

Obesity in Nursery School Children in Corum, Turkey

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Abstract

Background: Regular body mass index (BMI) screenings in schools is important to ensure that 3- to 6-year-old children are not negatively affected by obesity in terms of their current and future health.

Objectives: The aim of this study was to determine the overweight and obesity results of 3- to 6-year-old children and to guide children and their family in making healthier dietary choices by informing them.

Methods: This analytical-descriptive study was conducted in Corum, Turkey, in the year 2011. The study's sample consisted of all available 3- to 6-year-old children entering nursery school (specifically, the Buharaevler, Karsiyaka, Nasrettin Hoca, Ulukavak, Mimar Sinan, and Sevgi nursery schools). Findings from the study were statistically analyzed using the SPSS 15.0 program. The Chi-square test and analysis of variance (ANOVA) program were used in the comparison of study data. A p-value of less than 0.05 was considered significant.

Results: It was determined that 9.5% of the participating female children and 5.2% of the male children were underweight and that the boys were more obese than the girls in general. The correlation between the child's gender and their BMI was not found to be statistically significant (P-value > 0.05). The overweight frequency of the children was 12.1%, and the obesity frequency was 14.3%. Furthermore, it was determined that the obesity rates of the children increased with their age. Accordingly, the correlation between the child's age and BMI was found to be statistically significant (P-value < 0.05).

Conclusions: An approach to preventing obesity must not be enacted only in health centers. Schools should also offer information and resources for families in order to prevent obesity in children.

Keywords: Body Mass Index (BMI), Obesity, 3- to 6-Year-Old Children, Health Screening

1. Background

Adequate and balanced nutrition are important for meeting physical, psychological, and social needs throughout a human's life. The pre-school period is a sensitive period during which many habits that will be carried on into adulthood are learned (1, 2). Each year, millions of children die due to inadequate nutrition during this period; furthermore, the obesity problem resulting from malnutrition is threatening the public health considerably (1-3).

Childhood obesity is a major public health problem that leads to increased morbidity and mortality in adulthood. In addition, 50% of obese children and children who enter into adolescence as an obese person are also obese as adults (3, 4). One third of obese children and 80% of obese adolescents stay obese after reaching adulthood. It was reported that 30% of obesity that starts in adulthood can be related to childhood experiences (5).

Childhood obesity is swiftly increasing in prevalence

worldwide (6, 7). Although obesity is more common in the lower social strata in developed countries, it is seen more often in the middle and high social strata in developing countries (8, 9). A study conducted in Sweden (10) reported that the prevalence of obesity in children has increased in recent years approximately 2 times, and a study conducted in China (11) reported the increase to be 4 times. Childhood obesity is a major problem in Turkey. In a study conducted in Istanbul (12) on children between 1-11 years, it was noted that 36.1% of the children were overweight or obese. It has been reported in other studies that some of the factors affecting obesity in the childhood period are heritage, gender, ethnicity, eating habits, level of nutrition between 0-1 years, and inadequate physical activity (13, 14).

As health problems in childhood can be reflected in adulthood, health problems such as overweight and obesity showing up during this period should be prevented if possible, or, if they already exist, they must be recognized early on and treated (4, 8). Therefore regular body mass in-

dex (BMI) screenings in school are important for preventing complications connected with obesity in adulthood and ensuring that the futures of 3- to 6-year-old children are not affected negatively because of obesity. In many countries, studies have been carried out in order to determine the prevalence of childhood obesity (3, 6, 8-10). The ministry of education and the ministry of health in our country continue their efforts to raise the awareness of the public in order to reduce the occurrence of obesity. These efforts are considered to have an effect on reducing the prevalence of obesity.

2. Objectives

The aim of the present study was to determine the results in terms of being overweight or obese for children 3 to 6 years old and to guide the children and their family in making healthier nutritional choices by informing them.

3. Methods

3.1. Participants

This was an analytical-descriptive study conducted between January 2011 and April 2011 at all of the nursery schools (Buharaevler, Karsiyaka, Nasrettin Hoca, Ulukavak, Mimar Sinan, and Sevgi) located in Corum, Turkey. There was no sample selection done among the schools; the study's sample consisted of all available 3- to 6-year-old children attending nursery (554/648). Data was obtained for 85.5% of the children.

