

Comparison of Some Physical and Anthropometric Parameters and Examination of Relationship between them in Volleyball Players in Different Leagues

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Abstract

Aim: In this research aim to compare some physical and anthropometric parameters and examine relationship between them in volleyball players who play in different leagues.

Material and Method: 25 male volunteers from regional league players and 21 male volunteers from third league players so that 46 male volunteers in total participated in the research. Anthropometric measurements, body weight (BW), Height, Body fat percentage (BFP), Arm-Forearm Circumference, Hand Grip Strength, Skin fold thickness (*SFT*) from six regions: triceps *SFT* (mm), biceps *SFT* (mm), abdominal *SFT* (mm), suprailiac *SFT* (mm), femur *SFT* (mm), subscapula *SFT* were measured.

Findings: Regional and third league players between the mean age and weight measurement there was no statistical difference ($p > 0,05$), Height and BMI measurements were statistically significant differences between the means ($p < 0,05$). Regional and third league players triceps skinfold, biceps skinfold, abdomen skinfold, suprailiac skinfold, femur skinfold, subscapula skinfold, right-hand grip strength and left-hand grip strength there was no statistically significant difference between the means of measurement ($p > 0,05$). PBF values were observed significant differences in regional and third league players ($p < 0,01$). There was no relationship between Right hand grip strength and Biceps-Triceps *SFT* values in volleyball players ($p > 0,05$). Positive linear relationship was observed between Right hand grip and arm-forearm circumference ($p < 0,01$) (Table 3).

Result: Regional and third league volleyball players, height and the mean BMI of the parameters measured showed a statistically significant difference in favor of the third league players. There was statistically positive relationship observed between hand grip and arm-forearm Circumference.

KEYWORDS: Volleyball, Physical, Anthropometric, Hand grip

INTRODUCTIN

In recent years, the volleyball has become the forefront of an activity that millions of spectators and practitioners interest in the world and in our country. Technical and physical properties volleyball which differ according to positions which appear as a combat sport. It's score change makes the game more exciting and has helped to being adored. Volleyball does not have an exact time of match and has a high pace, quickness, strength, mobility, flexibility, strength, splash a physical game based on the dynamic (9). Volleyball has become a sport which physical force is used in the upper level as well as the technical and tactical elements use. One of the prerequisites necessary for sporting success is to develop basic motor characteristics.. As such, the motoric features have become more important (16). In today's sports branches

required to succeed physical fitness criteria (10). Height is an important feature in volleyball as in the design of the basic technical and tactical, attack-planning. In volleyball spike, block, jump and shoot parameters are getting more important. Volleyball players demonstrate to their physiological capacity they must have an appropriate physical structure in these areas. If physical structure is not appropriate adversely affect the performance. (1). Body parts, length, perimeter and diameter ratios to each other mechanical aspects of sporting activities provides information about who is more advantageous. Each sport branch will be in place to know these rates (6).

The aim of this study to compare some of the physical and anthropometric parameters in volleyball players who struggling in different leagues and to develop a recommendation on the result.

MATERIAL AND METHOD

25 male volunteers from regional league players with mean age $20,40 \pm 2,81$ (years), mean height $179,64 \pm 3,34$ (cm), and mean body weight $75,16 \pm 3,53$ (kg) together with 21 male volunteers from third league players with mean age $20,66 \pm 2,76$ (years), mean height $183,05 \pm 4,57$ (cm) and mean body weight $74,28 \pm 5,15$ (kg), 46 male volunteers in total participated in the research.

Measurements;

As one of the anthropometric measurements, measure body weight (VA) was measured using Tanita digital scales with a sensitivity of 0,01 kg. Height was measured with an ultrasonic digital heightmeter device branded Soehnle.

Skinfold Measurements; For determine the percentage of body fat, holtan brand skinfold caliper was used to apply pressure 10 g/sq in every angle. Measurements were taken from the right side of all subjects who standing upright. For measure the skin thickness, subcutaneous fat layer leaved from muscle tissue using the fingers. Caliper placed about 1 cm away from the fingers and recorded all values from indicator (8).

Skin fold thickness (*SFT*) from six regions: triceps *SFT* (mm), biceps *SFT* (mm), abdominal *SFT* (mm), suprailiac *SFT* (mm), femur *SFT* (mm), subscapula *SFT* were measured through skin fold caliper.

Body fat percentage (BFP); Calculated formula according to the Yuhazs.

$$Fat \% = 5.783 + 0.153 (Triceps + Subscapula + Abdominal + Suprailiac)$$

Circumference Measurements; arm circumference (cm), forearm circumference (cm) were measured using and a tape measure (18).

Hand Grip Measurements; right-hand grip strength and left-hand grip strength values were measured using hand grip dynamometer branded Takei.

Statistical Analysis; SPSS-16 packaged software to process the raw data obtained from the measurements, independent samples T-test and pearson correlation was applied to independent groups and level of significance was chosen to be 0.05 and 0.01.

