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Obesity Prevalence and Physical Fitness in School-aged Children

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Abstract The purpose of this study is to determine the overweight and obesity prevalence among students studying in primary school by ages and to reveal the relation with physical activity. 1946 students aged between 7 and 11 and receiving primary education in a district of Manisa province have participated in this study. There are 885 female students and 1061 male students. Height measurements, body composition measurements, vertical jump test and 30mt tests of the participants were performed respectively. SPSS 22 program was used for statistical analysis. Frequency distributions and percentage values were presented in statistical notations. Pearson correlation analysis was performed in data analysis. In conclusion, it is observed that 12% of female students are overweight, 9.5% are obese and 21.5% are both overweight and obese. 8.8% of male students are overweight, 11.3% are obese and 20.1% are both overweight and obese. There is also a statistically correlation between obesity and age and parameters of physical fitness. In order to reduce the prevalence of overweight and obesity in children, school and community-based programs must be planned to encourage children to do physical activity and exercise and to prefer low calorie intake. The content and importance of these programs should be made applicable by parents and local governments.

Keywords Obesity, Overweight, Physical Fitness, School-aged Children

1. Introduction

The prevalence of overweight and obesity among children increases rapidly and leads to serious health problems worldwide. This affects both developed and developing countries. While overweight and fatness is defined as "excessive fat accumulation" [1, 2], it results in a balance of positive energy [3]. Obesity develops when there is a discrepancy between energy intake and energy

production [2]. The obesity that occurs in childhood increases the risk of obesity in adulthood and the period of obesity in childhood increases the risk of developing chronic diseases during adulthood [4]. Potential risk factors for obesity in early life include genetic, physical, lifestyle and environmental conditions [5]. According to the results of the research, it is emphasized that obesity has a significant effect on the risk factors for development of cardiovascular disease in children and adolescents and the development of atherosclerosis in adults and it is important to take precautions in the early life [6]. Type 2 diabetes also causes a number of health problems such as hypertension, some types of cancer and gallbladder diseases, musculoskeletal problems, and skin problems. Especially the possibility of developing diabetes and hypertension increases sharply with the increase of fatness in the body. This disease, which is confined to older adults, also affects obese children in the period before puberty. According to World Health Organization data, about 85% of people with diabetes are type 2 and 90% of them are obese or overweight [1].

Changeable risk factors for obesity in childhood include gestational diabetes, high levels of watching television, low levels of physical activity, ineffectiveness of parents and consuming high levels of dietary fat, carbohydrate and sugary drinks. Lack of physical activity is suggested as an important factor in childhood obesity. Increased energy, low energy consumption and low physical activity are one of the factors that cause an increase in the body mass index in children [1].

The most commonly used measurement to identify obesity is body mass index (BMI) (weight / height², kg / m²) [7]. Obesity diagnosis in children is evaluated with percentile curves by considering age and gender factors as different from the adults. Children and adolescents with BMI above 85 percentile are defined as overweight and children and adolescents with BMI above 95 percentile are defined as obese [8, 9]. The possibility of a permanent obesity is high in children with BMI above 95 percentile and it is related to morbidity [10, 11].

The negative effect of obesity on health and quality of life is emphasized in literature. Limited and school-based programs that combine the promotion of healthy eating habits and physical activity show that it is possible to prevent obesity in children and adolescents [12]. In this regard, the purpose of this study is to determine the overweight and obesity prevalence among primary school students by ages and to reveal the relation with physical fitness.

2. Materials and Methods

1946 students aged between 7 and 11 and receiving primary education in a district of Manisa province have participated in this study. There are 885 female students and 1061 male students. The families of all participants were informed by the working team and permission of parents on voluntary participation was taken. All participants were asked for health reports before participating in the study. The students without any health problems participated in the study.

Height measurements, body composition measurements and vertical jump tests of the participants were performed respectively.

Body composition measurement: Body composition measurements were performed in the early hours with Tanita MC 780 MA. With this measurement, participants' weight, body mass index, body fat ratio, lean muscle mass were determined. Participants were advised not to make any liquid consumption before measurement.

Percentile evaluation: Obesity diagnosis in children is evaluated with percentile curves by considering age and gender factors as different from the adults.

