pass farthest distance and some physiological measurements (test of pulse rate after effort 30 Sec, test of pulse rate at rest, and test of Vo2max 30 Sec), but there is no correlation coefficient between pass farthest distance and other physiological measurements (4 variables).Several studies have documented the relationship between physiological characteristics and skills performance of volleyball players like (Yavuz S., 2015) [30] indicated that the physiological components in volleyball has the characteristics of an interval sport, also the high-skills and technical performance levels affect performance. (Nikolaidis P. *et al*, 2012) [21] (Schaal M. *et al*, 2013) [24] have been demonstrated that players of different competitive levels differ among themselves with regard to physical and physiological characteristics in adolescence and in adulthood. (Gabett T., & Georgieff B., 2007) [7] have emphasized the importance of lower body muscular power and maximal aerobic capacity with increased playing level in volleyball players. (Lidor R., & Ziv G., 2010) [15] observed that the training induced changes in various anthropometric, physiological and biochemical variables can be attributed to appropriate load dynamics, which have a most significance in volleyball playing success. (Koley S. *et al*, 2010) [13] showed that the Indian volleyball players have lesser value for heart rate and greater value for Vo2max than controls, and indicated that the volleyball players require well-developed speed, agility, upper-body and lower body muscular power, and maximal aerobic power (VO2max). (Gabbett T., & Georgieff B., 2007) [7] confirmed that the volleyball is an intermittent high-intensity team sport that requires a combination of physical and physiological characteristics to perform a sequence of well-coordinated high demanding activities. (Smith D. *et al*, 1992) [27] resulted that there is high VO2 max value among volleyball players, and suggested that either years of specific physical conditioning and playing or the selection of individuals for the national team who possess more desirable characteristics as a consequence of genetic endowment, plays a significant role in the preparation of international caliber volleyball players. (Manna I. *et al*, 2012) [18] studied the influence of endurance training on heart rate among the volleyball players through preparatory and competitive phases, and shown significant improvement in recovery heart rate of the players during preparatory phase, however, no significant change was observed in maximal heart rate of the volleyball players following the training program. So it can be confirmed on important of heart rate as a physiological indicator in selection process of volleyball juniors.
From what mentioned above can be concluded that the second hypothesis is partly achieved in repeat pass only with pulse rate at rest, and pass farthest distance with some physiological measurements (pulse rate after effort 30 Sec, pulse rate at rest, and Vo2max 30 Sec).

Conclusions

There is no correlation coefficient between attack and all physiological characteristics. There is no correlation coefficient between forearm pass and physiological characteristics. There is correlation coefficient between repeat pass the ball to the wall and only test of pulse rate at rest, while there is no correlation coefficient between repeat pass the ball to the wall and other physiological characteristics. There is no correlation coefficient between serve and all physiological characteristics. There is correlation coefficient between pass farthest distance and some physiological characteristics, test of pulse rate at rest, and test of Vo2max 30 Sec), but there is no correlation coefficient between pass farthest distance and other physiological characteristics.

Recommendations

Physiological measurements should be taken in consideration during selection process of junior players. Physiological measurements, which achieved correlation coefficient with skills performance, whether it is a positive or negative can be depended on it in selection process of junior volleyball players. Conduct other studies complementary to this study in other physiological characteristics, in addition other skills performance that did not mention in this study.

