The Study of Overweight and Obesity Predictors in Children Beginning Elementary School in Rasht City

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Abstract

Introduction: Overweight and obesity is one of health related problems that its prevalence in developed and developing countries is on rise and has become a public health problem. Objective: This study aimed to determine the predictors of overweight and obesity in children beginning elementary schools in the city of Rasht. Methods: This descriptive cross-sectional study was conducted on 426 children aging 6-7 years old, who were selected by stratified randomized method from two districts of Rasht city from all children who referred to National program of children health measurement. Data collection instrument consisted of a researcher made questionnaire to assess predictors of overweight and obesity and sample's demographic characteristics. Data were analyzed using t-test and ANOVA and Pearson correlation test. Results: The results showed that 8.6% of boys and 14 percent of children were overweight and 19% of boys and 15.3% of girls were obese. There was a positive relationship between children's overweight and obesity with family history of obesity (p<0.001), maternal BMI (p<0.02), amount of food eaten in comparison with same age children (p<0.001) and the amount of physical activity for children (p=0.02). Conclusions: Four variables of family history of obesity, maternal body mass index, and parents' view on food taken compared with other children of the same age and hours of physical activity were shown as predictors of overweight and obesity in children entering elementary school.

Keywords: Overweight, Pediatric Obesity, Child.

Introduction

One of the health problems closely related to life style, is obesity. Today, weight gain and obesity has negatively affected many people in different societies (1). Unlike past when it was thought fat people were healthy and strong people, nowadays it has been proved that not only such individuals are not strong, but they get ill more frequently and they have a shortened lifetime as well (2). In fact, obesity is a condition in which fat supplies rise so much in body that damage the person’s health. Also according to its definition, being overweight is a such individuals are not strong, but they get ill more frequently and they have a shortened lifetime as well (2). In fact, obesity is a condition in which fat supplies rise so much in body that damage the person's health. Also according to its definition, being overweight is a condition in which the individual's weight in relation to one's height exceeds its standard level (3).
However, in children overweight and obesity are defined based on BMI marginal limit between 85-95 percentile as overweight and 95 percentile and over as obesity based on standard curves for Body Mass Index (BMI) for age and gender according to Centers for Disease Control and Prevention (2).

Obesity prevalence has considerably increased in children (4). Studies of 2009-2010 indicate that 15% of 2-19 year-old American Children are overweight which was nearly 13% in 2006 (5). According to studies, obesity prevalence in schools all over Iran is 5-10% (6). Some of the study in Iran demonstrates that obesity incidence has been on rise in recent decade (7). In a study of female elementary students in Babel town, the incidence of overweight and obesity were respectively 13.3% and 7.7% (6). The exact reason of this increase in overweight and obesity is not clear and demographic characteristics of the child and parents, extra calorie intake, decreased physical activity, and TV time duration may be involved in its occurrence (8).

There is a close relationship between childhood obesity and increased obesity probability in adulthood as well as its respective physical difficulties (9). Today obesity and overweight is a chronic disease which has turned to a health problem and it is counted as one of the most serious public health challenges in 21st century (9).

Despite the fact that obesity predictors can involve numerous dimensions (10), very few studies have investigated the relationship between all these aspects and obesity problem, and most surveys have just measured the influence of one or some restricted variables.

Considering that 7 year-old children are the first age group who enters the new atmosphere of school, and this often causes some changes in their habits and life style, identifying and determining the relationship between any of these factors and obesity occurrence as well as providing strategies to prevent obesity have resulted in maintaining and promoting individuals' health in society, preventing economical costs due to obesity treatment and its related diseases. This study aimed to determine the factors leading to children overweight and obesity at the beginning of entering elementary schools in Rasht.

**Method**

This cross-sectional study was of descriptive and analytic type performed on 426 children aged between 6-7 years old who referred to health measurement stations (6 stations) in Rasht in 2012 second semester. Sampling was random stratified. In order to determine the sample volume, similar studies were applied (Kalantari et al) (9) and the necessary samples (95% confidence and 90% test power) were defined as 284 and considering the effect of design to be 1.5 fold, the sample numbers were estimated to be 426. Next, between the two districts of Rasht Education Office namely districts 1 and 2, six health stations were designated and among children referring to these stations nearly 70 samples with equal male-female proportion were elected.

Accordingly, after obtaining parents approval and also being qualified for the survey, children and their parents entered the study. Entering criteria were as follow: children whose parents were both alive, children who were not physically challenged and did not suffer from known mental disorders (anorexia nervosa, bulimia nervosa, depression, bipolar disorder) according to their mothers and were not under treatment by certain medication or any medication for decreasing or increasing weight (medication, physical exercises, diet).

This data were obtained based on written contents of the child’s file formed in health center. Total weight and height of the selected children were measured and then BMI was calculated. Height was measured without shoes in standing position using a standard meter with 0.5 cm accuracy, and weight was measured applying a scale (Seca, Germany) with 0.5 accuracy. BMI was estimated by dividing weight (kg) to height square (m²) and according to child development curve and regarding the percentiles, children were divided to four groups of obese (percentile 95 and more),
overweight (85-95 percentile), normal (50-85 percentile), and underweight (less than 50 percentile).

