ORIGINAL ARTICLE

# The effects of healthy lifestyle behaviors of mothers on obesity in preschool children

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## Abstract

**Objective:** To determine the relationship between healthy lifestyle behaviours of mothers and obesity in their pre-school children.

**Methods:** The cross-sectional study was performed in a district of Istanbul, Turkey, between April and June 2011, and comprised children aged 4-6 years attending public pre-schools and their mothers.. Data was obtained using a questionnaire and Healthy Lifestyle Behaviours Scale-II. Number Cruncher Statistical System 2007 was used for statistical analysis.

**Results:** Of the 531 children in the study, 246(46.3%) were girls. Overall prevalence of overweight was 136(25.6%), obesity 77(14.5%)Overweight mothers were 126(23.7%), and obese mothers were 31(5.8%). The mothers of obese children obtained lower scores in the physical activity ($p<0.05$) and nutrition ($p=0.001$) subscales, and their total score was also lower ($p<0.05$).

**Conclusions:** Lifestyle behaviours of mothers, especially with respect to nutrition and physical activity, may influence obesity among preschool children. Strategies should be developed to improve the physical activity and eating habits of mothers.

**Keywords:** Preschool children, Obesity, Healthy lifestyle behaviours, Mothers, School nursing. (JPMA 65: 1079; 2015)

## Introduction

Obesity is one of the most significant public health problems in the world in both adults and children.[1-4] Many factors are involved in increasing obesity in children. The eating preferences of the family, types of food consumed at home, and physical activity,[5,6] have been reported to have important roles in the development of obesity.

According to studies, the rate of pre-school obesity has increased worldwide.[7] About 25 per cent of children aged 2-5 years in the United States and England are overweight or obese.[2] Also it was demonstrated that 26-41% of obese preschool-age children and 42-63% of obese school-age children remained obese in adulthood worldwide.[1-4]

Despite the increasing prevalence of overweight in pre-school children, a large body of research has focused on risk factors in school-age children and adolescents.[2,8,9] However, the first years of life can be crucial to start preventive interventions about obesity. Thus, there is an urgent need to identify effective and sustainable interventions targeting pre-school children.

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Demographic, socio-structural, and environmental risk factors associated with obesity have been studied. However, lifestyle of mothers has not been studied in association with obesity in pre-school children. Demographic, socio-structural and environmental risk factors in obesity cannot be evaluated without considering the lifestyle of mothers because the lifestyle of the mother may affect the eating and physical activity patterns of adults and children, as well as what and how adults feed their children and how they choose foods for themselves.[10] Mothers could play a key role in preventing obesity in pre-school children because they generally control the child's diet and participate in activities with the child.[11]

In addition, school health and public health nurses have an important role in preventing obesity in pre-school children. They need to be knowledgeable about how the lifestyles of mothers (e.g., nutrition and level of activity) can affect obesity in pre-school children. They also need to be able to provide education to children and their families about nutrition, obesity and the causes of obesity. Strategies to reduce and prevent obesity in pre-school children should aim at identifying preventable risk factors and to eliminate these factors.

The current study was planned to identify the relationship between the healthy lifestyle behaviours of mothers and obesity in their pre-school children.

## Subjects and Methods

The cross-sectional prevalence study was conducted in a district of Istanbul during the 2010-2011 academic year from April 20 to June 17, 2011. There were 18 pre-school and 2122 pre-school students aged 4-6 years. The estimated minimum sample size was calculated to be 506 to obtain a precision rate of 4%, a confidence interval (CI) of 99%, and an estimated overweight and obese prevalence of 20%.[12]

To ensure sufficient statistical power, we aimed at reaching a minimum of 506 mothers. We determined that for each pre-school, there were on average 70 students aged between 4-6 years (i.e., 750 mothers for 11 pre-schools). To ensure sufficient statistical power, the study was conducted in 11 randomly selected pre-schools from among the 18 in the study district of Istanbul. Randomisation was performed by drawing lots. We wrote the names of the 18 pre-schools and put them into an envelope. We then randomly chose the names of 11 pre-schools from among the 18.

