



## EVALUATION OF SIT-UP PERFORMANCE TEST OF OVERWEIGHT CHILDREN

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### **Abstract:**

Obesity is a worldwide epidemic. The main cause of obesity is generally explained as energy intake being more than energy consumption. In the past 40 years, a severe increase in the childhood obesity rates is observed. Sedentary life style is considered as one of the major influences of obesity. While sedentary habits become more common, the tendencies towards physical activity decrease significantly. Physical activity is a definite must for children. It must be emphasized and encouraged. The aim of the study is to measure the physical characteristics of individuals aged 10-12 ages and to investigate the relationship between childhood obesity, its causes and consequences.

**Keywords:** body mass index, sit-up test, flexibility, overweight

### **1. Introduction**

Today, globally, there is a significant change in terms of nutritional behaviours. Nutritional inadequacies are seen more commonly each day and their prevalence is on rise. The consequences of these inadequacies are quite severe, leading to diseases such as stunting, anemia and mineral inadequacies. As a result, the rates of obesity and

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several nutrition related chronic diseases (NRCDs) such as diabetes, cancer, cardiovascular diseases are increasing. Obesity is a worldwide epidemic. Especially this disease is very common in developed countries (Popkin & Doak, 1998). Moreover, childhood obesity, which is also prevalent in developed countries, constitutes an important threat to human health, too (Sahoo et al., 2015).

### **1.1. Obesity**

The main cause of obesity is generally explained as energy intake being more than energy consumption. There are several factors that may lead to obesity. There are studies that indicate the genetic influences on obesity. As for other factors, imbalanced nutritional behaviours, lack of physical activity and sedentary life style are major influences (Flegal & Birch, 2001). In addition, families and environment take part in the occurrence of obesity too. Culture, home life, parents' life styles play important roles on the child's eating and physical habits.

### **1.2. Childhood Obesity**

In the past 40 years, severe increase in the childhood obesity rates is observed. While this increase is observed commonly in developed countries, studies in developing countries such as India also indicate the same result (Chhatwal et al., 2004; Khadilkar & Khadilkar, 2004; Raj et al., 2007; Laxmaiah et al., 2007; Subramanyam & Rafi, 2003; Panjikaran & Kumari, 2009).

Childhood obesity can simply be defined as having excess body fat (Sahoo et al., 2015). According to statement of The Center for Disease Control and Prevention a person is overweight if there is 95<sup>th</sup> percentile of BMI (Body Mass Index). European researchers on the other hand stated their identification of overweight as 85<sup>th</sup> percentile of BMI and obese as 95<sup>th</sup> percentile of BMI (Flegal et al., 2002; Himes & Dietz, 1994; Ghosh, 2014).

Body fat percentage of a person can be calculated through a number of different methods. The most common methods include BMI, waist circumference, densitometry, multi-frequency bioelectrical impedance analysis (BIA), and magnetic resonance imaging (MRI). BMI is a widely used method and provides reliable results with adults; however in some cases it doesn't provide the best results for children. The reason for that is because children do not have a still body shape, they grow up and this alters their body frequently. Moreover, BMI method may also not be able to identify the difference between fat and fat free mass. This may result in a misdiagnosis, suggesting a child with high amount of muscle may be identified as obese (Sahoo et al., 2015).

Childhood obesity is a major threat against human health in our century. It is not to be underestimated; in fact, the epidemic has reached to a severe level. For instance, the number of obese children was nearly more than 42 million in 2010 (Sahoo et al., 2015).

Sedentary life style is considered as one of the major influences of obesity. As studies indicate, obesity prevalence rises nearly %2 every additional hour spent watching television (Anderson & Butcher, 2006). In the last decade, the habit of

watching television has spread greatly across children and teenagers (Anderson & Butcher, 2006; Kapil & Bhadoria, 2014). While these types of sedentary habits become more common, the tendencies towards physical activity decrease significantly (Sahoo et al., 2015).

Providing an active and healthy way of life to a child is quite important in terms of their development. Thus, physical activity is a definite must for children. Today, with the prevalence of childhood obesity, children tend to lean towards a sedentary life style and unhealthy nutritional behaviours, such as snack food or fast food (McDevitt & Ormrod, 2010). They make a habit of watching TV, spending time with computer and take less part in physical activities. All these factors contribute to the epidemic of childhood obesity. Findings suggest that exercising on a regular basis especially between the ages of 8 and 12 is very effective for avoiding the disease (NSW Health/SPANS, 2006).

In the past years, the rate of people that take part in physical activities fell considerably and number of people who prefer a sedentary life style have increased. This may be the result of modern life style. However, the new way of life threatens public health severely, causing hypertension, obesity, muscle atrophy, cardiovascular disease (Imamoğlu, 2014; Imamoğlu et al., 2002; Koca, 2017).

