DIET ANALYSIS IN OBESE CHILDREN

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Abstract

Background: Childhood obesity is a public health issue and the available management options include dietary recommendations which are time-consuming and general. Diet analysis can help in improving the obesity treatment.

Aim: to evaluate the food pyramid and dietary patterns in obese children.

Material and methods: cross-sectional study on a sample of 82 children 5-19 years with abdominal obesity evaluated between March 2013 - April 2014 in the Emergency County Hospital Mures. Variables: age, sex, environment, BMI Z score (according to the WHO charts), food pyramid, diet composition. Each child was measured and weighted by the same person, using verified instruments. Each legal representative filled in a food frequency questionnaire regarding eating habits for the previous 6 months. The questionnaire has 126 items and for each one there are 10 frequencies to choose from. A dedicated web-based tool was developed for the questionnaire analysis which returns the personal food pyramid based on the questionnaire and allows further group analysis of dietary patterns, using different criteria, and variable number of food items.

Results: The mean age was 12.4±4.8 years, with a predominance of females (1.34:1) and of the urban environment (2.28:1). 64.6% of the subjects (n=53) were obese. Sex and the environment have no influence on the food pyramid, although children from rural areas have more unhealthy eating habits when analyzing diet composition. Age is significantly negatively correlated with all food groups' number of servings. Children at pubertal age have more healthy eating habits than younger ones.

Conclusion: Diet analysis is a useful tool in the management of overweight and obesity, but more objective methods for assessment must be developed.

Key words: childhood obesity, food pyramid

Introduction

Childhood obesity has become a major public health issue, the burden of the disease being very well demonstrated [1]. In children obesity is associated with a wide range of health complications and an increased risk of premature onset of illnesses, including diabetes and heart disease. Preventing childhood obesity is a key approach to the primary prevention of noncommunicable diseases.

The obesity epidemic has the potential to negate many of the health benefits that have contributed to the increased longevity observed in the world. The WHO's Commission on Ending Childhood Obesity has developed a report describing future policy directions with the aim of countering this epidemic [2].

The management of obesity focuses on lifestyle changes, including dietary recommendations. The latter are difficult to obtain given the subjective and time-consuming diet analysis.

Aim

To evaluate the food pyramid and dietary patterns in obese children.

Subjects and methods

A cross-sectional study was conducted between March 2013 and April 2014 in the Emergency Mures County Hospital involving children with abdominal obesity from 5-19 years of age. Sample: 82 children. Exclusion criteria: secondary causes of obesity, refusal to participate.

Variables: age, sex, environment, BMI Z score (according to the WHO charts), food pyramid, diet composition. Abdominal obesity was defined as waist above the 80th centile according to the curves developed by Fernandez et al. in 2004 [3]. Overweight was defined as 1SD < BMI < 2SD and obesity was defined as a BMI > +2 SDS according to the WHO reference. The ideal food pyramid was defined as follows: cereal at least 6 portions/day, fruits and vegetables, at least 5 portions, dairy 3 portions, meat 2 portions, fat 2 portions, concentrated sweets maximum 1 portion.

Method: each child was measured and weighted by the same person, using verified instruments. Each legal representative filled in a food frequency questionnaire regarding eating habits for the previous 6 months. The questionnaire has 126 items and for each one there are 10 frequencies to choose from. It was developed based on the one used in the 3rd NHANES and adapted to local food habits. A dedicated web-based tool was developed [4] for the questionnaire analysis which returns the personal food pyramid based on the questionnaire and allows further group analysis of dietary patterns, using different criteria, and variable number of food items.

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The study was approved by the local Ethics Committee and each legal representative had to sign an informed consent.

Statistical analysis: for data collection the M.O Excel and the web-based tool were used; for statistical analysis MedCalc v. 5.0 was used. Categorical and binary data were analyzed using the t-test, Mann-Whitney test, $\chi 2$ test for testing associations, Spearman or Pearson test for correlations. A level of significance α=0.05 was used.

Results

The mean age was 12.4±4.8 years, with a predominance of females (1.34:1) and of the urban environment (2.28:1). 64.6% of the subjects (n=53) were obese (table1).

Table 1 – General characteristics of the sample.

Variable	Girls	Boys	Total
n	47	35	82
Mean age (years)	12.5±4.9	12.2±4.9	12.4±4.8
Urban (n/%)	36 (76.6%)	21 (60%)	57 (69.5%)
Rural (n/%)	11 (23.4%)	14 (40%)	25 (30.5%)
Normal weight (n/%)	13 (27.6%)	8 (22.8%)	21 (25.6%)
Overweight (n/%)	5 (10.6%)	3 (8.5%)	8 (9.75%)
Obese (n/%)	29 (61.7%)	24 (68.57%)	53 (64.6%)

Considering the subjectivity of the food frequency questionnaire, we tested for outliers for each food group and eliminated them from the final analysis. The final sample was of 72 subjects. Both boys and girls eat more servings than the recommended amount, with significant differences for fruits and vegetables (figure 1). Environment has no significant influence on the food pyramid, but children from urban areas consume higher amounts of fruit and vegetable and lower amounts of cereal, sweets and fat.

When analyzing the food pyramid according to BMI, the only significant difference is in the fat amount, with obese subjects having the highest value. Overweight people consume the highest amount of food servings/day (figure 2).

Age is negatively associated with all the food groups, significant for sweets, fat, and dairy (table 2).