Instrumentations in this study were researcher-made questionnaire adapted from Stanhope the translated questionnaire 2004, Met hour standard questionnaire, and researcher-constructed questionnaire of investigating child’s demographic characteristics including age, gender, present height in cm, present weight in kg, birth weight, infancy nutrition, age of starting supplementary nutrition, birth rate, number of children and parents’ demographic characteristics including age, weight, height, BMI, mother diseases in pregnancy, level of education, career, obesity background in family, and household’s monthly income and the second part of questions was about physical and nutritional habits and patterns.

The latter part included 3 domains “children’s nutrition, physical activity, and sleep and relaxation” that embedded questions respecting meals, snacks, breakfast intake, junk food intake, level and intensity of physical activity, TV time, computer time, and sleep and relaxation pattern.

In order to determine the validity of the questionnaire, content validity was used. That is after having constructed the final questionnaire, it was handed to ten members of nursing and midwifery faculty and their recommendations were used to modify the tool. The reliability of scales and meters were proved via test re-test in three steps.

To collect data, we referred to health measurement stations after having obtained the references. In sampling we got help from health mentors in health stations who were trained practically regarding the measurement techniques and recording weight and height and questionnaire completion procedure was discussed during a 1-hour session. Moreover, written instructions to unanimously complete the questionnaire and measuring weight and height were delivered to them. The questionnaire was in the form of short-answer questions and it was completely filled in by parents in place. Then the data were analyzed by the use of descriptive statistics indices (frequency distribution) and referential statistics tests (chi square tests, independent T, variance analysis, Pearson correlation coefficient test, logistic regression model).

**Results**

In demographic characteristics there was a significant relationship only between the age of starting the supplementary nutrition (P<0.04), mothers’ BMI (P<0.02), fathers’ BMI (P<0.01), parents’ occupation (P<0.03), and family obesity background (P<0.001) with children weight condition (Fishers Exact Test), however there was no statistically significant relationship between children’s weight condition and other questioned personal characteristics of parents and children.

The outcomes revealed that BMI of most children is in normal range (71.5%). Overweight and obesity outbreaks were estimated to be respectively 8.6% and 19% in boys and 14% and 15.3% in girls, and in total 11.3% of children were overweight and 17.2% were obese. The results indicate that being overweight or obese was not significantly related to gender (Table 1).

Taking nutrition patterns into account, there was a significant relation between breakfast intake times (P<0.02) and parents’ ideas about children weight state in comparison to their peers (Fisher Exact Test) (P<0.001). Nevertheless, there was no meaningful relationship between meals’ times, going to restaurants, frequency of eating at a restaurant, taking food only when hungry, taking fast food, having snacks, type of snack, taking junk food, eating fatty foods, and having breakfast with children weight state.

In case of child’s physical activity there existed a significant correlation between physical exercise duration (P<0.02) and children weight status, but there was no relationship between attending a gym, exercise time at a gym, going to nursery or pre-school, exercising and its duration with children’s weight status.
Respecting children’s sleep and relaxation pattern there was a significant correlation between children’s bed time at night (P<0.008) and their eight status (Fisher Exact Test), however there was found no significant relationship between waking up during night, TV watching time, and computer games time with children’s weight state.

In this study multinomial logistic regression model was used and ultimately four variables, family obesity background, mothers’ BMI, parents’ idea regarding child’s eating habits in comparison to her peers, and child’s physical activity time were identified as overweight- and obesity-related factors in children starting school (Table 2).

Discussion and Conclusion

The results of the survey revealed that in general 11.3% of children are overweight and 17.2% were obese which was respectively 13.2% and 5.4% in elementary girls and boys in a study by Maddah and Nikouyeh (11). In a survey carried out by Akhavan in Yazd, overweight and obesity outbreak in pre-school children was found to be 4.3% and 3.8% respectively (12). These differences may be due to the under-study age limit, obvious cultural variations, attitude, and to some extent individuals’ geographical position even when they live in different regions of a country that prone them to obesity and overweight.

In current study there was a statistically significant relationship between children’s weight state and age of starting supplementary nutrition in a way that the early start of supplementary feeding had a significant role in children’s overweight and obesity (13). In addition, Fesharaki et al. showed that early start of supplementary feeding leads to obesity in children (7). In author’s view the extra energy obtained via early start of supplementary feeding in susceptible children could be one of the factors contributing to obesity outbreak.

In current study there was a significant difference between children weight and BMI of their parents in a way that overweight and obese children with normal-weighted parents, were nearly half the obese or overweight children who had obese parents. Huss et al. showed that mother’ BMI is directly related to the risk of being obese in 5-year-old children. In a way that in his study the risk of having an obese child for obese mothers in comparison to mothers with normal BMI was higher (14).

