

A Comparative Study of Subcutaneous Fat Distribution Pattern of Male Junior and Senior Volleyball Players

Sukhwinder Singh and Parwinder Singh

Abstract

Aim: A Comparative Study of Subcutaneous Fat Distribution Pattern and Explosive Power of Male Junior and Senior Volleyball Players. **Materials and Methods:** The study was conducted on 60 male junior and senior volleyball players age ranged 17-20 years of junior volleyball players and age ranged 20-25 years of senior volleyball players. The subjects were divided into two different groups i.e. Group 1 was junior volleyball players and Group 2 was senior volleyball players. Each group consists of 30 volleyball players. The percentage fat of junior and senior volleyball players was evaluated as per the way described by Durnin and Womersley (1974). Body Mass Index can be measured according to the WHO (Laquatra, 2004). Body weight was checked with digital weighing machine. Comparison of Mean \pm SD and t-test was used to identify the significant differences between junior and senior volleyball players in selected subcutaneous fat distribution pattern. To observe the relationship Karl Pearson's coefficient of correlation was used among age, body weight, waist circumference, hip circumference, waist to hip ratio, body mass index and percentage body fat and percentage lean body mass variables of junior and senior volleyball players. The level of significance was $p < 0.05$. **Results:** The relationship among the variables showed that the anthropometric variables body percentage fat was positively significant related with age, height, weight, BMI, waist circumference, hip circumference, waist-to-hip ratio and percentage body fat at $p < 0.05$ and highly significant correlation with each other at $p < 0.01$. Percentage lean body mass was negatively significant related with age, height, weight, BMI, waist circumference, hip circumference, waist-to-hip ratio, percentage body fat at $p < 0.05$ and highly and negatively significant correlation with each other's at $p < 0.01$. **Conclusion:** it was concluded that the body fat percentage of the volleyball players of different groups were in the acceptable range. In other words, we can say no obesity was observed in them. The maximum body fat percentage was observed in senior volleyball players and minimum in junior volleyball players. The maximum lean body mass percentage was observed in junior volleyball players and minimum lean body mass percentage was observed in senior volleyball players. A positively relationship was found among the variables body percentage fat, age, height, weight, BMI, waist circumference, hip circumference, waist-to-hip ratio and skinfold thickness. Percentage lean body mass was found negatively relationship with age, height, weight, BMI, waist circumference, hip circumference, waist-to-hip ratio, skinfold thickness and percentage body fat.

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Introduction

Volleyball is one of the world's most fashionable sports and because of its huge popularity many studies have been conducted in a challenge to understand the better program training required to

develop total body performance by a volleyball player (Marques, Tillaar, Gabbett, Reis and Gonzaleze, 2009). Unfortunately, the scientific understanding of this issue remains indistinct, with most young participants acquiring muscular performance through individual experience rather than research-based instructions (Zhu et al., 2011, Vassil and Bazanov, 2012). Certainly, volleyball is a sport that requires strength in upper and lower limbs (Forthomme, Croisier, Ciccarone, Crielaard and Cloeset 2005). The development of muscle strength and specific technical skills are particularly important for young players and especially to female athletes as main concern factors to achieve success (Marques et al., 2008). Volleyball, which is an excellent all-around team sports, has been extensively accepted as a highly competitive as well as recreational game all over the world. The reason lies in the truth that it is not difficult for a beginner to analyze the fundamental or to learn basic skills. Now, it is a game of power and tactics and is played at a faster pace and this calls sharper thinking, high standard of skills and technical application. There are very fast action and accuracy in performance to technique, and tactics, which are they require of present game. Volleyball game may be characterized as an integrated playing action of six main skill, serve, serve-reception, set, spike, block and dig. Volleyball is game of skill and strategies. One skill is the wall spike ability to smash the ball in the desired direction, with the explosive strength and high speed (Singh and Singh, 2013). Volleyball belongs to sport activities in which anthropometric characteristics of its participants manipulate the level of sport performance. It was established that volleyball players compared to most other athletes have distinct anthropo-morphological characteristics (Ercolessi, 1999).

