The Comprasion Of Anthropometric Measurements Of Elite Rowers And Sedanteries

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ABSTRACT

It is aimed to introduce the differences of elite rowers pursuant to sedentary from anthropometric aspect and to present scientifically the anatomical changes to be occurred in sportsman related with rowers comparing with their anthropometric parameters in the elite rowers and sedentaries in this research. The total 36 individual in range of 16-18 years old man who consists of one group including 18 rowers also national sportsman activing in Galatasaray Sports Club and other group including 18 sedentaries took part in this research. Length, width, circumferences and subcutaneous fat measurements were done in the research. Statistical analyses were made with SPSS for Windows program. Paired comparisons and variables not having normal distribution were calculated with Mann-Whitney U test. The statistical significance was recognized as $p<0.05$. Comparing elite rowers to sedentaries for height and weight measurements according to the conclusions, a significant difference was determined. It was determined that the elite rowers pursuant to sedentaries were taller and weightier. As a conclusion, the conclusions of fat rates, measurement areas of circumferences, width and height were high in rowers, and especially the height of arm and leg was significantly high in rowers pursuant to sedentaries in the light of findings.

Keywords: Rowers, anthropometry, sedentary.

INTRODUCTION

Rowing can be defined as a sport in which athletes race against each other with using all of their main muscles in shells. Athletes that do rowing have to be strong, enduring, balanced and also they have to have mental balance and good technique. In rowing, tall athletes have an advantage, because if someone has long arms and legs, s/he can scull much longer. Average length of men rowers is 2.00 m and average length of women rowers is approximately 1.80m[7].

In rowing, arm, body and leg muscles are used at maximum level and also, rowing is a sport that requires strength and endurance.

Anthropometry is related to the measurements of body lengths and their ratios. Body ratio is expressed as body weight/body length ratio. For evaluating body dimensions and ratios, caliber, peripheral length, length and subcutaneous fat thickness of the body have to be measured. These measurements are also done for evaluating general and endemic structures of the body [21].

Ratios of length, wideness and peripheral length of the body parts inform us about who is more advantageous as mechanically in sport activities. Thus, these ratios have to be measured in every sports branch [4].

For determining the effects of trainings on morphological structure and following the performances of athletes, anthropometric measures have to be done [8].

Recent searches have shown the effects of anthropometry on the trainings [5]. It is connected with stature, body weight, arm and leg lengths, joint mobility, flexibility levels and especially performance and strength [8].

During the evaluation of anthropometric measurements, determining body structure and body composition, determining the ratios of body parts, determining body weight and specifying the adaptation between the sports branch and training schedule on anthropometric structure [13].

In the light of the recent studies, morphological parameters that provide an advantage in sports were

examined in common and an average model was created for every branch. Structurally, parameters like height, weight, samotype, body composition and fibril composition affect the ability and functional factors in sports branches [13]. Heredity is the most important factor that specifies the body structure. However, nobody can estimate the winner of the competition with only regarding the appearance of the competitors. Length, width and peripheral length ratios of body parts bring us some datum about who is more advantageous as mechanically in the race. For example, long arms and legs provide an advantage to artistic gymnastics athletes and the length of lower extremities provide an advantage to high jumpers [13]. After searches, researchers found that specific body types are succeed in specific branches [3]. For this reason, it is important to prefer anthropometric methods and to determine the samotype and body fat of the athletes for body structure studies.

Starting from this, knowing anthropometric structure and performance values of athletes is necessary for preparing quality training programs and determining the athlete selection criteria. These values also have to be used in sport sciences researches. Thus, sport anthropometry is very important [13, 6].

Growth and maturing processes of adolescent athletes should be followed. After those periods, starting of branch out and private training period is important for following the connection between the body structures and performances of athletes [14].

MATERIAL AND METHOD

18 rowers and 18 sedentaries, who are work within Galatasaray Sports Club, whose ages are between 16-18 and who are national athletes, participated in this research. All of the participants are male and all of them participated voluntarily. Sedentary participants were selected from Isparta Milli Piyango Anatolian High School and rowers were selected from Galatasaray Sports Club and all of which have been doing this sport approximately for 4 years. They had been informed about this researches main purpose and importance before the measurements were made. Length, width, peripheral length and subcutaneous fat thickness of the athletes were measured.

