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Anthropomorphic and physical parameters of volleyball players at different positions: A study

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Abstract
The objectives of the study were to compare the anthropometric and physical parameters of volleyball players playing in different position, to establish an anthropometric and physical profile database for volleyball players at different positions (Attacker, Blocker, Universal, Setter and Libero) in volleyball and to develop a logistic regression model to predict the likelihood of volleyball player according to different playing positions on the basis of selected anthropometric and physical variables. To achieve the purpose One hundred four male volleyball players were purposively selected for this study. Out of these, eighteen universal, sixteen libero, sixteen setters, twenty middle blocker, and thirty four attackers, within an age group of 19-33 years were selected from the top eight team of senior national volleyball championship. The study was delimited to only international and national male volleyball players.

Keywords: Anthropometric and physical variables, playing positions, volleyball, logistic regression model

1. Introduction
The amount of increasing stress among the people is constantly rising day by day due to the drastic lifestyle adaptations and in connection with the advancement of technology has made people's life very mechanical. The process of industrialization, modernization and urbanization have had a negative impact on the lifestyle of the people. Stress level is increasing among people due to the mechanical and busy life schedule. Advancement in technology has given a very comfortable domestic life, but people are becoming too sedentary and mere movement oriented.

Physical inactivity is considered more dangerous than physical activity. People in our country the young and the old do not get enough exercises, that is why modern society is increasingly drifting away from the habit of physical work. Inactive people are more likely to add more weight, became obese and develop impaired cardiac functions and have less tolerance of physical and mental stress and less able to cope with illness and injuries. People of the country should take an active part in sports to make the country a healthier one.

Volleyball has become a very popular game throughout the world. It has the world's second most popular sports and it is an international game that requires great skill and complex strategy, but it can be adapted to any level of play and it is always fun (Dumphy & Wilde, 2000). Volleyball, which is an excellent team sport, has been widely accepted as a highly competitive, as well as, recreational game throughout the world. It is now recognized as one of the most breath-taking and dramatic sport of the Olympics, both from the players and spectators view point. The game of volleyball gives a broad opportunity for the improvement of explosive strength, speed, agility, flexibility, neuro-muscular skills and coordination in relation to every movement like jumping, running, bending and all other combining related movements.

Height and reach are the most important factors in today's game. The players having extraordinary heights like more than 2 meters are dominating the game. It is vitally important to spike, block or to set the ball high above the net than the opponent. Height of action above net call for tall players, good jumping ability and perfect skills for spiking, blocking, setting and even at the time of servicing (hitting) the ball as high as possible. The game provides an ample opportunity for the development of strength, speed, endurance, agility, neuro-muscular

skill and coordination by various actions involved in it. Such actions are running, jumping, bending, stretching and other movements, which call for balance and carryout values, and thus it meets all the requirements of an excellent form of physical activity.

Anthropometric parameters are of great importance in the selection of appropriate athletes for appropriate sports. The primary reason for determining an athlete's body composition is to obtain information that may be beneficial in improving athletic performance". Body composition and weight are two of the many factors that contribute to optimal exercise performance. Taken together, these two factors may affect an athlete's potential for success within a given sport An athlete's anthropometric characteristics represent important prerequisites for successful participation in any given sport. It has been suggested that volleyball players at different positions have different anthropometric characteristics, especially in height. Successes in sport competitions have been associated with specific anthropometric characteristic.

Physical fitness is an inseparable part of sports performance and achievements. The quality of its utilization value is directly proportional to the level of performance. That means the greater the level of fitness, the greater will be the ability of a person to attain higher level of performance. Players are required to have good physical fitness that will enable successful performance at the competitive level. Anthropometric and physical parameters have been found to discriminate among successful athletes in different sports.

Furthermore, the study of the anthropometric and physical parameters of volleyball players can provide valuable insights into the sport's evolution. By comparing the physical attributes of players from different eras, researchers can identify trends in the sport's development and the changes in the requirements for each position.