3.2. Instruments

As a means of data collection, a questionnaire developed in line with researchers and expert opinions was used in the study. The questionnaire included questions about the child's age, gender, number of siblings, family type, social security and parental education, and parental employment status and income level. During the implementation of the questionnaire, aid was obtained from the teachers of the children and each questionnaire was filled out by the researchers in approximately 15 minutes.

Anthropometric measurements of the children enrolled in the study (body weight and body height) were taken by the researchers. In total, 554 children were measured nude while standing with their feet, back, and hips to the wall. A Harpenden Stadiometer was used to measure the child's height from head to sole in meters. All children also had their weight measured in kilograms using a digital SECA brand scale (767 model) sensitive to 100 grams. The device was reset after every measurement.

According to the BMI assessment of the centers for disease control (CDC; 2000), the index obtained with the ratio of the measured weight and the measured height squared was assessed according to the schedules prepared for children in each country (6, 15-17). If the calculated value was more than 95%, it was accepted as obese. In a study where the specificity and sensitivity of the BMI was researched, 95% was accepted as the cut-off value, 88% as sensitivity, and 94% as specificity (6, 15). For childhood and adolescence periods, the CDC takes the BMI percentages as the basis and defines the percentage range 85% - 95% as overweight and over 95% as obese (16-19). In our study, the BMI of the children was calculated by using their height and weight measures with the formula of weight divided by height squared (kg/m^2). The percentage curve defined for Turkish children was used and the ones with a BMI < 5 were accepted as underweight, 5 - 84 as a healthy weight, 85 - 95 as overweight, and > 95 as obese (20). Children who had a chronic disease that can cause obesity, had a drug use history, had endocrine pathology or cases that were considered as syndromes due to obesity, or had any factors that can cause insulin secretion, were excluded from the study.

This study was conducted after having obtained the ethics committee's approval and in accordance with the rules of the Helsinki declaration. All parents of the participating children were informed about the study and a written consent was obtained from them. Our study was conducted in all nursery schools in the city of Corum with the permission of the provincial directorate of the ministry of education.

3.3. Statistical Analysis

Statistical analysis of the findings was conducted using the SPSS 15.0 program (statistical package for social sciences Inc., Chicago, IL). The Chi-square test and analysis of variance (ANOVA) program were used in the comparison of study data. A P-value of less than 0.05 was considered significant.

4. Results

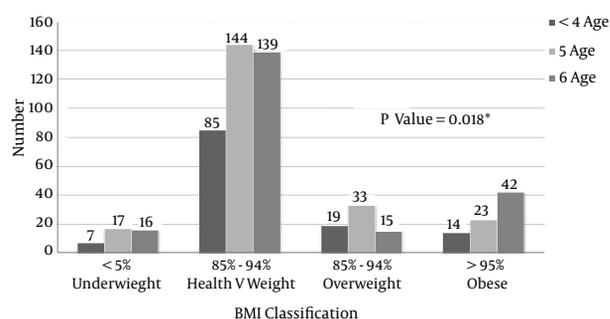
Two hundred and sixty-three of the total 554 children were girls and 291 were boys (Table 1). The average age of the children was 5.15 ± 0.76 years. The BMI average was calculated as 16.17 ± 2.55 .

Table 1 shows that 35% of the children did not have any siblings. Many of the mothers (36.8%) were primary school graduates, and 58.1% did not work. Furthermore, 40.4% of the participating children's fathers were university graduates and 96.8% had work. In terms of income level, 39.5% of the families had more income than expense (high socioeconomic level), and 27.6% had less income than expense

Table 1. Distribution of Socio-Demographic Characteristics of the Children (N = 554)