Table 1. Obesity classification

Below 5 percentile	Thin	
5 percentile – 84 percentile	Normal or Healthy Weight	
Above 85 percentile and below 94 percentile	Overweight	
Above 95 percentile	Obesity	

Vertical Jump Test: In front of a wall-hung platform, the student tried to jump as high as possible. Before the test, the student's normal arm length was determined in front of the platform to be tested. The difference between the student's jump distance and arm length was determined following the test and vertical jump distance was recorded in "cm". The test was repeated twice on the participants and the best result was recorded [13].

30 Meters Sprint: Participants showed sprint performance in a rubber covered area. Participants' sprint duration (Brower Timing Systems, Draper, UT) was recorded using a photocell. Participants did two times 30

metres test and the best result had taken.

Statistical Analysis: SPSS 22 program was used for statistical analysis. Frequency distributions and percentage values were indicated in statistical notations. Pearson correlation analysis was performed in data analysis. The significance limit used during the study was p<0.05.

3. Results

In Table 2, overweight and obesity percentages of the participant children are presented by taking into account the variables of BMI values, age and gender and by classifying them according to percentile curves.

Table 2. Overweight and obesity percentages by gender and age

Age	Gender	Overweight	Obese	
7 age	Girls	9.1	13.6	
	Boys	1.9	13.1	
8 age	Girls	13	8.7	
	Boys	9.1	10.6	
9 age	Girls	12.5	9.6	
	Boys	9.0	15.8	
10 age	Girls	12.9	10.2	
	Boys	10.9	8.7	
11 age	Girls	8.7	5.8	
	Boys	8.4	3.6	

According to Table 2, the highest obesity level in females is observed in the ages of 7 and 10 while the highest obesity level in males is observed in the ages of 9 and 10.

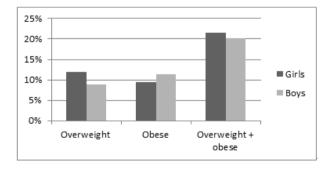


Figure 1. Overweight and obesity percentages of females and males at the age range of 7-10.

According to Figure 1, 12% of females are observed to be overweight, 9.5% are obese and 21.5% overweight and obese, while 8.8% of males are seen to be overweight, 11.3% are obese and 20.1% are overweight and obese.

The relation between BMI and physical fitness is indicated in Table 3.

		Age	Gender	Vertical Jump	30 meters
ВМІ	Pearson Correlation	,192	-,023	-,073	,100
	Sig. (2-tailed)	,000*	,320	,001*	,000*
	N	1966	1966	1966	1966

Table 3. The relation between BMI and parameters of physical fitness

As per Table 3, between age and BMI positive statistically relation and between BMI and physical fitness parameters there were a statistically negative relation had occurred.

4. Discussion

The risk of obesity in school-aged children is one of the determinants of the health-related lifestyle and the initiator of many problems in the future life of the child [14]. As a result of the study, the overweight rate in boys and girls within the age range of 7-11 was found to be 8.8% and 12% respectively. Looking at the obesity levels for the age group of 7-11, these are 11.3% and 9.5% for boys and girls, respectively. The rate of overweight + obesity in girls is 21.5% and 20.1% in boys. It has been determined in the study performed in Turkey in 2010 that the overweight rate for the age range of 6-18 is 14.3%, the frequency of obesity is 8.2% (9.1% in boys and 7.3% in girls) and the rate of overweight + obesity is 22.5% [15]. Analyzing the data of 2016 in our study it is clearly seen that the rate of overweight has decreased while the obesity rate has increased within 6 years.

According to the Investigation Report of "Surveillance on Growth Monitoring in School Aged Children in Turkey' (2009), the overweight percentages in Turkey are 15.3 for the age of 7, 14.4 for the age of 8, 14.1 for the age of 9 and 14.5 for the age of 10. The obesity percentages are 5.8 for the age of 7, 6.1 for the age of 8, 7.7 for the age of 9 and 6.9 for the age of 10. The total overweight and obese percentages are 21.1 for the age of 7, 20.5 for the age of 8, 21.8 for the age of 9 and 21.4 for the age of 10 [16]. In our study, the overweight percentages are 5.5 for the age of 7, 11.05 for the age of 8, 10.75 for the age of 9 and 11.9 for the age of 10 and 8.55 for the age of 11. The obesity percentages are 13.35 for the age of 7, 9.65 for the age of 8, 12.7 for the age of 9, 9.45 for the age of 10 and 4.7 for the age of 11. As a result of this study conducted according to ages, it is seen that overweight percentages decreased and obesity rates increased in every age group in 2016.