Data was obtained through questionnaire form and Healthy Lifestyle Behaviours Scale-II (HLBS-II). The questionnaire form consisted of 18 questions, which included the birth date, weight, and height of children, height and weight of the mothers and fathers, and information related to the physical activities and nutritional habits of the children and the mothers. Based on literature, the questionnaire was developed by the researchers.[5,7,8,10] In the questionnaire, "fast food restaurant" was defined as a specific type of restaurant characterised by quick service and fast-food meals such as hamburgers, hot dogs, and French fries served with ketchup, mayonnaise and sweet bevereges. "Junk food" was defined as snacks that have little nutritional value and contain high amounts of fat, sugar, salt, starch, and calories, such as potato chips and candies."Working mother" was defined as a mother who worked outside the home (e.g., worker, officer, etc.).

The first version of the HLBS, which was developed in 1987,[13] consisted of 48 items and six factors. In 1996, the scale was revised and renamed HLBS-II.[14] The revised scale consists of 52 items and six subscales. The subscales are: health care responsibility (9 items), physical activity (8 items), nutrition (9 items), moral development (9 items), interpersonal relationships (9 items), and stress management (8 items). All items in the scale are positive. Scoring was done using a 4-point Likert style as follows: never (1), sometimes (2), frequently (3), and regularly (4). The total lowest score is 52, and the total highest score is 208. It can be used to determine behaviours in order to improve health and to evaluate the efficiency of programmes developed for this purpose. Studies of validity and reliability of the revised scale were conducted[15] in Turkish population and results showed that the scale has high levels of validity and reliability. The Cronbach's alpha coefficient of the HLBS-II was 0.92, reflecting a high level of confidence. The confidence coefficients of the subscales were determined as follows: health care responsibility, 0.77; physical activity, 0.79; nutrition, 0.68; mental development, 0.79; interpersonal relationships, 0.80; and stress management, 0.64. These results indicated that this scale is appropriate for evaluating the lifestyle behaviours of the Turkish population.

In accordance with ethical guidelines, this study was conducted with the approval of the Ethical Commission of the National Education Directorate. The researchers provided the mothers with a verbal and written explanation and obtained their written informed consent.

School managers were also taken on board and the researchers visited the schools on specified dates. The heights and weights of the children were recorded. Questionnaire forms were distributed among the children with instructions and information about the study's objectives. The children were asked to hand the forms over to their mothers. The mothers who were willing to participate completed the questionnaire forms and returned them through their children.

The children's heights, weights, and body mass index (BMI) (kg/m$^2$) were calculated. The calculated BMIs were classified in accordance with recently updated reference percentile standards for Turkish children[16,17] and categorised according to the literature (<5 =underweight; 5-85th = normal; >85-95th = overweight; and >95 obese).[18] The heights, weights, and BMIs (kg/m$^2$) of the mothers were calculated. The calculated BMIs were categorised according to reference percentile values for adults (<18.5 = underweight; ≥18.5-<24.9 = normal; ≥25.0-<29.9 = overweight; ≥30.0 = obese).[19]

Number Cruncher Statistical System (NCSS) 2007 (Kaysville, Utah, USA) was used for statistical analysis. Descriptive statistical methods (mean, standard deviation, frequency, percentage, range) were used for evaluating the data.

Compliance with normal distribution of quantitative data was tested with Shapiro-Wilk test and graphical evaluations. In comparing normal distribution groups (three and more) one-way analysis of variance (ANOVA) and Bonferroni post-hoc test were used for variables that

provide homogeneity of variance assumption. Welch's ANOVA and Games-Howell post-hoc test were used for variables that violate homogeneity of variance assumption. Statistical significance was considered at p< 0.01 and p<0.05.