Social-Demographic Characteristics	No.	%
Gender		
Female	263	47.5
Male	291	52.5
Age		
3	35	6.5
4	90	16.2
5	217	39.2
6	212	38.1
Number of siblings		
None	194	35.0
1	231	41.7
≥ 2	129	23.3
Family type		
Nuclear	453	81.8
Extended	86	15.5
Broken	15	2.7
Social insurance		
yes	418	75.5
no	136	24.5
Mother's Educational Status		
Elementary	204	36.8
High	168	30.3
University	182	32.9
Mother's Working Status		
Yes	232	41.9
No	322	58.1
Father's Educational Status		
Elementary	137	24.7
High	193	34.8
University	224	40.4
Father's Working Status		
Yes	536	96.8
No	18	3.2
Family's Income Status		
Incomes lower than expenses	153	27.6
Incomes equal to expenses	182	32.9
Income higher than expenses	219	39.5

(low socio-economic level). It was determined that a vast majority (81.8%) of the children who participated in the

Figure 1. Comparison Between Age and BMI

BMI= Body Mass Index; *P-value < 0.05"

study had a nuclear family.

Table 2 shows that 9.5% of the girls and 5.2% of the boys who participated in the study were underweight, and that the boys were generally more obese than the girls. In total, the overweight frequency was 12.1% and the obesity frequency was 14.3%. A statistically significant correlation was found between the ages of the children and their BMI (P-value = 0.018; also see Figure 1). No statistical significance was found between the BMI and the gender of participating children (P-value = 0.234), their family type (P-value = 0.715), mother's education (P-value = 0.178), mother's working situation (P-value = 0.484), father's education (P-value = 0.073), or the family's income level (P-value = 0.132).

5. Discussion

The study's findings show that 26.4% of the children who participated in the study were overweight or obese. According to the data obtained from the statistical institute of Turkey (2013) the percentage of overweight or obese primary graduates in our country is 28% (21). In our study, 32.9% of the mothers were university graduates, while 36.8% primary graduates. Although 40.4% of the fathers were university graduates, 24.7% were only primary graduates. Only a small number of the fathers did not work (Table 1). According to the data of the Statistical Institute of Turkey, the education level of parents in this study was considered to be high.

In national and international studies, it has been reported that boys are more obese in comparison to girls (22-24). In a study conducted in Greece by Mavrakanas et al., 21.1% of 4- to 10-year-old girls and 23.7% of boys the same age were deemed to be obese (24). In a comparative study conducted in Japan in 2001 and 2007, obesity has shown an increase of 2% - 8% in girls and boys (25). In our study, it was determined that 13.3% of girls and 15.1% of boys were obese,

Table 2. Comparison of Socio-Demographic Characteristics and BMI of The Children (N = 554)^a

Social-Demographic Characteristics	Body Mass Index Classification									
	< 5% (Underweight)		5% - 84% (Healthy Weight)		85% - 95% (Over Weight)		> 95% (Obese)		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Gender										
Female	25	9.5	170	64.6	33	12.5	35	13.3	263	47.5
Male	15	5.2	198	68.0	34	11.7	44	15.1	291	52.5
Total	40	7.2	368	66.4	67	12.1	79	14.3	554	100
$\chi^2 = 4.266, P\text{-Value} = 0.234^{**}$										
Age										
< 4	7	5.6	85	68.0	19	15.2	14	11.2	125	22.7
5	17	7.8	144	66.4	33	15.2	23	10.6	217	39.2
6	16	7.5	139	65.6	15	7.1	42	19.8	212	38.1
Total	40	7.2	368	66.4	67	12.1	79	14.3	554	100
$\chi^2 = 15.263, P\text{-Value} = 0.018^*$										
Family type										
Nuclear	34	7.5	300	66.2	57	12.6	62	13.7	453	81.8
Not nuclear	6	5.9	68	67.3	10	9.9	17	16.8	101	18.2
Total	40	7.2	368	66.4	67	12.1	79	14.3	554	100
$\chi^2 = 1.359, P\text{-Value} = 0.715^{**}$										
Mother's Educational Status										
Elementary	20	9.8	139	68.1	25	12.3	20	9.8	204	36.8
High	9	5.4	114	67.9	17	10.1	28	16.7	168	30.3
University	11	6.0	115	63.2	25	13.7	31	17.0	182	32.9
Total	40	7.2	368	66.4	67	12.1	79	14.3	554	100
$\chi^2 = 8.928, P\text{-Value} = 0.178^{**}$										
Mother's Working Status										
Yes	14	6.0	150	64.7	30	12.9	38	16.4	232	41.9
No	26	8.1	218	67.7	37	11.5	41	12.7	322	58.1
Total	40	7.2	368	66.4	67	12.1	79	14.3	554	100
$\chi^2 = 2.454, P\text{-Value} = 0.484^{**}$										
Father's Educational Status										
Elementary	13	9.5	90	65.7	21	15.3	13	9.5	137	24.7
High	18	9.3	126	65.3	17	8.8	32	16.6	193	34.8
University	9	4.0	152	67.9	29	12.9	34	15.2	224	40.4
Total	40	7.2	368	66.4	67	12.1	79	14.3	554	100
$\chi^2 = 11.553, P\text{-Value} = 0.073^{**}$										
Family's Income Status										
Incomes lower	15	9.8	204	68.0	15	9.8	19	12.4	153	27.6
Incomes equal to expenses	14	7.7	126	69.2	23	12.6	19	10.4	182	32.9
Income higher	11	5.0	138	63.0	29	13.2	41	18.7	219	39.5
Total	40	7.2	368	66.4	67	12.1	79	14.3	554	100
$\chi^2 = 9.820, P\text{-Value} = 0.132^{**}$										

