Comparison of physical activity and skinfold thickness of students living in rural and city center

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Abstract

Purpose: In this academic research, it was aimed to compare the physical activity and skinfold thickness of the students living in the city center and rural areas.

Material: 89 students attending the 6th grade level, whose total age is 12 years old, residing in the city center and rural areas of Çanakkale participated in the study. Students were examined with SenseWear armband bmi, total energy consumption, daily step count, met, active energy consumption, physical activity time, reach time and sleep times. Body mass index was determined with Holtain Skinfold Caliper. For the analysis of the dataset, the Independent Sample t test was utilized to examine the difference between the students' physical activity levels and skin fold thickness. Then, the relevance between physical activity level and skinfold thickness was examined for pearson correlation. Significance value $p<.05$ and $p<.01$were accepted.

Results: In accordance with the data obtained with SenseWear Armband, it has been determined that a statistically substantial amount of difference between BMI total energy consumption und daily step number of students living in rural and city centers is present. According to the results of skin fold thickness measurements made with skinfold calipers, there was a significant difference in triceps, subscapular, abdominal, suprailiac and femur regions ($p<.05$).

Conclusions: As a result of the research, it is concluded that students studying in the city center have less physical activity level than students living in the rural area.

Keywords: adolescent, physical, skinfold thickness. sport, children.

Introduction

The notions of physical activity, exercise and physical fitness are frequently used for each other in an interchangeable manner. Nevertheless, these three terms refer to different definitions. Physical activity is a lifelong lifestyle by adopting an active lifestyle in children and adolescents. School-age children get the chance to do physical activity activities through physical education and sports lessons and extracurricular activities [1]. However, some factors such as the environment in which students live, socio-economic level and education level or parents are tractors that determine the degree of physical activity.

Although physical activity degree is the basic element of health and physical development in childhood, physical activity degrees of children decrease day by day. Children and adolescents are recommended to perform physical activity for minimum 60 minutes per day by Disease Control and Prevention Centers [2]. This perspective is mostly reinforced by cross-sectional studies conducted by US samples [3]. In addition, there are studies stating that the deterioration of physical activity started in both genders during school entry [4, 5]. Teens are subject to critical emergencies and long dated health problems such as obesity, feeble bones and possible heart illness by limited physical activity and surplus of sedentary behavior. Children and adolescents in the obese class are in the imperilment of cardiometabolic disease, metabolic syndrome [6, 7].

Physical activities are classified considering the intensity of the activity [8]. Different levels or intensity are experienced during physical activity. This intensity depends on the person's exercise experience and fitness level. Metabolic equivalent (MET) is used to express this density. MET value is a standard method that defines the absolute intensity of physical activity. 1 MET equals 1 Kcal cuiorie consumption per kilogram of body weight per hour. It also equates to 3.5 millilitres (ml) of oxygen consumption per kilogram of body weight per minute. Body mass index bioimpedance [9], skinfold caliper [10], dexa, bod pod [11], etc. can be measured with many tools and methods [12, 13].

In addition to the physical activity level, body mass index (BMI) is a method utilized to approximate obesity or critical fat values. In estimating this value, a calculation based on height and body weight is used. This calculation is the dividing the weight in kilograms by the square of the length in meters. BMI, general sedentary people are a useful tool for evaluating individuals. However, caution should be exercised when evaluating athletes with large muscle mass, as this method cannot recognize the difference between lean body mass and fat mass und fat distribution.

Like the physical activity level and BMI, skinfold thickness is also a method used to estimate obesity or critical fat values. It is also a practical method used to evaluate body composition. This method is expressed as the measurement corresponding to the amount of subcutaneous fat and two skin thicknesses. With this method developed based on the principle that half of the body adipose tissue is under the skin, skin fold

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measurement is made from various parts or the body and body fatness is estimated by equations.

When the previous academic studies in the literature investigating the levels of physical activity are examined, it is seen that they are examined by considering different variables. Some studies show that physical properties (weak, overweight, etc.) are classified through a standard equation such as BMI. For this reason, in this study designed to understand the differences between physical activity levels of rural and urban centers, a more objective study was designed by taking the skinfold thickness measurements. In this study, it was aimed to compare the physical activity and skinfold thickness of the students living in the urban and rural areas.

Material and Methods

Participants. 89 students from the 6th grade, who are 12 years old, living in the city center and rural areas of Çanakkale participated in the study. While rural students constitute 51.7% (n = 46) of the research, students studying in Çanakkale city center made up 48.3% (n = 43) of the study. While the average height or students living in rural areas is 154.652 ± 6.899, the average weight is 45.934 ± 10.609. The average height of students living in the city center was 160.395 ± 7.020, while the average weight was 53.740 ± 11 .740.