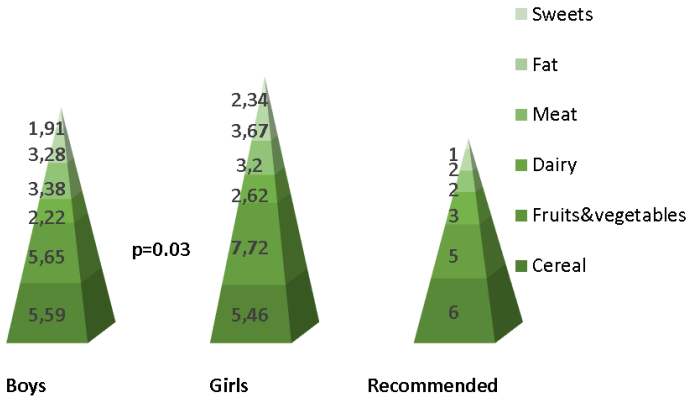

Figure 1 – The food pyramid of the subjects.

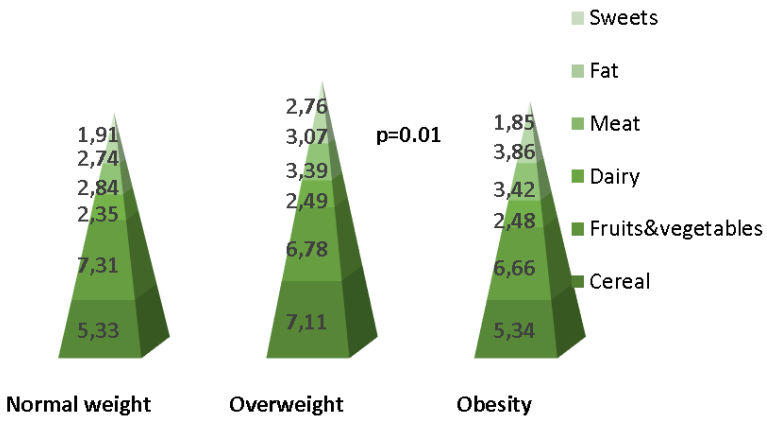

Figure 2 – The food pyramid depending on the weight.

Table 2 – Age correlation coefficients with the food groups.

Food group	r coefficient	95% CI	p
Sweets	-0.14	-0.23 – (-0.04)	0.003
Fat	-0.31	-0.51 – (-0.08)	0.007
Meat	-0.22	-0.43 – (-0.01)	0.06
Dairy	-0.27	-0.48 – (-0.04)	0.02
Fruits & vegetables	-0.22	-0.34 – 0.19	0.35
Cereal	-0.09	-0.32 – 0.11	0.45

Considering 12 years as the mean age for pubertal development and comparing the two groups, the younger the children, the higher the amount of fat and dairy consumed (figure 3).

When comparing the 2 groups regarding the first 3 items mostly consumed, the older children choose healthier fat and meat products, while consuming the exact same sweets and dairy.

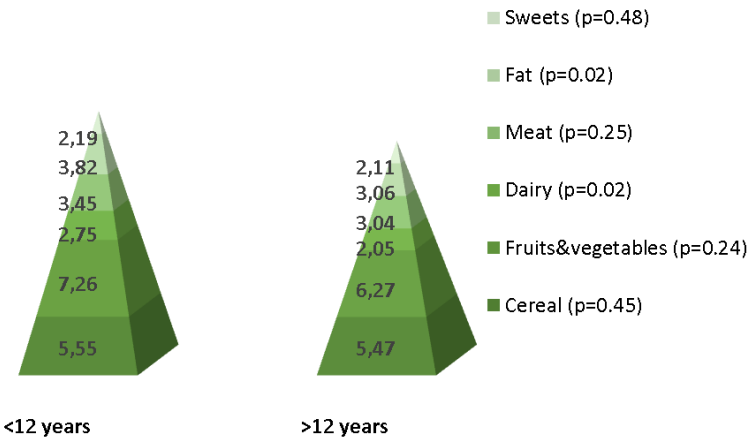

Figure 3 – The food pyramid depending on age.

Discussions

This study aimed to analyze the food pyramid and dietary patterns among obese children. Although diet analysis is time-consuming, it is an important part of the management of obesity, especially in children and adolescents. There are 2 meta-analysis that state the lack of consistency among studies regarding dietary interventions and the need for further well-designed populational studies in order to fully describe the diet's role in the management of obesity in children [5,6].

Diet assessment tools are available throughout the world-wide-web more or less controlled or based on guides or professional information. The high income countries have been using different types of assessment tools for developing national guidelines and recommendations [7].

Obese and overweighed children consume higher amounts of food servings than the current recommendations, with only small differences among sexes or environment, a result consistent with previous studies [8,9,10,11]. In our study, pubertal subjects had healthier food choices and consumed lower number of servings from all food groups. Other studies reported the opposite or no difference between prepubertal children and older ones [12,13]. This fact might be explained by the choice of 12 years as cut-off for pubertal development in our study.

Our results showed that age was negatively correlated with all food groups. Pre-pubertal children have a more controlled diet, compared with those in high school, directed by parents and school cafeteria food availability [14,15]. These results show the need for school policies that do not allow unhealthy foods to be available for children and public health policies that raise parents' awareness regarding the health burden of obesity [16].

We must state the limitations of our study: small sample, the subjectivity of dietary assessment, the lack of physical activity evaluation. Future populational studies are needed in order to fully understand the diet composition importance in childhood obesity.

Conclusion

Diet analysis is a useful tool in the management of overweight and obesity, but more objective methods for assessment must be developed.

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