Abbreviation: BMI, body mass index.

^aP < 0.05; **P > 0.05.

and no statistically significant correlation was found between their genders and BMI (P-value > 0.05; Table 2). Both our study and other studies conducted in our region and other regions have shown a higher obesity rate in males than in females. It is possible that obesity is more frequent

in boys in our country because we are a male-dominant society and therefore more importance is given to the nutrition of male children.

The pre-school period is a risky period in terms of body fat. Although the adipose tissue decreases after infancy un-

til the ages of 6-8, it increases after these ages. This early increase of body fat creates a significant risk for obesity. The period between 3-6 years is an important period in terms of growth and development (1). Our study shows that the obesity rate increases with age (Figure 1). Furthermore, it was determined that there is a statistically significant correlation between the ages of the children and their BMI (P-value < 0.05; Table 2). The high prevalence of obesity in the pre-school period suggests that obesity will be a very important problem for the future in our country.

It is reported that in developed countries children who put on weight quickly are recognized early and a required follow-up is made in order to prevent obesity (6). The overweight and obesity rate of 26.4% in our study reveals the importance of early recognition of this problem. Thus, it is expected that with early recognition the frequency of obesity will decrease. Additionally, emphasis should be given to rapid weight gain, which can be recognized by parents in an early period before obesity is developed in 3- to 6-year-old children, and if necessary families should receive help from child endocrinology polyclinics.

Studies report that in developed countries obesity is less frequent in high socio-economic populations than in similar populations of developing countries (8, 26). In our study, no statistically significant relation was found between the socio-economic and cultural features of the participating children and their BMIs (P-value > 0.05). If we take into account that Turkey is a developing country, our findings, which indicate higher levels of overweight and obese individuals in families with more income than expense in other words, higher in terms of the socio-economic aspect are in accordance with previous literature. The higher rate of obesity observed in families with a higher socio-economic level indicates that environmental factors have a greater effect than genetic factors in our society, and it also draws attention to the easy access to food and poor eating habits, which raises the question of how to take measures regarding this issue (Table 2).

This study was limited to the data obtained from 554 children who were attending the nursery schools of Corum and were available during the time of the study and therefore included in the study. Future studies should be more comprehensive so that their results may reflect the prevalence of obesity for all children throughout the country.

Obesity is not just an aesthetical disorder; it is a clinical problem that affects all organs and systems. Since obesity can start in childhood and continue into adulthood, there is a high risk of development complications. As a result, if it is considered that one of four children is overweight or obese, it is obvious how important BMI screenings in schools are. Obesity should not only be addressed in health

centers. There should also be efforts taken in schools to prevent obesity and families should be informed about the dangers of obesity.