According to the National Health and Nutrition Examination Survey (NHANES), obesity prevalence has increased from 6% to 10.7% in children (aged 6-11) and from 4.8% to 10.7% in adolescents (aged 12-17) in 10 years (1976-1980 / 1988-1991) [17].

Examining the studies performed in other countries, it has been established in the study performed in Brazil in

that 17.3% are overweight (18.0% of women and 15.3% of men) and 15.0% are obese (12.5 of women and 18.9% of men). Overweight and obesity percentages in Brazil are observed to be higher than the percentages in our study [18].

Shields (2006) has found in his study that 12% of the children at the age range of 2-17 and living in Canada in 1978-79 are overweight and 3% of them are obese and 15% are overweight + obese. The rate of overweight and obesity has been reported to increase as of 2004 (18% for overweight and 8% for obesity) [19]. Kleiser et al. (2009) have expressed that the prevalence of obesity in Germany doubled compared to the early 1990s [5]. In the study of Reily (1999) which addresses overweight and obesity conditions by ages, overweight-obesity percentages in men have been ascertained as follows; 25.7% for the age of 7, 24.3% - 11.8% for the age of 8, 25.2% - 13% for the age of 9, 23% - 9.6% for the age of 10 and 27.8% - 13.9% for the age of 11. The overweight-obesity percentages in women are as follows; 17.6% - 11.8% for the age of 7, 20.7% -13.2% for the age of 8, 19% - 9.5% for the age of 9, 23.9% - 11.1% for the age of 10 and 23.9% - 11.1% for the age of 11 [9]. When the percentages obtained from the results of the research are compared with the percentages observed in our study, it is seen that especially the overweight rates are high. In conclusion, obesity is a worldwide problem and the rate of obesity is gradually increasing.

Age is considered to be an important factor in being overweight. Obesity that starts early in life continues until adulthood and increases the risk of obesity-related morbidity in following stages of life [20]. Lipid abnormalities between children and adolescents are associated with the risk of insulin resistance and hypertension afterwards and play an important role in the development of heart disease. In the study of Nemet et al. (2005), significant decreases have been found in serum cholesterol and LDL cholesterol levels in the activity group [21]. In addition, Figueroa-colon et all (1997) have found that systolic and diastolic blood pressure is significantly higher in obese children compared to non-obese children [22].

Potential risk factors for obesity in early stages of life include genetic, physical, lifestyle and environmental conditions. Furthermore, increased calorie intake and reduced energy expenditure and sedentary lifestyle (e.g. watching television, computer games, mobile phone) play a major role in the mechanisms responsible for the prevalence of obesity [21, 23]. For this reason, both diet

^{*}p< 0.05

and physical activity parameters have been emphasized as appropriate interventions for prevention of obesity. Physical activity is suggested to play a role not only in the development of childhood obesity, but also in many health problems, lifestyle models and psycho-social welfare [20].

Today, the prevalence of television, computer and video games has increased in children and adolescents. Andersen et al. (1998) have reported that children who watch television more and participate in physical activity less have higher BMI values [24]. According to Eliakim (2002), significant weight loss, decrease in BMI and watching TV and ensuring improvement can be observed in obese and children adolescents with 3-month nutrition-behavior-exercise intervention [23].statistically significant relation has been found between BMI and physical fitness in our study. community-based interventions aiming physical activity, low calorie intake, balanced nutrition and eating behavior should be created in order to reduce the prevalence of obesity in children (Obesity in children. Part 2: 2008)

5. Conclusions

In our study and literature, obesity prevalence in children is observed to be increasing and it is a worldwide health problem. The negative relation between obesity and physical activity has also emerged in our study. The importance of school and community-based multidisciplinary programs is emphasized in order to reduce the prevalence of overweight and obesity in children. By encouraging children for physical activity, suitable environments should be created for them and care must be provided to nutrition. For this purpose, various seminars should be given about the benefits of physical activity and how to have a proper and balanced nutrition to families and children in schools. Official institutions and relevant organizations must perform long-term physical activity works regarding children's healthy life and children should be encouraged for these programs.

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