Research Design.

In this study, causal comparison was used as a research design. No intervention was made for either group (12-year primary school students living in rural and city center).

Data Collection Tools

SenseWear Armband: SenseWear Armband is a portable device for measuring energy consumption, daily step count, rest time and many other parameters such as MET value, taking into account some personal features such us weight, height, age. SenseWear Armband is used by wearing on the triceps muscle of the right arm of the participants. With Sensewear armband, brni, total energy consumption, daily step count, met, active energy consumption, physical activity time, resting time and sleeping time were examined. Holtain Skinfold Caliper: Holtain brand skinfold caliper, which applies 10 gr / sq mm pressure, was used to determine the body fat ratio.

Statistical Analysis

After collecting the research data, it was determined that skewness and kurtosis coefficients were controlled and distributed normally. It was determined that the skewness values of the variables were between -0.62 and -0.89, while the kurtosis values were between -0.29 and 0.81. According to Tabachnick and Fidell [14], the skewness and kurtosis values between + 1.5 and -1.5 are indicators for using parametric tests in data analysis. Due to the normal distribution or data, the Independent Sample t test was applied to examine the difference between the physical activity levels and skinfold thickness of students studying in the city center and students studying in rural [14]. Then, the correlation between physical activity level and skinfold thickness was examined. The significance value was accepted as $p < .05$ and $p < .001$.

Results

According to the results of independent sample t test conducted in accordance with the data obtained with SenseWear Armband, BMI, total energy consumption and the number of daily steps were found to be statistically significant differences. It was found that there was

Table 1. Independent Sample T Test Results of Physical Activity and Skinfold Thickness of Rural and Urban Students

Variables	Region	n	X	Ss	Sd	t	p
BMI	Rural	46	19.11	3.80	87	2.567	.012
	Urban	43	21.13	3.59			
Total Energy Consumption	Rural	46	2199.60	481.37	87	-4.410	.000
	Urban	43	2624.83	423.89			
Daily Step Count	Rural	46	18564.54	4494.62	87	2.807	.006
	Urban	43	16118.53	3649.23			
MET	Rural	46	2.03	.25	87	1.506	.136
	Urban	43	1.95	.22			
Active Energy Consumption	Rural	46	947.89	326.72	87	-1.593	.115
	Urban	43	1064.65	364.68			
Physical Activity Time	Rural	46	261.65	90.43	87	-1.064	.290
	Urban	43	242.27	80.65			
Resting Time	Rural	46	507.71	70.73	87	.371	.711
	Urban	43	502.88	49.43			
Sleep time	Rural	46	391.15	65.64	87	.918	.361
	Urban	43	378.69	62.05			
Triceps	Rural	46	13.48	6.98	87	-5.030	.000
	Urban	43	20.36	5.80			
Subscapular	Rural	46	13.44	6.76	87	-2.488	.015
	Urban	43	16.73	5.60			
Abdominal	Rural	46	15.61	7.97	87	-4.180	.000
	Urban	43	22.06	6.44			
Suprailiac	Rural	46	14.90	8.73	87	-2.619	.010
	Urban	43	19.14	6.23			
Femur	Rural	46	21.52	8.44	87	4.362	.000
	Urban	43	28,33	5.98			

Table 2. Correlation Analysis Results of SenseWear and Skinfold Thickness Measurement Values

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1												
2	.762**	1											
3	-.062	.196	1										
4	-.272**	.022	.669**	1									
5	.382**	.693**	.587**	.602**	1								
6	-.149	.119	.668**	.889**	.678**	1							
7	-.034	-.118	-.060	-.186	-.140	-.099	1						
8	.098	-.137	-.251*	-.273**	-.257*	-.198	.514**	1					
9	.689**	.684**	-.085	-.277**	.283**	-.223*	-.135	-.062	1				
10	.819**	.709**	-.038	-.328**	.285**	-.244*	-.135	.024	.752**	1			
11	.769**	.711**	-.139	-.320**	.269*	-.219*	-.157	-.070	.881**	.839**	1		
12	.832**	.710**	-.014	-.328**	.317**	-.242*	-.169	-.026	.781**	.908**	.906**	1	
13	.750**	.687**	-.136	-.353**	.217*	-.315**	-.041	-.026	.826**	.859**	.874**	.872**	1

NOTE: 1.Bmi, 2.Total Energy Consumption, 3 Daily Step Count, 4. MET, 5. Active Energy Consumption, 6. Physical Activity Time, 7. Resting Time, 8. Sleep Time, 9. Triceps, 10. Subscapular, 11. Abdominal, 12. Suprailiac, 13. Femur.

no statistically difference between active energy consumption, physical activity time, resting time, sleep time. According to the results of measurement of skinfold thickness made with skinfold caliper; triceps, subscapular, abdominal, suprailiac and femur regions were found to be significantly different (Table 1).