All measurements were taken from the right side of the subject and average value was recorded. At peripheral length measurements, a steel tape measure of which degree of accuracy is 0,1 cm and width is 7 mm. and which is flexible, was used. During the measurements the tape measure was applied to body parts vertically and any tissues were not compressed [20]. At length measurements, all measurements were taken twice from right side of the subject when he was at anatomical position [14]. For determining the oil rate, a skinfold caliper (Holtain) which exerts 10 g/sq mm pressure at all angles, was used. Measurements were taken from right side of the subject at the time he was standing. Measurements were made with an anthropometric set. Before the measurements were made, measured areas had been determined with fingers. The device was contacted with bone [17].

For making statistical analysis "SPSS for Windows" package program was used. Paired comparisons and variables that do not show normal distributions are evaluated with Mann-Whitney U Test. Statistical significance level was considered of $p<0.05$.

FINDINGS

Average age of the subjects is 17.05±0.53 ($p>0.05$). Also, average length of elite athletes is 183.94±4.30, average weight of them is 75.86±6.53. Average length of sedentaries is 174.27±5.52, average weight of them is 65.94±6.43. Distinction between them is significant as statistical ($p<0.05$). There are not any significant distinction between the subjects as age, because all of them were selected from 16-18 age group ($p>0.05$).

Table 1: Comparing the demographical findings of the subjects.

Demographical Findings	Groups		t value*
	Athlete n=18	Sedentary n=18	
	ORT±SS	ORT±SS	
Age(year)	17.05±0.53	17.05±0.53	1.000

Weight(kg)	75.86±6.53	65.94±6.43	.000*
Length(cm)	183.94±4.30	174.27±5.52	.000*

Table 2: Comparing the fat measurement area of elite rowers and sedentaries.

Skinfold Fat Measurement Areas	**Groups**		**t value***
	Athlete n=18	**Sedentary n=18**	
	ORT±SS	**ORT±SS**	
Biceps	6.36±2.10	3.86±1.14	.000*
Triceps	9.34±3.03	8.20±2.80	.235
Pectoral Muscle	7.79±2.42	7.26±2.19	.558
Sub scapular	11.26±2.12	7.56±1.84	.000*
Abdomen	14.63±6.06	10.15±3.04	.029*
Suprailiac	10.67±4.05	5.64±1.70	.000*
Femur(upper leg)	11.18±3.95	9.69±2.40	.288

At the comparison of the suprailiac, arm (biceps), sub scapular, abdomen and fat measurement area values of elite rowers and sedentaries there were significant distinction ($p<0.05$). However, there are not any significant distinction between elite athletes and sedentaries about pectoral, triceps and femur (upper leg) fat measurement areas ($p>0.05$).

Table 3 : Comparing the peripheral lengths of elite rowers and sedentaries.

Peripheral Length Measurement Areas	**Groups**		**t value***
	Athlete n=18	**Sedentary n=18**	
	ORT±SS	**ORT±SS**	
Shoulder Circumference	110.23±17.15	103.52±4.05	.000*
Chest normal	91.98±17.71	86.83±3.20	.001*
Chest inspiration	95.65±15.67	91.58±3.29	.001*
Chest expiration	88.66±14.82	85.47±3.41	.001*
Abdomen	79.37±13.60	78.19±4.48	.055

Circumference			
Sciatic Circumference	96.75±4.90	91.63±4.80	.005*
Arm Circumference	28.73±1.72	25.88±1.82	.000*
Triceps Circumference	31.19±1.78	29.38±2.01	.015*
Forearm Circumference	26.21±4.13	25.66±1.21	.018*
Forearm Muscles Circumference	28.08±1.41	27.49±4.31	.737
Femur Circumference	54.19±8.88	52.94±2.65	.057
Femur Muscles Circumference	54.70±8.79	53.44±3.02	.064
Leg Circumference	35.76±5.62	35.86±1.31	.250
Leg Muscles Circumference	36.16±5.65	36.16±1.36	.192

After being compared with Mann-Whitney U Test, shoulder, breast normal, breast inspiration, breast expiration, sciatic, arm, triceps and forearm peripheral lengths of elite rowers and sedentaries were found significant ($p<0.05$). After being compared with Mann-Whitney U Test, abdomen, forearm muscles, femur, femur muscles, leg and leg muscles of elite rowers and sedentaries were not found significant ($p>0.05$).

Table 4: Comparing the width measurement areas of elite rowers and sedentaries.