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Footnote

Authors' Contribution: Selen Ozakar Akca, Gulzade Uysal, and Lale Aysegul Buyukgonenc all contributed to the study's design, preparation of the manuscript, data collection, and analysis

References

1. Caballero B. A nutrition paradox-underweight and obesity in developing countries. *N Engl J Med*. 2005;352(15):1514-6. doi: [10.1056/NEJMp048310](https://doi.org/10.1056/NEJMp048310). [PubMed: [15829531](https://pubmed.ncbi.nlm.nih.gov/15829531/)].
2. Ayyildiz TK, Kurtuncu M, Kulakci H, Celik S. Factors affecting the prevalence of obesity among primary school students in Turkey. *Iranian Red Crescent Med J*. 2014;16(12):17785. doi: [10.5812/ircmj.17785](https://doi.org/10.5812/ircmj.17785). [PubMed: [25763240](https://pubmed.ncbi.nlm.nih.gov/25763240/)].
3. Mattsson N, Ronnema T, Juonala M, Viikari JS, Raitakari OT. Childhood predictors of the metabolic syndrome in adulthood. The Cardiovascular Risk in Young Finns Study. *Ann Med*. 2008;40(7):542-52. doi: [10.1080/07853890802307709](https://doi.org/10.1080/07853890802307709). [PubMed: [18728920](https://pubmed.ncbi.nlm.nih.gov/18728920/)].
4. Atamturk D. Prevalence of obesity and overweight among children from lower socioeconomic status. *Gaziantep Med J*. 2009;15(2):10-4.
5. Parlak A, Cetinkaya S. The factors that effects constitution of obesity [in Turkish]. *J Firat Health Services*. 2007;2:24-35.
6. Akcam M, Boyaci A, Pirgon O, Dundar B. Evaluation of the change in the prevalence of childhood obesity in ten schools of Isparta city. *Turk Arch Ped*. 2013;48(2):152-5. doi: [10.4274/tpa.1074](https://doi.org/10.4274/tpa.1074).
7. Kirchengast S, Schober E. Obesity among female adolescents in Vienna, Austria-the impact of childhood weight status and ethnicity. *BJOG*. 2006;113(10):1188-94. doi: [10.1111/j.1471-0528.2006.01033.x](https://doi.org/10.1111/j.1471-0528.2006.01033.x). [PubMed: [16945117](https://pubmed.ncbi.nlm.nih.gov/16945117/)].
8. Bereket A, Atay Z. Current status of childhood obesity and its associated morbidities in Turkey. *J Clin Res Pediatr Endocrinol*. 2012;4(1):1-7. doi: [10.4274/jcrpe.506](https://doi.org/10.4274/jcrpe.506). [PubMed: [22394698](https://pubmed.ncbi.nlm.nih.gov/22394698/)].
9. Matheson DM, Killen JD, Wang Y, Varady A, Robinson TN. Children's food consumption during television viewing. *Am J Clin Nutr*. 2004;79(6):1088-94. [PubMed: [15159240](https://pubmed.ncbi.nlm.nih.gov/15159240/)].
10. Holmback U, Fridman J, Gustafsson J, Proos L, Sundelin C, Forslund A. Overweight more prevalent among children than among adolescents. *Acta Paediatr*. 2007;96(4):577-81. doi: [10.1111/j.1651-2227.2006.00189.x](https://doi.org/10.1111/j.1651-2227.2006.00189.x). [PubMed: [17391474](https://pubmed.ncbi.nlm.nih.gov/17391474/)].
11. National Task Force on Childhood Obesity, National Center for Women's and Children's Health, Ding ZY. National epidemiological survey on childhood obesity, 2006 [in Chinese]. *Zhonghua Er Ke Za Zhi*. 2008;46(3):179-84. [PubMed: [19099704](https://pubmed.ncbi.nlm.nih.gov/19099704/)].
12. Erkan T, Yalvac S, Erginoz E, Cokugras F, Kutlu T. The evaluation of nutritional status of children, by anthropometric measurements, attending the day nursery of Cerrahpasa Medical School. *Turk Arch Ped*. 2007;42(4):142-7.