The US Department of Health and Human Services (USDHHS) advises that it will be beneficial for body and mental development if children and teenagers spend 60 minutes each day doing physical activities. Physical activities increase the strength of bones and muscles and decrease risk of obesity.

Nutritional factors are quite important for the prevention of obesity. It is a positive influential when a person is exposed to healthy nutrients frequently and is expected to alter the eating habits. For instance, family factor may be a key role in the regulation of eating habits. Some studies suggest that family members that eat together are likely to eat healthier meals and thus reduce the risk of unhealthy nutritional behaviours. Likewise, studies also suggest that having meals in front of a TV is likely to increase the amount of fat taken (Sahoo et al., 2015).

Fast food and obesity are terms that are frequently linked to each other. Studies on this issue also suggest the similar, indicate a relationship with fast food consumption, and increase in obesity. For instance, families that are working are exposed to fast food commonly because of its availability, its attractiveness to children and cheapness (Niehoff, 2009). The reason why fast foods are linked to obesity is because these types of foods include inadequate nutritive values while they provide a lot of calories.

The factor of snack food consumption is also examined as an obesity trigger. Snack foods include chips, candies etc. In order to investigate the possible link between snack food and obesity, several researches were conducted. Even though the results represented the calorie increase when snack food is consumed, no concrete evidence was identified to indicate a certain relationship between childhood obesity and snack food (Anderson & Butcher, 2006).

Basal Metabolic Rate (BMR) is also suggested to play a role in the occurrence of obesity. BMR can be defined as the amount of energy body during rest. Some studies state that BMR of obese adults is lower than normal weight adults. Yet, this information does not show a direct relationship between Basal Metabolic Rate and obesity (Anderson & Butcher, 2006; Sahoo et al., 2015).

Adults that suffered from childhood obesity carry a greater risk of becoming obese compared to those with non-obese childhoods (Rössner, 1998; Serdula et al., 1993). There is concrete evidence that Type 2 Diabetes and Coronary Heart Disease are grounded on childhood period (Bhave et al., 2004). For the occurrence of these diseases, childhood obesity is a major contributing cause. A study suggested that nearly %80 of obese teenagers will become obese during adulthood as well. Moreover, aside from increasing the risk of obesity during adulthood, childhood obesity is also known to potentially cause cardiometabolic syndrome. Considering the studies examined this issue, it is important to emphasize that childhood obesity caused by lack of physical activity is a potential risk factor for adulthood (Allcock et al., 2009; Francis et al. 2009; Whitaker et al., 1997).

## 2. Material and Methods

The aim of the study is to measure the physical characteristics of individuals aged 10-12 ages. Participation of the subjects in the study was voluntary.

### 2.1 Research Universe and Sample

The universe of research consisted of individuals aged 10 and 12 ages. The sample includes of 105 students between ages 10 and 12 residing in Izmir.

### 2.2 Data Collection Tools

Height measures of individuals were recorded by a height measuring scale in 1mm precision. Weights were recorded by an electronic weighting machine. Body mass index (BMI) was calculated by using weight in kg unit and height in meter unit. The following formula was used to calculate BMI.  $BMI (kg/m^2) = Weight (kg) / Height^2 (m^2)$ . Subjects were supine, the knees were twisted 90 degrees, the hands were on the nape and the soles of the feet were in contact with the ground, and the command was repeated for 30 seconds. The number of Sit-up Tests they could repeat within 30 seconds was recorded. The left and right Flexibility Test dimensions of the subjects were recorded with the sit and reach device. Firstly, the students were able to extend their right feet to the instrument in the sitting position, and their left feet would get in contact with the ground bent over the knee. Then the students were asked to stretch their hands to the front. The best value is saved after this operation has been done twice. During flexing, attention was paid to the non-twisted state of the right knees of the students. The same procedure was performed in the left foot and the values were recorded.

### 2.3 Data Analysis

Data was analyzed by SPSS 11.0 package programs. Correlation and crosstabs analyses were also used in the research. Correlation and some variables have been found to be related to each other. ( $P < 0.05$ )

### 3. Results

**Table 1:** Some physical characteristics of the participants and measured test values

Variables	N	X	SD
Age (year)	105	11,47	0,889
Height (cm)	105	156,98	9,908
Weight (kg)	105	54,17	14,864
BMI (kg/m <sup>2</sup> )	105	22,5	3,527
Sit-up Test	105	14,56	8,177

**Table 2:** Relation between measured test values of participants and BMI values

Variables	N	X	SD	BMI (kg/m <sup>2</sup> )
1. BMI (kg/m <sup>2</sup> )	105	22,5	3,53	1
2. Sit-up Test	105	14,56	8,18	-,287**

\*\* Correlation is significant at the 0.01 level

H<sub>0</sub>: There is no relationship between body mass index values and Sit-up Test values. It was observed that the value of significant was less than 0.05. ( $p < .05$ )

The hypothesis was rejected and it was observed that there was a relationship between body mass index values and Sit-up Test values. When Pearson correlation value was considered, there was a negative and weak relationship between the variables. ( $r = -.20$ ,  $20 < -.287 < -.39$ ) One of the variables increases while the other decreases. When the values of the body mass index values of the students increased, it was observed that the Sit-up Test values decreased.