2. Methodology

The procedure adopted for the selection of subjects, selection of variables, criterion measures, reliability of test items, administration of tests, along with the procedures for collection of data and statistical techniques employed for the study have been presented. Data on selected anthropometric and physical variables were collected on the national and international volleyball players from Nine (9) state teams of the country within an age group of 19-33 years. A total of one hundred and four (104) male volleyball players were purposively selected for this study including twenty four (24) universal, Eight (8) libero, sixteen (16) setters, twenty four (24) middle blockers, and thirty-two (32) attackers,

Anthropometric and physical variables were selected for the study namely Height (HT), Weight (WT), Arm Length (AL). Hand Length (HL), Palm Width (PW), Arm Girth Relax (AGR), Arm Girth Flexed (AGF), Fore Arm Circumference (FAC), Wrist Circumference (WC), Chest Circumference (CC). Thigh circumference (TC). Calf circumference (CF_C), Ankle Girth (AG), Leg Length (LL), Foot Length (FL). Speed, Shoulder Strength (SS). Explosive Leg Strength (SVJ). Agility (AGTY), Flexibility (FLEX), Abdominal Strength (ABS), and Body Composition (BODY COMP). Descriptive statistics were used to describe the nature and characteristic of data. For finding out significant difference in different parameters among the selected positions, one way ANOVA was applied and the level of significance was chosen as 0.05. For finding out the contribution of different parameters towards different playing positions, Logistic regression was applied.

Height was measured with the help of Stadiometer in centimeter. Weight was measured with the help of weighing machine in kg. Arm length, Hand length, Arm girth relaxed, Arm girth flexed, fore arm circumference, Wrist circumference, Chest circumference, Thigh circumference, Calf circumference, Ankle girth and Leg length were measured with the help of Gullick tape in Centimeter. Hand length, Palm width and Foot length were measured with the help of Sliding caliper in Centimeter. Speed was measured by 50 m Dash in seconds. Shoulder strength was measured by medicine ball throw in Meter. Explosive strength of legs was measured by Sargent jump test in Centimeter. Agility was measured by T-Shuttle Run Test in seconds. Flexibility was measured by Sit and reach in Centimeter. Abdominal Strength was measured by One Minute Sit-ups Test. Body composition was measured with the help of Skinfold caliper in mm. All the necessary data on different parameters were collected by the researcher scholar himself with the help of the experts.

Descriptive statistics were used to describe the nature and characteristic of data. For finding out significant difference in different parameters among the selected positions, one way ANOVA was applied and the level of significance was chosen as 0.05. For finding out the contribution of different parameters towards different playing positions, Logistic regression was applied.

Criterion measures

In general, the following are listed as criteria to be reviewed in the selection of a test to be used to measure achievement.

Height Weight	Stadiometer Weighing machine	Centimeter Kilogram
Arm Length	Gullick tape	Centimeter
Hand Length	Sliding calliper	Centimeter
Palm Width	Sliding calliper	Centimeter
Arm Girth Relaxed	Gullick tape	Centimeter
Arm Girth Flexed	Gullick tape	Centimeter
Fore Arm Circumference	Gullick tape	Centimeter
Wrist Circumference	Gullick tape	Centimeter
Chest Circumference	Gullick tape	Centimeter
Thigh Circumference	Gullick tape	Centimeter
Calf Circumference	Gullick tape	Centimeter
Ankle Girth	Gullick tape	Centimeter
Leg Length	Gulliek tape	Centimeter
Foot Length	Sliding caliper	Centimeter
Speed	50 m Dash	Seconds
Shoulder Strength	Medicine Ball Throw	Meter
Explosive Leg Strength	Sargent Jump	Centimeter

Agility	T- Shuttle Run	Seconds
Flexibility	Sit and reach	Centimeter
Abdominal Strength	One Min.Sit ups	No. of Sit ups
Body Composition	Skin fold caliper	mm

Reliability of Tests
The reliability of data was assured by establishing the instrument reliability, tester's competency and subject reliability.

Reliability of Instrument
The reliability of the equipment's used were available at the Central University of Kashmir Ganderbal, for the collection of data. These instruments were procured from the standard companies of India. Hence, the instruments were considered to be reliable.