## Results

Overall, 750 mothers were invited to participate in the study. Of them, 580(77.3%) agreed to participate. Further, 49(8.4%) questionnaires were left out because of missing data, and the final study sample comprised 531(91.5%) subjects.

Of the 531 children in the study, 246(46.3%) were girls. Overall prevalence of overweight was 136(25.6%), obesity 77(14.5%)Overweight mothers were 126(23.7%), and obese mothers were 31(5.8%) (Table-1).

Nutritional behaviour of the children and their families showed 398(75%) children visited fast-food restaurants more than once a week (Table-2). Only 50(9.4%) children were active outdoors every day, but there was no statistical significant difference between the boys and girls in taking part in any sports activities (p=0.14).

The mean HLBS-II score of the mothers in the study was compared with the BMI values of the children and there was no statistically significant difference (Table-3).

The statistically significant difference was found between physical activity scores of mothers (p<0.05). According to binary comparisons of groups; the mothers with obese children obtained significantly lower scores on the physical activity subscale compared with the mothers with normal-weight children (p<0.05). We didn't find any statistically significant differences between other groups on physical activity subscale (p>0.05).

In addition, statistically significant difference was found

**Table-1:** Sociodemographic Characteristics of the Children (N=531) and their Mothers (N=531).

| Characteristics | n | % |
|---|---|---|
| **Age of the child** | | |
| 4 years | 114 | 21.5 |
| 5 years | 197 | 37.1 |
| 6 years | 220 | 41.4 |
| **Gender of the child** | | |
| Female | 246 | 46.3 |
| Male | 285 | 53.7 |
| **Economic status** | | |
| Income greater than expenses | 142 | 26.7 |
| Income equal to expenses | 351 | 66.1 |
| Income lower than expenses | 38 | 7.2 |
| **Educational level of mother** | | |
| Primary school | 51 | 9.6 |
| Secondary school | 26 | 4.9 |
| High school | 177 | 33.3 |
| University | 277 | 52.2 |
| **Working status of mother** | | |
| Working | 283 | 53.3 |
| Not working | 248 | 46.7 |
| **BMI classification of child** | | |
| Underweight(<5th percentile) | 32 | 6 |
| Normal (5–85th percentile) | 286 | 53.9 |
| Overweight (85-95th percentile) | 136 | 25.6 |
| Obese (<95th percentile) | 77 | 14.5 |
| **BMI classification of mother** | | |
| Underweight (<18.5) | 13 | 2.4 |
| Normal (18.5–24.9) | 361 | 68 |
| Overweight (25–29.9) | 126 | 23.8 |
| Obese (30 and above) | 31 | 5.8 |

BMI: Body mass index.

**Table-2:** Some Nutritional/Physical Activity Behaviours of the Children (N=531) and their Families.

| Behaviours | N | % |
|---|---|---|
| **Frequency of child's consumption of junk food** | | |
| Every day | 49 | 9.2 |
| Several times a days | 98 | 18.5 |
| Several times a week | 161 | 30.3 |
| Several times a month | 181 | 34.1 |
| Never | 42 | 7.9 |
| **Frequency of visiting fast-food restaurants with child** | | |
| Never | 45 | 8.5 |
| Less than once a week | 88 | 16.6 |
| More than once a week | 398 | 75 |
| **Junk food consumption by child while watching television** | | |
| Yes | 121 | 22.8 |
| No | 410 | 77.2 |
| **Breakfast eaten at home** | | |
| Yes | 307 | 57.8 |
| No | 224 | 42.2 |
| **Meals eaten as a family** | | |
| Breakfast | 141 | 26.6 |
| Lunch | 57 | 10.7 |
| Dinner | 503 | 94.7 |
| **Television watching during having meal** | | |
| Yes | 267 | 50.3 |
| No | 264 | 49.7 |
| **Outdoor activity opportunities of the child** | | |
| Available | 485 | 91.3 |
| Not available | 46 | 8.7 |
| **Frequency of outdoor activity** | | |
| Every day | 50 | 9.4 |
| More than once a week | 75 | 14.1 |
| Less than once a week | 406 | 76.5 |
| **Sports activities of the child** | | |
| Available | 96 | 18.1 |
| Not available | 435 | 81.9 |