Anthropometry is the measurement of body size and proportions. The measurements include body weight, height, circumference, skin fold thickness and bony widths and lengths (Heyward, 2006). Anthropometric measurements are broadly used to evaluate and assess performance in different sports. Morphological characteristics and Anthropometric measurements play an important role in find out the success of a sportsperson (Wilmore & Costill, 1999). Anthropometric characteristics are associated to a player's profile and might be used to guess a player's achievement. Anthropometric characteristics of individual has been an interest of scientists, sports trainers, exercise, sport medicine professionals and physical education for years and many of them assumed the practicing players might be estimated to functional characteristics and exhibited structural that are exclusively constructive for the sport (Gaurav and Singh, 2014). The understanding of anthropometric characteristics is essential to establish their significance for the achievement in competitive sport (Viswanathan and Chandrasekaran 2011). Game of Volleyball mainly belongs to sports activities in which anthropometric characteristics of its players influence the level of achievements and sport performance. It was estimated that volleyball players compared to mainly other athletes have unique anthropo-morphological characteristics (Gaurav and Singh 2014). Body composition and the anthropometrical characteristics of players have been an interest of trainers, sport medicine professionals and exercise scientists for years and many of them assumed the practicing athletes might be expected to functional characteristics and exhibit structural that are exclusively favorable for the sport (Singh et al., 2010).

Materials and Methods

The study was conducted on sixty (N=60) male junior (17-20 years) and senior (20-25 years) volleyball players from different centers / clubs / colleges / schools / institution / universities. Further the subjects were divided into two different groups i.e. Group 1 was comprised of junior volleyball players and Group 2 was comprised of senior volleyball players. Convenience sampling method was used in this study. In this study Age, Height, Weight, Waist circumference, Hip circumference and Waist to hip ratio, BMI, percentage fat and percentage LBM of junior and senior volleyball players were considered with standardized procedure. The percentage body fat of junior and senior volleyball players was measured as per the way defined by (Durnin and Womersley, 1974). Body Mass Index was considered according to the

WHO (Laquatra, 2004). Weight was taken with digital weighing machine. Comparison of Mean \pm SD and t-test was used to identify the significant differences between junior and volleyball players in selected fat distribution and body composition variables. To observe the relationship Karl Pearson's coefficient of correlation was used among age, height, weight, BMI, waist circumference, hip circumference, waist-to-hip ratio, percentage body fat and percentage lean body mass variables of junior and senior volleyball players. The level of significance was $p < 0.05$.

Results

Table 1 show that the mean age of junior and senior volleyball players were 18.70 \pm .91year and 23.03 \pm .2.35 years. There was a significant difference in age between junior and senior volleyball players. The mean height of the subjects of junior and senior volleyball players were 179.83 \pm 6.86cm and 181.30 \pm 7.813cm. There was no significant difference in height of the subjects of junior and senior volleyball players $p = .443$. The mean weight of the subjects of football and volleyball players was 70.33 \pm 10.88kg and 73.00 \pm 11.14kg. There was no significant difference in weight of the subjects of junior and senior volleyball players $p = .352$. The mean body mass index of the subjects of junior and senior volleyball players were 21.67 \pm 2.54 and 21.62 \pm 2.50 respectively. There was no significant difference in BMI junior and senior volleyball players at $p = .49$.The Mean \pm SD Waist Circumferences of the subjects of group 1 and group2 was 75.80 \pm 7.667, 78.70 \pm 6.979 of junior volleyball players and senior volleyball players. The Mean \pm SD Hip Circumferences of the subjects of group 1 and group2 was 75.80 \pm 7.667 and 78.70 \pm 6.979 of junior volleyball players and senior volleyball players. there was not a significant difference in Waist Circumferences and hip Circumferences between junior volleyball and senior volleyball players The mean percentage fat of the subjects of junior and senior volleyball players were 14.35 \pm 4.43 and 16.86 \pm 4.29. There was a significant difference in percentage body fat between junior and senior volleyball players at $p = .03$. The mean value of percentage LBM of the subjects of junior and senior volleyball players were 85.64 \pm 4.43 and 83.13 \pm 4.29. There was a significant difference in percentage LBM between junior and senior volleyball players at $p = .03$.