**H<sub>0</sub>:** There is no correlation between body mass index values and left elastic values of students. The significant value was greater than 0.05. ( $0.283 > 0.05$ ) In this case, the hypothesis H<sub>0</sub> cannot be rejected. As a result of this analysis, it was determined that there was no relationship between body mass index values and left elastic values of the subjects.

**Table 3:** Distribution of BMI values according to age

	BMI				Total
	18.5 and below	18.5-24.9	25.5-29.9	30-34.9	
Age 10	9	15	3	1	28
12	6	57	12	2	77
Total	15	72	15	3	105

When we look at the table, it was observed that 15 of the students evaluated were in thin weight class. (The fifteen persons nine were ten years old and six were twelve years old.) It was observed that 72 of the students evaluated were in normal weight class.

(The seventy-two persons fifteen were ten years old and fifty seven were twelve years old.) It was observed that 15 of the students evaluated were in overweight class. (The fifteen persons three were ten years old and twelve were twelve years old.) It was observed that 3 of the students evaluated were in first degree obese class. (The three persons one was ten years old and two were twelve years old) Finally, there are no second degree obese and morbid obese individuals among 105 students.

**Table 4:** Distribution of Sit-up values according to BMI values

		Sit-up Test					
		0-9	10-19	20-25	26-31	32+	Total
BMI	18.5 and below	2	6	5	1	1	15
	18.5-24.9	15	32	22	3	0	72
	25.5-29.9	4	8	1	2	0	15
	30-34.9	1	1	1	0	0	3
	Total	22	47	29	6	1	105

It was observed that out of 5 from 15 student that have low BMI showed normal Sit-up Test values, out of 22 from 72 student that have normal BMI showed normal Sit-up Test values, out of 1 from 15 student that have high BMI showed normal Sit-up Test values, out of 1 from 3 student that have BMI of 1st degree obese showed normal Sit-up Test values. In total, 29 of the 105 subjects had normal Sit-up Test values.

#### 4. Discussion

According to World Health Organisation, children who make a habit of physical activity are likely to embrace other healthy behaviours such as keeping away from smoking, drugs etc. In addition, their academic standings are found to be better.

One research in 1992 worked with 3320 children between the ages of 5 and 18. The study estimated the percentage of body fat and identified the children with childhood obesity in case they had 30% body fat for females and 25% body fat for males (Williams et al., 1992).

According to Covic et al., people mostly consider the problem of childhood obesity as something to be resolved in small circles such as family. However, there are people who consider childhood obesity as a public issue, expecting an effort from all services such as government, schools, communities etc. (Shilton 2001). Schools are likely to be quite effective in terms of helping children gain frequent physical activity habits. Implementing a programme in school that promotes exercise may be quite effective. This is also expected to positively affect children’s problem solving and social skills.

One study focused on teenagers that consume fast food. The subject group consisted of overweight and lean people. The results showed that both subject groups take more calories from fast food than their normal meals but while lean teenagers balanced the calorie intake with their following or previous meals, overweight teenagers failed to do that (Ebbelling et al., 2004).

A study was conducted in late between 1996 and 1998 to investigate the relationship between sugary drinks and BMI. The subject group consisted of children between the ages of 9 and 14. The study was spread to a 2 year period to observe the effects. It was concluded that BMI rised over time with the consumption of sugary drinks, showing the possible effect of these drinks on childhood obesity (Anderson & Butcher, 2006).

## 5. Conclusion

Childhood obesity is a worldwide epidemic and a major threat against public health in our century. It is not to be underestimated; in fact, the epidemic has reached to a severe level. Providing an active and healthy way of life to a child is important in terms of their development. Thus, physical activity is a definite must for children. Today, with the prevalence of childhood obesity, children tend to lean towards a sedentary life style and unhealthy nutritional behaviours, such as snack food or fast food (McDevitt & Ormrod, 2010). Emphasizing the habit of physical activity will help them avoid childhood obesity, increase their self-confidence and help prevent the occurrence of childhood obesity related diseases in adulthood.

According to the results of our study, there was a negative correlation between body mass index and sit-up performance of the children who participated in the study. In other words, as the body mass index of the children increases, sit-up performances decrease. Childhood obesity and lack of physical activity are the cause and the result of each other. As the body weight increases, physical activity decreases and this leads to obesity. Therefore, physical activity especially in early childhood is significantly important in terms of fight against obesity.

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