**Table-3:** Comparison of the Mean Scores that Mothers Obtained in the Subscales of HLBS-II with the Classifications of the BMI Values of the Children (N=531).

| BMI classification of child | [1]Underweight (<5. per.) (n=32; 6%) | [2]Normal (5-85. per.) (n=286; 53.9%) | [3]Overweight (85-95) (n=136; 25.6%) | [4]Obese (>95. per.) (n=77; 14.5%) | Statistical evaluation | |
|---|---|---|---|---|---|---|
| Subscale | Mean±SD | Mean±SD | Mean±SD | Mean±SD | F; p-value | Post-Hoc |
| Total score | 131.13±15.26 | 136.58±19.97 | 134.57±18.86 | 127.13±20.82 | F: 5.027<br>p: 0.002 | 2 > 4<br>3 > 4 |
| Health responsibility | 22.41±4.49 | 22.80±4.61 | 22.22±4.27 | 21.51±4.14 | F: 1.849<br>p: 0.137 | - |
| Physical activity | 14.91±4.49 | 16.60±5.58 | 16.30±5.19 | 14.71±5.46 | F: 3.073<br>p: 0.027 | 2 > 4 |
| Nutrition | 22.47±3.34 | 23.50±3.99 | 23.09±4.63 | 20.14±6.40 | ‡F: 6.756<br>p: 0.001 | 2 > 4<br>3 > 4 |
| Moral development | 27.41±3.07 | 27.78±4.19 | 27.31±4.18 | 26.51±4.03 | F: 2.026<br>p: 0.109 | - |
| Interpersonal relationships | 25.44±3.32 | 26.64±4.32 | 26.21±3.59 | 25.74±3.52 | ‡F: 1.924<br>p: 0.129 | - |
| Stress management | 18.56±3.57 | 19.26±3.90 | 19.44±3.50 | 18.52±3.60 | F: 1.352<br>p: 0.257 | - |

One-way ANOVA Test with Bonferroni post-hoc test
‡Welch's ANOVA with Games-Howell post-hoc test(Homogeneity of variance assumption was violated)
BMI: Body Mass Index
HLBS: Healthy Lifestyle Behaviours Scale-II.

between nutrition scores of mothers (p<0.01). According to binary comparisons of groups, the mothers with obese children obtained significantly lower scores on the nutrition subscale compared to the mothers with normal-weight and overweight children (p<0.01). We didn't find any statistically significant differences between other groups on nutrition subscale (p>0.05).

## Discussion

The study examined the relationship between obesity in pre-school children and healthy lifestyle behaviours of their mothers. In the study group, the rate of overweight children was 25.6%, and the rate of obese children was 14.5%. There is no previous national or local study evaluating the prevalence of obesity and overweight in pre-school children in Turkey, though some local studies were conducted to evaluate the prevalence of obesity in primary school children and adolescents.[8,9,20]

A study conducted in central Aydin in Turkey indicated that the prevalence of overweight was 12.8% and prevalence of obesity was 13.7% among primary school children.[8] Another study found that the prevalence of overweight was 10.6% and the prevalence of obesity was 2.1% for adolescent girls, whereas it was 11.3% and 1.6%, for adolescent boys.[9] Our results showed that the prevalence of obesity was higher than found in other Turkish studies. This difference might be associated with the rising trend of obesity in Turkey. In addition, this study was conducted in the biggest metropolis in Turkey in contrast to the other two studies. For this reason, the risk factors in the present study, such as increased sedentary lifestyle and increased consumption of fast food, may contribute to the obesity of pre-school children, as in developed countries.[5,6]

