Obesity in Nursery School Children in Corum, Turkey

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Received 2015 February 09; Revised 2015 March 30; Accepted 2015 April 19.

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, Karsıyaka, 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/m²). 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       | 249 | 39.5 |

It was determined that a vast majority (81.8%) of the children who participated in the 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% of the fathers were university 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.
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-

| 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. | %    | No. | %    | No. | %    | No. | %    | No. | %    | No. | %    | No. | %    |
| Gender                           |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |
| Female                           | 25  | 9.5  | 170 | 64.6 | 33  | 12.5 | 35  | 13.3 | 243 | 47.5 |
| Male                             | 15  | 5.2  | 198 | 68.0 | 34  | 11.7 | 44  | 15.1 | 281 | 52.5 |
| Total                            | 40  | 7.2  | 368 | 66.4 | 67  | 12.1 | 79  | 14.3 | 554 | 100  |
|                                 | X²  | 4.266, P-Value = 0.234** |
| Age                              |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |
| < 4                              | 7   | 5.6  | 85  | 68.0 | 19  | 15.2 | 14  | 11.2 | 125 | 22.7 |
| 5                                | 17  | 7.8  | 164 | 66.4 | 33  | 15.2 | 23  | 10.6 | 207 | 39.3 |
| 6                                | 18  | 7.5  | 159 | 65.6 | 15  | 7.1  | 42  | 19.8 | 217 | 39.1 |
| Total                            | 40  | 7.2  | 368 | 66.4 | 67  | 12.1 | 79  | 14.3 | 554 | 100  |
|                                 | X²  | 15.263, P-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  | 15.2 | 101 | 18.2 |
| Total                            | 40  | 7.2  | 368 | 66.4 | 67  | 12.1 | 79  | 14.3 | 554 | 100  |
|                                 | X²  | 1.359, P-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  |
|                                 | X²  | 8.928, P-Value = 0.178** |
| Mother’s Working Status          |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |
| Yes                              | 14  | 6.0  | 150 | 64.7 | 30  | 12.0 | 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  |
|                                 | X²  | 2.454, P-Value = 0.484** |
| Father’s Educational Status      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |
| Elementary                       | 11  | 9.5  | 100 | 65.7 | 21  | 15.5 | 11  | 9.5  | 127 | 24.7 |
| High                             | 18  | 9.3  | 126 | 65.3 | 17  | 8.8  | 32  | 16.8 | 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  |
|                                 | X²  | 11.553, P-Value = 0.075** |
| Family’s Income Status           |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |
| Income lower                     | 15  | 9.8  | 204 | 66.0 | 15  | 9.8  | 19  | 12.4 | 159 | 27.6 |
| Income equal to expenses         | 14  | 7.7  | 126 | 69.2 | 23  | 12.0 | 19  | 10.4 | 162 | 28.9 |
| Income higher                    | 8   | 5.0  | 139 | 63.0 | 29  | 15.2 | 41  | 10.7 | 198 | 35.5 |
| Total                            | 40  | 7.2  | 368 | 66.4 | 67  | 12.1 | 79  | 14.3 | 554 | 100  |
|                                 | X²  | 9.620, P-Value = 0.022*** |

Abbreviation: BMI, body mass index.

*P < 0.05; **P > 0.05.
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.

Acknowledgments

This study was accepted and presented orally at the XVth international nursing research conference in Madrid, Spain on November 15 - 18, 2011

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

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