After analysing the Table 2, a meaningful positive correlation is found out between BMI and total energy consumption, active energy consumption, triceps, subscapular, abdominal, suprailiac, femur while a negative correlation is found between BMI and MET value. A negative meaningful correlation is discovered between total energy consumption and active energy consumption, triceps, subscapular, abdominal, suprailiac, femur. While a positive meaningful correlation is found out between daily step count and active energy consumption and physical activity time, a negative correlation is found out between daily step count and sleep time. While a positive correlation is determined between MET value and active energy consumption, physical activity time, a negative correlation is determined between MET value and triceps, subscapular, abdominal, suprailiac, femur. A positive correlation is found out between active energy consumption and physical activity time, sleep time, triceps, subscapular, abdominal, suprailiac, femur. A negative correlation is determined between physical activity time and triceps, subscapular, abdominal, suprailiac, femur.

Discussion

In this study which is conducted to estimate similarity or dissimilarity between the physical activity levels of children in rural and urban centers; It was determined that statistically substantial amount of difference between BMI, total energy consumption and daily step count is present. It was determined that there was no statistical difference between MET, active energy consumption, physical activity time, resting time and sleep time. According to the measurement of skinfold thicknesses made with skinfold caliper, there was a significant difference in triceps, subscapular, abdominal, suprailiac and femur regions (Table 1). a meaningful positive correlation is found out between BMI and total energy consumption, active energy consumption, triceps, subscapular, abdominal, suprailiac, femur while a negative correlation is found between BMI and MET value. A negative meaningful correlation is discovered between total energy consumption and active energy consumption, triceps, subscapular, abdominal, suprailiac, femur. While a positive meaningful correlation is found out between daily step count and active energy consumption and physical activity time, a negative correlation is found out between daily step count and sleep time. While a positive correlation is determined between MET value and active energy consumption, physical activity time, a negative correlation is determined between MET value and triceps, subscapular, abdominal, suprailiac, femur. A positive correlation is found out between active energy consumption and physical activity time, sleep time, triceps, subscapular, abdominal, suprailiac, femur. A negative correlation is determined between physical activity time and triceps, subscapular, abdominal, suprailiac, femur (Table 2).

The level of physical activity has been the subject of discussion by researchers considering different situations in child age groups. Therefore, different research results are included in the literature.

When the physical activity is examined according to the status of being boys and girls in terms of socioeconomic terms.

Drenowatz et al. stated that physical activity of children with low socio-economic level is higher than that of children with high socio-economic level [15]. Matsudo et al. investigated the correlation between overweightness / obesity and socioeconomic level using accelerometer [16]. As a result of the research, they stated that there is no relationship between socio-economic level and overweightness/obesity. O'Donoghue et al. examined physical activity level and socio-economic level according to different age groups. As a result of the research, they did not find any relationship between the physical activity level and socio-economic level in preschool, school -age children and adolescents [17]. In a study conducted in Turkey based on socio-economic levels in children aged 11-13 were examined physical activity levels, it is stated that there is no relationship except for height and coordination value [18].

Parks et al. provided important information to the literature in their study to examine the relationship between various demographic characteristics (environmental, geographical, socio-economic level) and physical activity levels of rural and urban areas [19]. As a result of the study, they stated that individuals with low income level s had lower physical activity levels und physical activity planning status than individuals with high income levels. In addition, it has been determined the physical activity level are important according to income level and rural or city center settlements.

Troiano et al. examined the physical activity level s of children (6-11 years old), adolescents (12-19 years old) und adults (20+ years old) using the accelerometer [20]. According to the results of the research, they found that activity level of men is higher than that of women, and the level of physical activity decreases significantly as people grow older. In addition, 42% or children between the ages of 6 - 11 and 8% of adolescents between the ages or 12 - 19 reached the target of 1hour physical activity. Those who reached the 30-minute physical activity target in adults over 20 were round to be less than 5%. There is a comparable research by Møller et al. [21]. In the research, physical activity levels or Danish children were examined in 1997/1998 and 2003/2004. As a result of the research, no difference was found according to the socioeconomic level when compared with 1997/1998 and 2003/2004.

When the physical activity levels of children are examined according to the rural and urban center;

Joens - Matre et al. compared the physical activity levels of four, five and sixth grade students studying in rural and city center [22]. As a result of the research, it has been determined that the students studying in rural areas have higher physical activity levels compared to their children studying in the small city-town and city center. They stated that this was due to the fact that children had more physical activities in the countryside alter school and in the evening.