Width Measurement Areas	**Groups**		**t value***
	Athlete n=18	**Sedentary n=18**	
	ORT±SS	**ORT±SS**	
Biacrominal Width	40.80±2.47	39.69±1.99	.248
Chest Width	28.88±3.64	25.05±2.18	.000*
Chest Depth	20.44±1.84	19.88±1.27	.327
Elbow Width	7.44±0.53	7.44±1.09	.599
Wrist Width	6.05±0.16	5.47±0.43	.000*
Metacarpal Width	8.19±0.73	8.75±0.87	.027*
Sciatic Width	34.25±2.46	30.02±1.79	.000*

Knee Width	10.27±0.46	15.52±23.57	.117
Ankle Width	7.91±0.54	8.16±0.45	.116
Metatarsal Width	9.94±0.53	10.58±0.46	.001*

After being compared with Mann-Whitney U Test, chest, wrist, sciatic width, metacarpal and metatarsal width of elite rowers and sedentaries were found significant ($p<0.05$). After being compared with Mann-Whitney U Test, elbow, knee, ankle width and chest depth of elite rowers and sedentaries were not found significant ($p>0.05$).

Table 5: Comparing the length measurement areas of elite rowers and sedentaries.

Length Measurement Areas	Groups		t value*
	Athlete n=18	Sedentary n=18	
	ORT±SS	ORT±SS	
Bust	93.38±3.16	93.66±3.39	.692
Arm	82.55±2.30	66.97±9.59	.000*
Upper Arm	39.36±2.34	33.72±2.16	.000*
Hand	21.80±1.22	19.75±0.52	.000*
Fore Arm	31.25±2.55	27.66±1.50	.000*
Femur	47.83±3.91	45.29±2.17	.040*
Leg	41.30±1.70	41.16±3.68	.886
Foot	28.18±1.22	27.38±1.47	.137
Fathom	187.88±6.49	177.38±7.04	.001*

After being compared with Mann-Whitney U Test, arm, upper arm, hand, fore arm, femur and fathom lengths of elite rowers and sedentaries were found significant ($p<0.05$). After being compared with Mann-Whitney U Test, bust, leg and foot lengths of elite rowers and sedentaries were not found significant ($p>0.05$).

DİSCUSSİON

It is known that every sports branch has its own characteristic features. And also, it is known that athletes that are proper to these features succeed in her/his sports branch [11]. Physical features of the athletes represent their physiological, functional and biomechanical demands about their training schedules. In rowing, proper technique is the most important feature for the athletes and also body composition and body ratio are supplementary factors for success [1]. For being a senior rower in rowing sport, in which physical condition is very important, athletes have to work hard and also they have to have some physical features [10]. In rowing, success criterion for an athlete is her/his place at the end of the race. There are many factors that affect athlete's performance during the race. These are physical and physiological parameters and technical and other factors [19]. Connection between development and engine performance depends on anthropometric factors in general and it contributes to performance improvement [16].

Knowing physical features during ability choice of successful athletes may be a good model. And also, length,

peripheral length and other measurements should be made. Especially, physical structure plays a crucial role in the sense of performance. Body structure and oil rate of rowers are important for the performance. Also, physical and physiological features are different between the rowers. In our country, there are very few sources can be found about physical and physiological features of young rowers. On the other hand, as in the other sports, rowing has its own physical, physiological, psychological and biometrical features and these features can be used during the chosen of new athletes [11].

In this research, physical differences of rowers are presented with comparing anthropometric measurements of subcutaneous fat thickness, width, length and peripheral length of young elite rowers and sedentaries. Owing to our research was made on young national athletes, age group was chosen as 16-18. Thus, there is not a significant difference in the conclusions from the point of the age of the subjects. However, there is a significant difference between elite rowers and sedentaries from the point of weight measurements and tall statures. Elite rowers are weightier and taller than sedentaries.

Length and weight measurements that constitute some parts of anthropometric measurements are used in defining and comparison the physical structures of people that come from different countries. Length and weight measurements create a standard value for clinic evaluations. Length and weight values are distinct factors for creating norms to different sport groups [9].