FINDINGS

The mean age of players in the regional league: $20,40 \pm 2,81$ (year), average height: $179,64 \pm 3,34$ (cm), BW average: $75,16 \pm 3,53$ (kg), BMI average: $23,28 \pm 1,02$ (kg/m^2) was found. The mean age of players in the third league: $20,66 \pm 2,76$ (year), average height: $183,05 \pm 4,57$ (cm), average weight: $74,28 \pm 5,15$ (kg), BMI average: $22,27 \pm 1,68$ (kg/m^2) was found. In regional and third league players between the mean age and weight measurement there was no statistical difference observed ($p > 0,05$). Height and BMI measurements were statistically significant differences considered between two groups ($p < 0,05$). Regional league players triceps SFT $8,59 \pm 2,49$ (mm), biceps SFT $5,89 \pm 2,04$ (mm), abdomen SFT $12,90 \pm 3,97$ (mm), suprailiac SFT $10,58 \pm 3,25$ (mm), Q.femoris SFT: $7,59 \pm 2,33$ (mm), subscapula SFT $8,39 \pm 2,50$ (mm), BFP $10,35 \pm 1,21$ (%), Arm Circumference $29,92 \pm 1,93$ (cm), Forearm Circumference $26,96 \pm 1,51$ (cm), Right-hand grip strength: $99,92 \pm 14,92$ (kg) Left -hand grip strength: $90,72 \pm 12,33$ (kg) was found. Third league players triceps SFT $8,34 \pm 3,37$ (mm), biceps SFT $6,13 \pm 2,84$ (mm), abdomen SFT $12,21 \pm 4,16$ (mm), suprailiac SFT $9,25 \pm 2,83$ (mm), femur SFT $6,82 \pm 2,47$ (mm), subscapula SFT $8,42 \pm 3,33$ (mm), Arm Circumference $29,19 \pm 5,49$ (cm), Forearm Circumference $27,04 \pm 1,49$ (cm), Right-hand grip strength: $98,04 \pm 18,55$ (kg) Left-hand grip strength: $91,80 \pm 15,56$ (kg) was found. Regional and third league players' triceps SFT, biceps SFT, abdomen SFT, suprailiac SFT, femur SFT, subscapula SFT, Right-hand grip strength and Left-hand grip strength were no statistically significant difference between the means of measurement ($p > 0,05$). PBF values were observed significant differences in regional and third league players ($p < 0,01$). There was no relationship between Right hand grip strength and Biceps-Triceps SFT values in volleyball players ($p > 0,05$). Positive linear relationship was observed between Right hand grip and arm-forearm circumference ($p < 0,01$) (Table 3).

Table 1: Compare the Averages of Anthropometric Measurements of Subjects

Parameters	Regional League (xx/ss)	Third League (xx/ss)	t	p
Age (year)	$20,40 \pm 2,81$	$20,66 \pm 2,76$	-0,323	0,748
Height (cm)	$179,64 \pm 3,34$	$183,05 \pm 4,57$	-2,914	0,006
Body Weight (kg)	$75,16 \pm 3,53$	$74,28 \pm 5,15$	0,679	0,500
BMI (kg/m^2)	$23,28 \pm 1,02$	$22,27 \pm 1,68$	2,509	0,016

Table 2: Comparing Hand Grip and Some Physical Parameters of Subjects

Parameters	Regional League (xx/ss)	Third League (xx/ss)	t	p
Triceps SFT (mm)	$8,59 \pm 2,49$	$8,34 \pm 3,37$	0,292	0,772
Biceps SFT (mm)	$5,89 \pm 2,04$	$6,13 \pm 2,84$	-0,328	0,744
Abdomen SFT (mm)	$12,90 \pm 3,97$	$12,21 \pm 4,16$	0,567	0,574
Supralliac SFT (mm)	$10,58 \pm 3,25$	$9,25 \pm 2,83$	1,460	0,151
Femoris SFT (mm)	$7,59 \pm 2,33$	$6,82 \pm 2,47$	1,076	0,288
Subscapula SFT (mm)	$8,39 \pm 2,50$	$8,42 \pm 3,33$	-0,037	0,971
BFP (%)	$10,35 \pm 1,21$	$11,63 \pm 1,86$	-2,793	0,008

Arm Circumference (cm)	29,92±1,93	29,19±5,49	0,301	0,538
Forearm Circumference (cm)	26,96±1,51	27,04±1,49	0,627	0,845
Handgrip-Right (kg)	99,92±14,92	98,04±18,55	0,379	0,706
Handgrip-Left (kg)	90,72±12,33	91,80±15,56	-0,265	0,792

Table 3: Examination of the Relationship Between Hand Grip and Arm-Forearm Circumference, Biceps-Triceps Skinfold Thickness in Volleyball Players

Parameters	Values	Biceps SFT	Triceps SFT	Arm Circumference	Forearm Circumference
Hand Grip-Right	Korelasyon	-0,126	-0,108	0,480	0,471
	P	0,404	0,475	0,001**	0,001**

DISCUSSION AND RESULT

The purpose of this study is to compare some physical parameters of volleyball players playing at different leagues and to analyze the relationship between them. While the mean age of the male volleyball players at local league is 20,40±2,81, the mean age of third league players is 20,66±2,76.