Johnson et al. discussed five studies in a systematic meta-analysis they conducted and compared children between the ages or 2- 19, urban and rural [23]. As a result of the study, it was concluded that the obesity levels of children from rural areas are higher than the that of the children from urban in other studies, except one study.

Liu et al. compared physical activity, physical fitness and overweight in children aged 2-11 years, according to rural and urban life situations [24]. As a result of the research, they found that rural children consume 90 kcal more food than the children living in the urban center, they consume 2-3 cups of milk recommended per day, and they participate more in the exercise. However, according to the comparison made using height weight data, rural children were more susceptible to overweight / obesity than the urban children. We think that this situation, which does not coincide with the results of our research, is due to the fact that a judgment is made by considering only the height and weight data without calculating the fat or lean body weight.

McMurray et at. studied children studying in rural and urban areas in terms of socio-economic, gender and race, in terms of risk of cardiovascular disease, physical activity and obesity [25]. In this study, it was concluded that there was no difference in the total cholesterol, blood pressure, smoking und physical activity levels of the children studying in rural and urban centers. In addition, body mass index and skinfold thickness und obesity were round to be higher in rural areas. This situation, which does not coincide with the results of our research, can be advocated with the idea that urban living conditions in 1999 were not affected by urbanization and technological developments (areas for transportation, use of elevators, physical activity).

Levels or physical activity and physical fitness of Colombian children and adolescents are investigated by Prieto-Benavides et al. with objective measurements [26]. In a study with 149 children and adolescents (9-17.9 years), physical activity by making use of an accelerometer. Physical fitness was measured by weight, height, waist circumference, hip, waist measurement and skinfold thickness mom subscapular / triceps region. In conclusion, high physical activity level and skinfold thickness were found to be inversely related in boys and girls.

Armstrong et al. examined the variables of age, gender, body mass und obesity, and physical activity levels of children aged 11 -13 [27]. Consequently, it has been determined that the children with 139 middle 159 high activity classes decrease their physical activity levels as the age progresses, and body mass and obesity are not a significant variable separating both groups. Moore et al. designed a different study [28]. Physical activity levels of adolescents living in urban and rural areas and the reasons that impede or facilitate the activity are investigated in this study. As a result of the research, it was stated that young people living in both rural and urban areas do not meet the recommended physical activity levels. In addition, it has been stated that tractors such as distance, cost, crime, and television make it difficult for young people, and facilitates such as facility facilities, social environment-peer and family role models facilitate physical activity.

Collins et id. contrasted the activity levels of rural

adolescents with slums close to the city center, in a study in Staffordshire, England [29]. In the study, where measurements were taken with the help of GPS, it was found that adolescents living in slums participated in more physical activities than rural adolescents. When this situation is evaluated together with other researches, it has revealed a new dimension in determining the variables. It is understood that those living in the city center and those living in the slums in the city can reveal different parameters.

Plotnikof et al. examined the physical activity levels of 20606 people living in Canada in terms of age, gender and rural-urban [30]. As a consequence of the research, dissimilarities between physical activity levels in rural and urban areas were determined. According to the age groups, physical activity levels vary.

In another study conducted in Canada, Loucaides et al. investigated the physical activity levels of urban and rural students [31]. In the study conducted with l398 students living in urban areas and 1290 students from rural areas, no difference was round in terms or physical condition, self-efficacy and recreation activities in both settlements. However, it has been determined that female students are less active than male student.

In a research done in Taiwan, Sheu-jen et al. compared the physical activity levels of school-age children as urban and rural areas [32]. In the study, in which 523 elementary school students participated, there was no difference in terms of walkability in urban and rural areas. In terms or accessibility, children living in urban areas are more active physically Children are determined to be more active in terms of physical activity after school, on weekends and holiday.

In a study based on a different variable apart from all these variables, seasonal conditions were prioritized while examining activity levels. Constantinos et al. measured the activity levels of children living in the Greek Cypriots using pedometer und found significant differences between rural children und urban children [33]. As a result of this study, where measurements were carried out in two different seasons : summer and winter, it was observed that children living in the countryside showed higher activity levels compared to children living in the countryside, while children from the city reached higher activity levels than children living in the countryside. This has been interpreted by the researchers that rural children live in the summer because of their lives, because they live closer to home in winter. Again, it was commented that children in the city move less in the summer and that in winter they have the chance to do more activities in closed and safe environments.

Conclusion

As a result of the research, it is concluded that students studying in the city center have less physical activity level than students living in the rural area. Another conclusion is that the low level of physical activity of students living in the city center also negatively affects their physical fitness levels. In this context, it may be recommended to inform students and parents about activities to increase the physical activity level of students living in the city center. Students can be enabled to participate in extra-curricular sports activities.

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Conflict of interest

The authors declare that there is no conflict of interests.

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