Although the prevalence rates of obesity in children vary depending on the country and the period of investigation, they are generally increasing.[7,8] For instance, according to the results of the National Health and Nutrition Examination Survey conducted in the US, the frequency of obesity increased from 7.2% to 13.9% in 2- to 5-year-olds between 1988 and 1994 and between 2003 and 2004.[4]

There is strong evidence that childhood obesity is also becoming increasingly prevalent in low- and middle-income countries.[21] An analysis of 160 nationally representative surveys conducted in 94 developing countries showed an increasing prevalence of overweight.[21]

In a study conducted with boys in Saudi Arabia,[22] the prevalence of obesity in the pre-school period was 15.8%, whereas it was 8.2% in Kuwait.[23] The World Health Organisation (WHO) reported that the number of overweight children below 5 years of age was 22 million worldwide.[2] The studies indicated that obesity is an important public healthcare concern in pre-school

children in both developed and developing countries.[1,7]

In the present study, the educational levels of the mothers and fathers were high, and most mothers reported a good income. Thus, it can be said that the characteristics of the families in this study group are representative of families at a moderate-to-high sociocultural level. In accordance with the findings of the present study, other studies performed in Turkey found that the prevalence of obesity in the school-age children of families at a high socioeconomic level was higher than in those with a low socioeconomic level.[8,9,20] Similar results have been found in studies conducted in other developing countries, indicating that the prevalence of obesity in families at a high socioeconomic level is higher than in those at a low socioeconomic level.[24,25] This may reflect the increased variety and the amount of food consumed in families with a higher socioeconomic status, as well as the increased consumption of fast food and industrialised food. These results may be interpreted as suggesting that children in families at a high socioeconomic level in developing countries show similarities with children in developed countries in terms of risk factors related to obesity, such as nutrition and activity.[1,25]

In the present study, although the mothers generally were from families at moderate and high socioeconomic levels, but most children frequently consumed junk food, and they did not take part in any sporting activity. A total of 75% children visited fast-food restaurants more than once a week and approximately half the children did not eat breakfast and watched television while eating. These results suggest that most mothers in the study did not encourage healthy nutrition and physical activity behaviours in their children despite having a high socioeconomic and educational level.

We found that the majority of families ate dinner together (94.7%). In Turkey, the dinner is usually a ceremonial activity in which the family members eat together. Having dinner with family members could prevent obesity in both children and their mothers. However, in our study group, watching television during meals was common (50.3%). We suggest that nurses and other healthcare providers should educate families about not watching television during dinner and not consuming foods that have high calorie values, such as pasta, rice, and sugar-sweetened beverages, during dinner.

In the present study, the mothers with obese children had lower scores on the physical activity subscale compared with the mothers of normal-weight children, and the mothers of obese children scored lower on the nutrition subscale compared with the mothers of normal-weight and underweight children. These results suggest that healthy lifestyle behaviours of mothers, especially physical activity and nutrition, are significantly associated with the BMIs of their children.

Early childhood may be a particularly sensitive period for predicting and preventing obesity. The obesity prevention approach must be focussed on pre-shool children and involve all family members, especially the mother. The strategies should be developed to improve the healty lifestyle of mothers. Future research should focus on early life interventions to prevent obesity.

Because of the cultural characteristics of Turkey, the mother is primarily responsible for the care of the pre-school child. Thus, it can be stated that the development of healthy lifestyle behaviours in mothers (especially with respect to nutrition and physical activity) may have a significantly positive effect on the prevention of obesity of preschool children. Programmes for developing healthy lifestyle behaviours in families might be effective in controlling obesity in pre-school children. Therefore, the active participation of mothers in programmes aimed at preventing and reducing obesity should be encouraged, and strategies to encourage healthy lifestyle behaviours of mothers should be developed. For example, programmes can be organised to encourage physical activity among mothers and to improve their knowledge and practice of nutrition.

## Conclusion

Lifestyle behaviours of mothers, especially with respect to nutrition and physical activity, may play a role in the obesity of pre-school children.

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