Collection of Data
The data of the anthropometric variables (height, weight, arm length, hand length, palm length, arm girth relaxed and flexed, fore arm circumference, chest circumference, wrist circumference, thigh circumference, calf circumference, leg length, ankle length, foot length) and physical performance variables (Speed, Explosive leg strength, Flexibility, Shoulder Strength, Abdominal strength, Agility, Skin fold total) were collecting by administering standard test. Before administering the tests the subjects were given a chance to practice so as to make them familiar with the testing procedure. They were explained about the use of the apparatus during the testing procedure. All the data on different parameters were collected with the help of experts.

Statistical Technique
Descriptive analysis was carried out for describing the data and comparing the profile of the volleyball players playing at different positions. In descriptive analysis various statistics Like Mean, Standard Deviation, Standard Error of Mean, Variance, Range, Maximum, Minimum, Skewness, Standard Error of Skewness, Kurtosis, and Standard Error of Kurtosis etc. were computed for understanding the nature of the data.

3. Results
The main objective of this study is to identify parameters which are having significant contribution towards different playing position. (Universal, Libero, Setter, Blocker and Attacker) in volleyball. The study is confined to the selected anthropometric and physical variables only. Descriptive statistics were used to describe the nature and characteristic of data. For finding out significant difference in different parameters among the selected positions, one way ANOVA was applied and the level of significance was chosen as 0.05. For finding out the contribution of different parameters towards different playing positions, Logistic regression was applied

Anthropometric and physical characteristics have got a significant relationship with playing positions and these characteristics shall be kept in mind for selecting and preparing the volleyball players according to their playing positions. For the blockers in addition to the height, the length of the particular body parts such as limbs etc. are important. Along with the height, blockers also need to be speedy and explosive but generally it may be found that it is difficult to get the optimum combination of height, speed and strength qualities, although training can improve the relationship. Spikers (attackers) are those players who need the most varied combin3ations of selected anthropometric and physical characteristics namely, height, arm length, palm width, wrist circumference, leg length, speed, flexibility and body composition. Libero's are having unique characteristics as compared to other players in terms of anthropometric Libero did not show any particular characteristic but in terms of physical characteristics libero need to possess speed, agility, flexibility and body composition for which he should have. The logistic regression analyses showed that the likelihood of being positional players in volleyball players was significantly predicted by ten parameters namely Height, Arm length, Land length, Palm width, Fore arm circumference, Wrist circumference, Leg length, Speed, Flexibility and Body composition. Rest of the other parameters was statistically insignificant as per the Wald test.

Table 1: Analysis of variance for height among volleyball players in different position

Sources	SS	DF	MSS	F	p-value
Between Groups	3574.683	4	893.671	52.854*	.000
Within Groups	1673.932	99	16.908		
Total	5248.615	103			

Table 1 depicts that the obtained F-value is 52.854 for which, the obtained pvalue is 0.000 (p<0.05), Thus there exists a significance difference in height of volleyball players, playing in different positions. As the F value was found significant, the pair wise comparison was made among volleyball players playing in different positions.

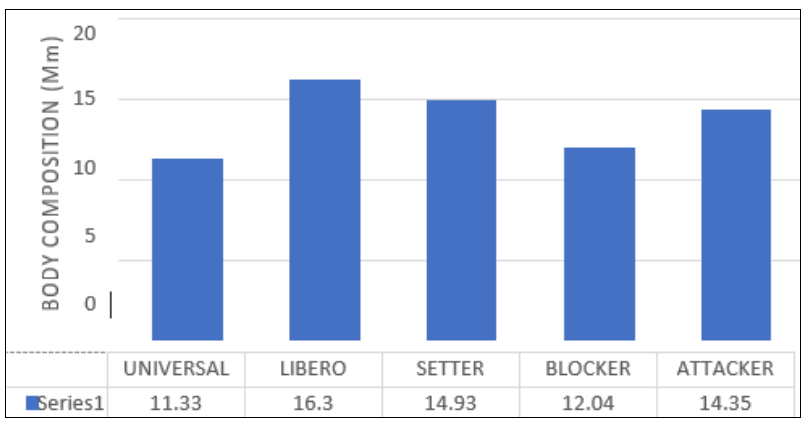

Fig 1: Shows the mean body composition of volleyball players in different positions