Table 1. Mean \pm SD of age, height, weight, BMI, % body fat, right and left-hand grip of different groups

Variable(s)	Group 1 (n=30)	Group 2 (n=30)	Sig.
Age (year)	18.70 \pm .91	23.03 \pm .2.35	.00
Height (cm)	179.83 \pm 6.86	181.30 \pm 7.813	.443
Weight (kg)	70.33 \pm 10.88	73.00 \pm 11.14	.352
BMI	21.67 \pm 2.54	21.62 \pm 2.50	.49
Waist Circumferences (cm)	75.80 \pm 7.66	78.70 \pm 6.97	.13
Hip Circumferences (cm)	21.67 \pm 7.66	78.70 \pm 6.97	.39
Waist to Hip Ratio	.81 \pm .029	.82 \pm .039	.077
% Body fat	14.35 \pm 4.43	16.86 \pm 4.29	.030
% LBM	85.64 \pm 4.43	83.13 \pm 4.29	.030

*significant at the 0.05 level

Table 2 show a positively significant relationship was observed among age, height, weight, BMI, percentage fat, percentage lean body mass variables of combined group of junior and senior volleyball players.

Table 2. Correlation among age, height, weight, BMI, percentage fat, percentage lean body mass variables of combined group of junior and senior volleyball players

Variable(s)	Height	Weight	Waist to hip ratio	Body Mass Index	Percentage Fat	Percentage LBM
Age	.102	.150	.261*	.126	.217	-.217
Height		.657**	.013	.183	.205	-.205
Weight		-	.210	.860**	.627**	-.627**
Waist to hip ratio			-	.271*	.146	-.146
BMI				-	.680**	-.680**
Percentage fat					-	-.630**

*significant at the 0.05 level

Discussion

From the results of the present study, junior volleyball players were found less tall than senior volleyball players. Junior Volleyball players were found less body weight than senior volleyball players. Therefore, the heights of volleyball players have a direct effect on the performances of volleyball skills. The results of the present study shows that Body mass index was found minimum in junior players as compared to senior volleyball players and both groups were observed normal body mass index. The body fat percentage of the junior players and senior volleyball players of different groups were found in the acceptable range. In other words, we can say no obesity was observed in them. The maximum body fat percentage was observed in senior volleyball players and minimum in junior volleyball players. Body mass index was found minimum in senior volleyball players than junior volleyball players furthermore BMI was found normal range in both groups. Waist to hip ratio was observed minimum in junior volleyball players as compared to senior volleyball players. A statistically significant difference were observed between junior and senior volleyball players in body fat percentage and percentage lean body mass. Karl Pearson's coefficient of correlation was used to find the relationship among the various anthropometric and body composition variables of junior and senior Volleyball Players. The finding of this study indicates that, there was a highly significant correlation observed between the various selected subcutaneous fat distribution pattern of junior and senior volleyball players. The relationship among the variables showed that the anthropometric variables body percentage fat was positively significant related with age, height, weight, BMI, waist circumference, hip circumference, waist-to-hip ratio at $p < 0.05$ and highly significant correlation with each other's at $p < 0.01$. Percentage lean body mass was negatively significant related with age, height, weight, BMI, waist circumference, hip circumference, waist-to-hip ratio, percentage body fat at $p < 0.05$ and highly and negatively significant correlation with each other's at $p < 0.01$.

Conclusion

From the results of the present study, it is concluded that the body fat percentage of the volleyball players of different groups were in the acceptable range. In other words, we can say no obesity was observed in them. The maximum body fat percentage was observed in senior volleyball players and minimum in junior volleyball players. The maximum lean body mass percentage was observed in junior volleyball players and minimum lean body mass percentage was observed in senior volleyball players. The mean value of various anthropometric variables (body mass index, waist circumference, hip circumference, waist-to-hip ratio) was found maximum in senior volleyball players than junior volleyball players. The positively relationship was found among the variables

body percentage fat, age, height, weight, BMI, waist circumference, hip circumference, waist-to-hip ratio and skinfold thickness. Percentage lean body mass was found negatively relationship with age, height, weight, BMI, waist circumference, hip circumference, waist-to-hip ratio, skinfold thickness and percentage body fat.

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Conflict of Interest: None declared