13. Neovius M, Janson A, Rossner S. Prevalence of obesity in Sweden. *Obes Rev.* 2006;7(1):1-3. doi: [10.1111/j.1467-789x.2006.00190.x](https://doi.org/10.1111/j.1467-789x.2006.00190.x). [PubMed: [16436097](https://pubmed.ncbi.nlm.nih.gov/16436097/)].
14. Balakrishnan R, Webster P, Sinclair D. Trends in overweight and obesity among 5-7-year-old White and South Asian children born between 1991 and 1999. *J Public Health (Oxf).* 2008;30(2):139-44. doi: [10.1093/pubmed/fdn013](https://doi.org/10.1093/pubmed/fdn013). [PubMed: [18319275](https://pubmed.ncbi.nlm.nih.gov/18319275/)].
15. Hancox RJ, Milne BJ, Poulton R. Association between child and adolescent television viewing and adult health: a longitudinal birth cohort study. *Lancet.* 2004;364(9430):257-62. doi: [10.1016/S0140-6736\(04\)16675-0](https://doi.org/10.1016/S0140-6736(04)16675-0). [PubMed: [15262103](https://pubmed.ncbi.nlm.nih.gov/15262103/)].
16. O'Brien SH, Holubkov R, Reis EC. Identification, evaluation, and management of obesity in an academic primary care center. *Pediatrics.* 2004;114(2):154-9. [PubMed: [15286251](https://pubmed.ncbi.nlm.nih.gov/15286251/)].
17. Hering E, Pritsker I, Gonchar L, Pillar G. Obesity in children is associated with increased health care use. *Clin Pediatr (Phila).* 2009;48(8):812-8. doi: [10.1177/0009922809336072](https://doi.org/10.1177/0009922809336072). [PubMed: [19487762](https://pubmed.ncbi.nlm.nih.gov/19487762/)].
18. Nader PR, O'Brien M, Houts R, Bradley R, Belsky J, Crosnoe R, et al. Identifying risk for obesity in early childhood. *Pediatrics.* 2006;118(3):594-601. doi: [10.1542/peds.2005-2801](https://doi.org/10.1542/peds.2005-2801). [PubMed: [16950951](https://pubmed.ncbi.nlm.nih.gov/16950951/)].
19. Bradford NF. Overweight and obesity in children and adolescents. *Prim Care.* 2009;36(2):319-39. doi: [10.1016/j.pop.2009.01.002](https://doi.org/10.1016/j.pop.2009.01.002). [PubMed: [19501246](https://pubmed.ncbi.nlm.nih.gov/19501246/)].
20. Ozturk A, Mazicioglu MM, Hatipoglu N, Budak N, Keskin G, Yazlak Z, et al. Reference body mass index curves for Turkish children 6 to 18 years of age. *J Pediatr Endocrinol Metab.* 2008;21(9):827-36. [PubMed: [18924576](https://pubmed.ncbi.nlm.nih.gov/18924576/)].
21. Turkey Statistical Institute . Turkey Statistical Institute 2013 (TUIK) Turkey: Turkey Statistical Institute; Available from: www.tuik.gov.tr.
22. Ari Z, Suzek H. Serum lipid profile and obesity scanning of a group of primary school students in central villages of Mugla province. *ADU Tip Fakultesi Dergisi.* 2008;9(2):11-6.
23. Atabek ME, Pirgon O, Kurtoglu S. Assessment of abnormal glucose homeostasis and insulin resistance in Turkish obese children and adolescents. *Diabetes Obes Metab.* 2007;9(3):304-10. doi: [10.1111/j.1463-1326.2006.00601.x](https://doi.org/10.1111/j.1463-1326.2006.00601.x). [PubMed: [17391156](https://pubmed.ncbi.nlm.nih.gov/17391156/)].
24. Mavrakanas TA, Konsoula G, Patsonis I, Merkouris BP. Childhood obesity and elevated blood pressure in a rural population of northern Greece. *Rural Remote Health.* 2009;9(2):1150. [PubMed: [19555129](https://pubmed.ncbi.nlm.nih.gov/19555129/)].
25. Nakano T, Sei M, Ewis AA, Munakata H, Onishi C, Nakahori Y. Tracking overweight and obesity in Japanese children; a six years longitudinal study. *J Med Invest.* 2010;57(1-2):114-23. [PubMed: [20299750](https://pubmed.ncbi.nlm.nih.gov/20299750/)].
26. Semiz S , Ozdemir O. M. , Ozdemir A. S. . The prevalence of obesity in childhood 6-15 years of age in Denizli. *Pamukkale Med J.* 2008;1(1):1-4.