References

1. Al-Dewan L. The Predictive Value of Skills Performance in Terms of Anthropometric, Physical, Kinetic, and Physiological Measurements for Selecting of Junior Football Players, 2011. http://lamya.yoo7.com/t627-topic
2. Duncan M, Woodfield L, Al-Nakeeb Y. Anthropometric and Physiological Characteristics of Junior Elite Volleyball Players, British Journal of Sports Medicine. 2006; 40(7):649-651.
3. Fattahi A, Ameli M, Sadeghi H. Relationship Between Anthropometric Parameters with Vertical Jump in Male Elite Volleyball Players Due to Game's Position, Middle-East Journal of Scientific Research. 2013; 13(8):1016-1023.
4. Fattahi A, Shamsabadi A, Kalani A, Khalifeh S, Ghofrani M. Differences between Biomechanical Variables of Professional Volleyball Attackers due to Game's Position, European Journal of Experimental Biology. 2014; 4 (2):06-411.
5. Fleck S, Case S, Puhl J, Van H. Physical and Physiological Demands of Elite Team Handball, J Strength Cond Res. 2012; 26 (12):3365-3375.
6. Fry A, Kraemer W, Weseman C, Conroy B, Gordon S, Hoffman J. *et al*. The Effects of an Off-season Strength and Conditioning Program on Starters and Non-starters in Women's Intercollegiate Volleyball, Journal of Applied Sport Science Research. 1991; 5(4):174-181.
7. Gabbett T, Georgieff B. Physiological and Anthropometric Characteristics of Australian Junior National, State, and Novice Volleyball Players, Journal of Strength and Conditioning Research. 2007; 21(3):902-908.
8. Galal El-Din H, Zapartidis I, Ibrahim H. A Comparative Study between Talented Young Greek and German Handball Players in some Physical and Anthropometric Characteristics, Biol Sport. 2011; 28:245-248.
9. Gaurav V, Singh M, Singh S. A Comparative Study of Somatic Traits and Body Composition between Volleyball Players and Controls, Indian Journal of Science and Technology. 2011; 4(2):116-118.
10. João P, Leite N, Mesquita I, Sampaio J. Sex Differences In Discriminative Power Of Volleyball Game-Related Statistics1, Percept Mot Skills. 2010; 111(3):893-900.
11. Keogh J. The Use of Physical Fitness Scores and Anthropometric Data to Predict Selection in an Elite under-18 Australian Rules Football Team, Journal of Sport Science and Medicine. 1999; 2(2):125-133.
12. Koley S, Bijwe V. Correlations of Back Strength with Selected Anthropometric Traits and Performance Tests in Elite Indian Volleyball Players, European Journal of Sports and Exercise Science. 2013; 2(2):1-5.
13. Koley S, Singh J, Singh J. Anthropometric and Physiological Characteristics on Indian Inter- University Volleyball Players. Journal of Human Sport and Exercise. 2010; 5(3):389-399.
14. Kumar S, Singh K. A Study of Relationship between Strength Measures and Kinanthropometric Profile of Volleyball Players, Acme International Journal of Multidisciplinary Research. 2013; 1(7):62-66.
15. Lidor R, Ziv G. Physical and Physiological Attributes of Female Volleyball Players a Review, Journal of Strength and Conditioning Research. 2010; 24(7):1963-73.
16. Malá L, Malý T, Záhalka F, Bunc V. The Profile and Comparison of Body Composition of Elite Female Volleyball Players, Kinesiology. 2010; 42(1):90-97.
17. Malousaris G, Bergeles N, Barzouka K, Bayios I, Nassis G, Koskolou M. Somatotype, Size and Body Composition of Competitive Female Volleyball Players, Journal of Science and Medicine in Sport. 2008; 11(3):337-344.
18. Manna I, Khanna G, Dhara P. Effect of Training on Anthropometric, Physiological and Biochemical Variables of U-19 Volleyball Players, Journal of Human Sport & Exercise. 2012; 7(1):263-274.
19. Marques C, Van den Tillaar R, Gabbett J, Reis M, González-Badillo J. Physical Fitness Qualities of Professional Volleyball Players, Determination of Positional Differences, Journal of Strength and Conditioning Research. 2009; 23(4):1106-11.
20. Marques M, González-Badillo J, Kluka D. In-season Strength Training Male Professional Volleyball Athletes, Strength and Conditioning Journal. 2006; 28(6):16-27.
21. Nikolaidis P, Ziv G, Arnon M, Lidor R. Physical Characteristics and Physiological Attributes of Female Volleyball Players-the Need for Individual Data, Journal of Strength and Conditioning Research. 2012; 26(9):2547-2557.
22. Palao J, Manzanares P, Valadés D. Anthropometric, Physical, and Age Differences by the Player Position and the Performance Level in Volleyball, J Hum Kinet. 2014; 9(44):223-236.
23. Ramesh N. Relationship between Team Cohesion and Performance among University Level Male Volleyball Players, Journal of Arts and Culture. 2011; 2(2):40-42.
24. Schaal M, Ransdell L, Simonson S, Gao Y. Physiologic Performance Test Differences in Female Volleyball Athletes by Competition Level and Player Position, Journal of Strength and Conditioning Research. 2013; 27(7):1841-1850.

25. Sheppard J, Gabbett T, Borgeaud R. Training Repeated Effort Ability in National Team Male Volleyball Players, International Journal of Sports Physiology and Performance. 2008; 3:397-400.
26. Silva M, Marcelino R, Lacerda D, João P. Match Analysis in Volleyball: A Systematic Review, Monten. J Sports Sci. Med. 2016; 5(1):35-46.
27. Smith D, Roberts D, Watson B. Physical, Physiological and Performance Differences between Canadian National Team and Universiade Volleyball Players, Journal of Sports Sciences. 1992; 10(2):131-138.
28. Stamm R, Veldre G, Stamm M, Thomson M, Kaarma H, Loko J. *et al*. Dependence of Young Female Volleyballers' Performance on their Body Build, Physical Abilities and Psychophysiological Properties, J Sports Med. and Physical Fitness. 2003; 43(3):291-299.
29. Vute R. Teaching and Coaching Volleyball for the Disabled Foundation Course Handbook, 2nd Ed, Faculty of Education, Ljubljana, 2009, p 28.
30. Yavuz S. Somatic and Physical Characteristics of Adolescent Female Volleyball Teams at Different Success Levels, Anthropologist. 2015; 21(3):427-438.
31. Zhang Y. An investigation on the Anthropometry Profile and its Relationship with Physical Performance of Elite Chinese Women Volleyball Players, MSc Thesis, Southern Cross University, Lismore, NSW, 2010.