Michels et al. also reported a positive relationship between parents’ obesity (BMI>30) and childhood obesity (15). In author’s view in this study, mother’s obesity can be related to children’s overweight who have an obese mother by genetic effect and also children’s pattern copying from their mothers.

In this study there was a significant relationship between children’s weight state and their parents’ occupation. That is the percentage of children who were obese or overweight with one of the working parents in comparison to children who had both parents working, was lower. Moshtagh et al. in their study concluded that children whose parents were both working, revealed statistical significant higher risk for overweight and obesity (16). Also in a study by Dorosti et al. there observed a positive relationship between parents’ occupational status and child’s obesity (17).

In this study the percentage of overweight and obese children with obesity background in their father family was lower in comparison to children with obesity background in both parents’ family. According to findings by Kalantari et al. also a significant relationship was observed between obesity in close relatives of a child and overweight and obesity at the age of 7 (13).Moreover, the case study by Paoandreou showed that there exists a significant relationship between obesity family background and children’s obesity and overweight (18).

In present survey, a significant difference was observed between children weight state and number of taking breakfast during the week. That is obese and overweight children who took 1-2 times breakfast in a week were more than children who consumed breakfast more than 4 times during the week. In a survey by Maddah and Nikouyeh which was
carried out under the title of factors related to school children overweight in Rasht, indicate that there was a significant difference between number of having breakfast and obesity prevalence in children (11). Vanhala et al. also concluded in their study that not having breakfast is one of the independent risks for children obesity (19). This study also demonstrated that there was a meaningful relationship between children's weight whose parents believed that they have less food than their peers and children's parents who thought that their children have more food than their peers; children whose parents thought that they eat less, were more overweight. The study by Dorosti et al showed that there was a statistically meaningful relationship between children's weight state and their mother's awareness about their children's nutrition (17).

In this study the percentage of overweight and obese children who had less than 1 hour physical activity during the week was almost twice the children who had over three hours physical activity during the week and the difference was significant. The study by Akhavan et al revealed that there was a significant relationship between the level of physical activity and obesity and overweight in children (12). In addition, in a study performed in Finland by Vanhala et al, it was shown that children low physical activity is a crucial and determining risk factor for obesity and overweight (19). High physical activity and decreased sitting time during spare time may lead to increased energy consumption in people and prevent obesity.

In present study there was a significant relationship between the sleep time during night and the number of sleep times during the day and obesity and overweight in children. In a study by Kimiagar et al also a significant relationship was observed children obesity and overweight and sleep time (20).

It is believed that insomnia disturbs the secretion of appetite regulating hormones. This change in hormones level makes the person to eat more and feel sleepy during the day and also allocates less time for exercise and this a factor leading to obesity and overweight.

In this study the prevalence of obesity was considerable and higher than expected, on the other hand parents’ awareness of related factors have a crucial role in its occurrence. Based on this nurses can pay a fundamental role in correcting unhealthy behavior and creating a suitable life style by training children and their parents at school, giving information and introducing healthy habits and behaviors as well as unhealthy ones in order to have a desired BMI and prevent obesity and overweight as a health-related problem. Managers and policy makers in health can also make use of outcomes of this study.

### Table 1: BMI frequency distribution based on gender

<table>
<thead>
<tr>
<th>Level of significance</th>
<th>Total</th>
<th>Obese</th>
<th>Overweight</th>
<th>Normal weight</th>
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<tr>
<td></td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>X²=3/6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>df=2</td>
<td></td>
<td></td>
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<tr>
<td>p&lt;0/164</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>210</td>
<td>19</td>
<td>40</td>
<td>8/6</td>
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<tr>
<td>100</td>
<td>215</td>
<td>15/3</td>
<td>33</td>
<td>14</td>
</tr>
<tr>
<td>100</td>
<td>425</td>
<td>17/2</td>
<td>73</td>
<td>11/3</td>
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<td></td>
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<tr>
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<td>male</td>
<td>female</td>
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<tr>
<td>%</td>
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</tr>
<tr>
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<td>152</td>
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<tr>
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<td></td>
<td></td>
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<tr>
<td>71/5</td>
<td></td>
<td></td>
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square chi-test*

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Table 2: predicting regression coefficients of overweight and obesity in children based on regression logistic model

<table>
<thead>
<tr>
<th>C.I.for EXP(B)95%</th>
<th>Exp(B)</th>
<th>Sig.</th>
<th>df</th>
<th>Wald</th>
<th>S.E</th>
<th>B</th>
<th>predictor</th>
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<td>lower</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>8/41</td>
<td>1/77</td>
<td>3/861</td>
<td>0/001</td>
<td>1</td>
<td>11/542</td>
<td>0/398</td>
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<td>1/009</td>
<td>1/07</td>
<td>0/025</td>
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<td>0/031</td>
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<td>0/038</td>
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<td>0/71</td>
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<td></td>
<td>0/023</td>
<td>3</td>
<td>9/49</td>
<td>1/33</td>
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