Table 2: Analysis of variance for body composition among volleyball players playing in different position

Sources	SS	DF	MSS	F	p-value
Between Groups	301.670	4	75.417	7.315*	.000
Within Groups	1020.650	99	10.310		
Total	1322.320	103			

Table 3 depicts that the obtained F-value is 7.315 for which, the obtained value is 0.000 (p<0.05). Thus there exists a significance difference in body composition of volleyball players, playing in different positions As the F value was found significant, the pair wise comparison was made among volleyball players playing in different positions.

Table 3: Descriptive statistics for physical profile of setter

Descriptive	Speed	SBJ	SS	SVJ	FLEX	ABD_S	BODY_COMP
Statistics							
Mean	7.02	2.43	9.99	61.87	38.56	64.56	14.93
Min.	6.5	2.18	9.32	49	33	50	10
Max.	7.62	2.68	10.87	78	42	79	18.7

SBJ: Standing broad jump SS: Shoulder strength SVJ: Standing vertical jump FLEX: Flexibility ABD_S: Abdominal strength BODY _COMP: Body composition

On identifying the parameters which are having some contributions toward classification of setter players in volleyball, the initial 8 physical variables namely, (speed, standing broad jump, shoulder strength, standing vertical jump, agility, flexibility, abdominal strength and body composition). Thus for the purpose of creating profile of players playing in different position, only significant variables were considered

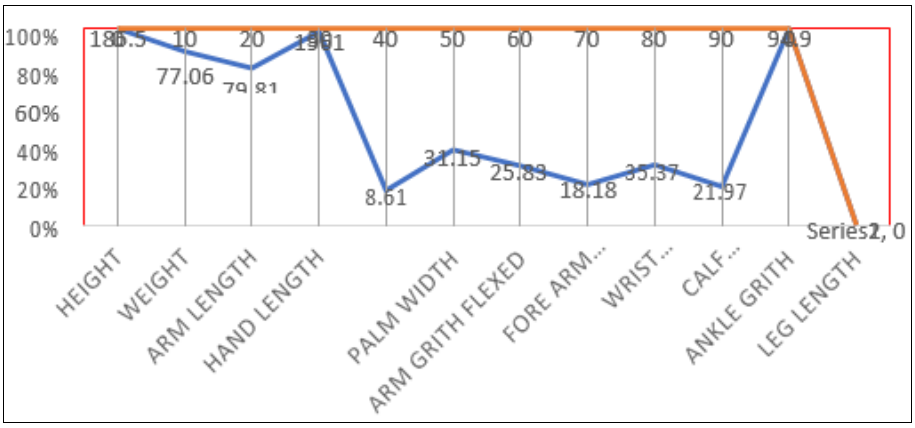

Fig 2: Shows the Anthropometric Profile of Setter

Table 4: Descriptive statistics for physical profile of blocker

Descriptive	speed	SBJ	SS	SVJ	FLEX	ABD_S	BODY_COMP
Statistics							
Mean	6.53	2.68	10.6	70.9	39	62.25	12.04
Min.	6.32	2.3	8.69	58	34	50	8.6
Max.	6.69	3.05	12.09	95	44	76	15.5

SBJ: Standing broad jump SS: Shoulder strength SVJ: Standing vertical jump FLEX: Flexibility ABD_S: Abdominal strength BODY _COMP: Body composition

On identifying the parameters which are having some contributions toward classification of blocker players in volleyball, the initial 8 physical variables namely, (speed, standing broad jump, shoulder strength, standing vertical jump, agility, t1exibility, abdominal strength and body composition). Thus for the purpose of creating profile of players playing in different position, only significant variables were considered. The table 70 shows that Speed of blocker range from 6.53 sec. to 6.69 sec. Similarly their standing broad jump range from 2.30 m to 3.05 m, shoulder strength range from 8.69 m to 12.09 m, Standing vertical jump range from 58 Cm to 95 Cm, Flexibility range from 34 Cm to 44 cm, Abdominal strength range from 50 to 76 sit-ups per minute and Body composition range from 8.6 mm to 15.5 mm.