In our research, average age of athletes and sedentaries is 17.05±0.53 (p=1). Also, average length of the athletes that do sports as elite is 183.94±4.30, and their average weight is 75.86±6.53. Average age of sedentaries is 74.27±5.52 and their average weight is 65.94±6.43. The difference between them is significant as statistical (p<000). As for these findings athletes that do rowing, are taller and weightier than sedentaries. Bourgois and his friends did a research in 2000 and their research supports our finding. In their research, they analyzed 383 young national rowers that attended 1997 World Championship and they found that average age of rowers is 17.8, their average length was 187 cm and their average weight is 82.2 kg. And also in their research, they compared the anthropometric measurements and they found that rowers were 15.5 kg weightier than sedentaries and also they were 12.0 cm taller than sedentaries. Meesonnier and his friends made a research in 1997. They analyzed 12 French male rowers and they found that average length of the rowers was 182 ± 5 cm. Cosgrove and his friends made a research in 1999. They analyzed 13 male rowers and they found that average length of the rowers was 180.5 ± 4.6 cm. Hanel and his friends made a research on 8 mal Danish rowers of which average age was 19 in 1993. They found that their average weight was 81 kg and their average length was 186 cm. Parkin and his friends made a research on 20 rowers in 2001. They found that average length of the rowers was 1.88 ± 2.7. Ditter and Nowacki made a research on 27 young national rowers of Germany in 1975. Average age of these rowers was 18 and they found that their average length was 186,6 cm and their average weight was 81.6 kg. (These findings have parallelism with the findings of our research).

Koutedakis and Sharp made a research on 8 players of national rowing teams of England and Greece in 1986. Average age of these 8 rowers was 17.6.They found that the average length of rowers was 190.2 cm and their average weight was 83.1 kg. Steinacker and his friends made a research on 19 German rowers. Average age of these rowers was 17.5. They found that their average length was 191,5 cm and their average weight was 83,7 kg.

Beneke made a research on 9 rowers in 1995. He found that their average body weight was 81.1± 6.3 kg. Hagerman made a research on 30 rowers in 1992. He found that average weight of heavyweight rowers was 88 kg. Russell and his friends made a research on 19 rowers in 1997. They found that average weight of rowers was (1997) 85 ± 8 kg. When comparing our research with the older ones, you can see that our weight findings are lower that the others.

In our day, average length of elite heavyweight male rowers is 197 cm, their average weight is 95 kg and their oil rate is %8 [18].

Koutedakis and Sharp made a research on 8 players of national rowing teams of England and Greece in 1985. They found that their average age was 17.6, their average length was 190.2 cm and their average weight was 83.1 kg.

J.Bourgois and J.Vrijens made a research on 10 athletes of Belgium National Rowing Team in 1988. They found that their average age was 17.0, their average length was 186.8 cm and their average weight was 81.2 kg.

RESULT

Growth and maturing processes of adolescent athletes should be followed. After those periods, starting of branch out and private training period is important for following the connection between the body structures and performances of athletes [15].

In our research, we compared anthropometric measurements of elite rowers and sedentaries and we aimed to

present that these two groups are different at their anthropometric features and also we wanted to present scientifically the anatomic changes of rowers.

18 rowers and 18 sedentaries, who are work within Galatasaray Sports Club, whose ages are between 16-18 and who are national athletes, participated in this research. All of the participants are male and all of them participated voluntarily. Sedentary participants were selected from Isparta Milli Piyango Anatolian High School and rowers were selected from Galatasaray Sports Club and all of which have been doing this sport approximately for 4 years. They had been informed about this researches main purpose and importance before the measurements were made. After comparing personal characteristics, successes and failures of people come up in parallel with their weaknesses and strong features. Specifying these weak and strong features is an important factor that determines the result especially in national team competitions [5].

When viewed from this aspect, in our research, with comparing anthropometrical measurements of the young athletes and sedentaries we aimed to present that these two groups are different at their anthropometric features and also we wanted to present scientifically the anatomic changes of rowers. When demographic features of young national team rowers and sedentaries are analyzed, there is not any significant differences between them as their age ($p>0,05$). On the other hand, elite rowers are taller and weightier than sedentaries.

In our research we found that all of subcutaneous fat thickness values of elite rowers are higher than values of sedentaries. However, there were not any statistical differences between skinfold, biceps skinfold, sub scapula skinfold and abdomen skinfold values of these two groups.

In peripheral length measurements, measurements of elite athletes are higher than sedentary group except for leg length measurements. However, only statistical differences are found in shoulder, chest normal, chest inspiration, chest expiration, sciatic, arm, biceps and forearm measurements.

When we compare the width of elite rowers and sedentaries, we found that chest, wrist and sciatic width of elite rowers are significantly higher than sedentaries and on the other hand, metatarsal width of elite rowers is significantly lower than sedentaries.

In our research, we found that all length measurements of elite rowers were higher than sedentaries but only statistical differences were found in arm, upper arm, hand, forearm, femur and fathom measurements.

When this research and similar researches will be ended, gained results from the athletes should be shared with researchers, trainers and people who will be considered necessary. We think that our research will be an advisor for them when they create personal training schedules.

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