A tall stature is the most critical factor to be successful at volleyball and to gain advantage in hits and blocks. The height, BW and BMI averages of the local league male volleyball players in this study are recorded respectively 179,64±3,34 (cm), 75,16±3,53 (kg), 23,28±1,02 kg/m². Height, BW and BMI averages of third league male volleyball players are respectively 183,05±4,57 (cm), 74,28±5,15 (kg), 22,27±1,68 kg/m². While no statistical difference (p>0,05) was determined between means of body weight measurements, a statistical difference (p< 0,05) was determined between means of height and BMI parameters' measurements.

The results of the study, conducted by Kurt in order to compare the effects of exercises on trained and non-trained sportsmen, in which mean age was 181,82 ± 6,00 cm and mean body weight was 74,09 ± 9,3 kg (12); the results of the study in which Cinel et. al. found that the mean height in male volleyball players was 182,87 ± 4,3 cm and body weight was 79,87 ± 2,2 kg (5); the results of the study in which Çelenk found that height of male volleyball players was 185,27 ± 3,69 cm and body weight was 73,40 ± 6,25 kg (7) show similarities with the results we obtained in our study.

In local league players, arm circumference was found as 29,92±1,93 (cm) and forearm circumference as 26,96±1,51 (cm). In third league players, arm circumference was 29,19±5,49 (cm) and forearm circumference was 27,04±1,49 (cm). No statistical difference (p>0,05) was found between mean values of arm circumference and forearm circumference measurements in local and third league players.

The results of the study, conducted by Albay, in which they found arm circumference was 31,57 cm and forearm circumference was 26,46 cm (3). The purpose of skin fold

thickness measurements is to determine the rate of body fat. A high rate of body fat can affect the performance in volleyball in a negative way.

It was observed that local league volleyball players involved in the research had following values: triceps *SFT* $8,59\pm 2,49$ (mm), biceps *SFT* $5,89\pm 2,04$ (mm), abdominal *SFT* $12,90\pm 3,97$ (mm), suprailiac *SFT* $10,58\pm 3,25$ (mm), femur *SFT* $7,59\pm 2,33$ (mm), subscapula *SFT* $8,39\pm 2,50$ (mm), percentage of body fat (PBF%) $10,35\pm 1,21$ (%). Apart from that, it was observed that third league volleyball players had following values: triceps *SFT* $8,34\pm 3,37$ (mm), biceps *SFT* $6,13\pm 2,84$ (mm), abdominal *SFT* $12,21\pm 4,16$ (mm), suprailiac *SFT* $9,25\pm 2,83$ (mm), femur *SFT* $6,82\pm 2,47$ (mm), subscapula *SFT* $8,42\pm 3,33$ (mm), percentage of body fat (PBF%) $11,63\pm 1,86$ (%).

The results of the research in which Albay et al., found that subcutaneous fat values of volleyball and football players at university teams were triceps 9,6 mm, abdomen 14,6 mm, subscapula 10,8 mm (3); the results of the research in which Akan et. al. found that means of subscapula skin fold thickness of Kuleli Military High School students was 9,35 mm, biceps skinfold thickness was 4,48 mm, triceps skinfold thickness was 8,69 mm and suprailiac skinfold thickness was 7,58 mm (2) show similar values with the ones we obtained in our research.

Right hand grip strength of local league players was found as $99,92\pm 14,92$ (kg) and left hand grip strength was found as $90,72\pm 12,33$ (kg). Right hand grip strength of third league players was $98,04\pm 18,55$ (kg) and left hand grip strength was $91,80\pm 15,56$ (kg). No statistically significant difference ($p>0,05$) was determined between means of right hand grip strength and left hand grip strength measurements.

Power generation is based on laws of physics. Muscular strength is considerably affected by muscular mass involved in the activity, total cross-sectional areas (physiological cross-sectional areas) and the order of leverage system structure of the muscles (15).

The results of the research in which Kürkçü determined a significant relationship between biceps extension circumference and hand grip strength values (13); the results of the research in which Anakwe et. al. stated that the grip strength increases as the forearm circumference value increases (4); the results of the research conducted by İncel et. al. in order to investigate the effect of sex on grip strength, in which they claimed that males' having higher values of grip strength may be associated with the fact that they have higher amount of muscle mass (11) support the findings we obtained.

Forearm circumference measurement may provide an estimated data about the muscular mass involved in the hand grip activity. Regarding the fact that hand grip strength is associated with anthropometric measurements of the forearm (14), the results we obtained in our research are expected results.

Consequently, Regional and third league volleyball players, height and the mean BMI of the parameters measured showed a statistically significant difference in favor of the third league players. There was statistically positive relationship observed between hand grip and arm-forearm Circumference.

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