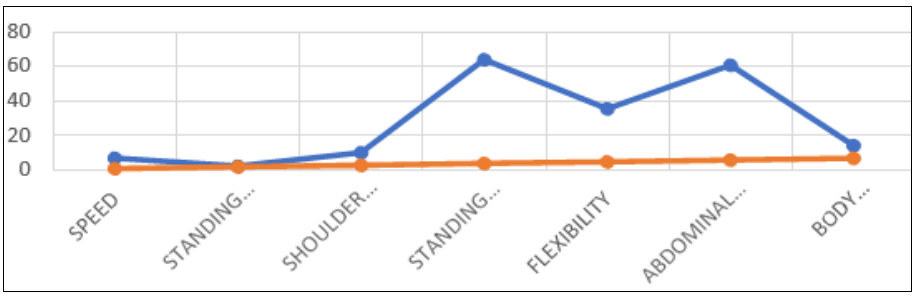

Fig 3: Shows the Physical Profile of Blocker

4. Discussion

The study was to compare the anthropometric and physical parameters of volleyball players playing in different positions. To develop anthropometric and physical profile of national level male volleyball players positions wise (Attacker, Blocker, Universal, Setter and Libero) and to develop a

logistic regression model to predict the likelihood of volleyball players according to different playing positions on the basis of selected anthropometric and physical variables. Descriptive statistics were used to describe the nature and characteristic of data. For finding out significant difference in different parameters among the selected positions, one way ANOVA was applied and the level of significance was chosen as 0.05. For finding out the contribution of different parameters towards different playing positions, Logistic regression was applied. The findings of the study showed significant difference among different position in height, weight, arm length, hand length, palm width, arm girth flexed, fore arm circumference, wrist circumference, calf circumference, ankle girth, leg length, foot length, speed, standing broad jump, shoulder strength, standing vertical jump, flexibility, abdominal strength, and body composition and found no significant difference in arm girth relaxed, chest circumference, thigh circumference and agility.

5. Conclusion

It was concluded from the results of the study that there is a significant difference between the heights of the volleyball players playing at different positions. The blockers were found to be tallest followed by universal, attacker, setter and libero respectively. This could be due to the reason that the blockers are required to reach the ball before the opponent sets the ball, for that they require greater limbs for the locomotion, as well as, to block the ball by extending and penetrating their upper limbs. Due to the above mentioned reason blocker requires greater height in comparison to other players. Small height give better stability due to low CG. Libero have to first receive the pass and also defend the opponent attack. For this purpose Libero have to be in a low stance position. Short heighted player like libero take less time to come in a low stance position as compare to other players. Height is selected as a factor to differentiate the players according to their position as the taller player in the volleyball has an advantage. In volleyball, teams compete by manipulating skills of spiking and blocking high above the head. Therefore, the presence of tall players is an indispensable factor in the success of a team.

6. References

1. Fallahi A, Ameli MS, 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.
2. Fonseca T, Luis C, Ferandes YP, Jose F. Analysis of anthropometrical profile of Brazilian junior volleyball team. International Journal of Morphology. 2010;28(4):1035-1041.
3. 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.
4. Gabbett T, Georgieff B. Changes in skill and physical fitness following training in talent-identified volleyball players. Journal of Strength and Conditioning Research. 2006;20:29-35.
5. Gabbett T, Georgieff B. Physiological and anthropometric characteristics of Australian junior national, state, and novice volleyball players. Journal of Strength & Conditioning Research. 2007;21:902-908.
6. Gabbett T, Georgieff B, Domrow N. The Use of Physiological Anthropometric, and skill Data to Predict Selection in a Talent-Identified Junior Volleyball Squad, Journal of Sports Science. 2007;25(12):1337-44.
7. Chauhan MS, Chauhan DS. The relationship between Anthropometric variables and explosive anns strength of volleyball players. Journal of Sports and Sports Science. 2005;28(2):5-13.