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Original article

Impact of food behavior on children's health. A case study

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Summary. The current study evaluated the impact of food behavior on the incidence of gastrointestinal disorders, food allergies, and overweight, on children. For this purpose, a series of questionnaires regarding diet, eating habits, and the incidence of childhood affections, were completed by the parents of 212 children aged between 0 and 14 years, patients in the St. John Children's Hospital of Galati, Romania. Eating patterns were investigated, including the frequency of eating breakfast, fruits and vegetable intake, fast food, and carbonated drinks consumption. The results showed an increase in the incidence of digestive disorders, by 6.13% for boys and by 4.72% for girls, especially for those who eat daily fast food compared to children who consumed fast food only two to three times a week and respectfully, an increase in the incidence of food allergies by 8.96% for boys and 6.60% for girls in case of daily consumption of carbonated drinks compared to children who consumed this type of beverages only once a week or less. In the case of overweight children, the results also displayed a low-frequency consumption of fresh fruits and vegetables, by 5.19% for boys and 4.71% for girls, less than two times a week, compared with the daily consumption of these products.

Key words: children diet, food allergies, food-behavior, fast-food, gastrointestinal disorders, overweight children.

Introduction

Health is one of our most important values, both for us as individuals and also for our society, and is also a very important condition for the sustainable development of a nation (1). With the recent globalization processes, besides various economic and political challenges, we also need to be aware of the challenges for our health.

The globalization that characterized and influenced our society seems to include even the food that we eat (2). Many nutritional factors may influence disease, including changes to the production and availability of food, changing food preferences, increased supply of processed foods for consumption (3).

In this context, some of the most important challenges to our health at this stage are the chronic diseases: heart disease, stroke, cancer, diabetes, and particularly obesity and especially the role of diet in the development of obesity that was poorly understood (4). Among other challenges of globalization, there is an urgent need to identify dietary factors that contribute to obesity among children and young adults so that prevention efforts can be effectively made from an early age (5).

Most components of metabolic syndrome are related separately to lifestyle factors such as weight control, diet, and physical activity (6). It was found that all these chronic diseases are governed by both genetic and lifestyle factors (7).

One of the major negative effects of an unhealthy lifestyle is obesity, the genesis of which begins in childhood. Obesity has reached epidemic proportions in the world (8). Obesity *per se* is an important risk factor for atherosclerotic cardiovascular disease, type 2 diabetes,

dyslipidemia, hypertension, and other chronic diseases (5). A recent study conducted in 79 countries revealed that there were 250 million obese worldwide, including an estimated 22 million children under the age of 5 years, emphasizing the idea that 50% of obese children will become obese adults (9).

According to WHO statistics, the prevalence of obesity has tripled since 1980, and in 2010, there were over 40 million overweight children under the age of 5 worldwide (10). Specialty literature and studies have shown a doubling of the prevalence of childhood obesity in the world over the past 30 years in both industrialized and developing countries (11).

Therefore, the question is: can we prevent obesity somehow (12). It is very important to know what we eat, so we can make the best choices (13). Individual recommendations included the decreasing of sugar and fat intake, increasing the consumption of fruit and vegetables as well as whole grains and cereals and exercising regularly (60 minutes a day for children) (14).

Materials and Methods

Cross-sectional survey

A cross-sectional survey was used in St John Child Hospital in Galati, Romania, to quantify the impact of food behavior on a group of children in Romania. For analysis, a child eating behavior questionnaire has been used and also anthropometric measurements, like the body weight, and height was used to calculate the body mass index. For this specific case study, the graphics from the World Health Organization website were used for calculating percentile and *Z* score.

The study information was provided by the parents on behalf of their children. A total of 212 parents gave their consent, and from the information obtained, 110 were boys and 102 were girls.

From this starting point, three groups of children were created, first one with the age between 0 and 3 years, the second one with the age between 3 and 7 years and the third group, with the age between 7 and 14 years.

Eating patterns of these groups of children were investigated, that included frequency of eating breakfast, fruits and vegetable intake, fast food consumption, and carbonated drinks consumption. More specific, it was assessed the impact of food behavior on the incidence of gastrointestinal disorders, food allergies, and obesity on the 212 children.

Statistical analysis

Statistically significant results were obtained with the CrossTabs in IBM SPSS Statistics 23 software. The threshold of significance we considered is $\alpha = 0.05$. Database associated variables were of a nominal or ordinal type.

Results and Discussion

First of all, it was studied the correspondence between eating habits represented by the frequency of taking breakfast, considered by most specialists the most important meal of the day, and weight calculation for a healthy life represented by *Z* score.

Centralized data can be seen in Table 1.

From the data in Table 1, it can be seen that the children with *Z* score within the normal range have had the habit of having breakfast daily in the proportion of 14.15% boys and 13.21% girls. Since the calculated value of the Pearson chi-square test, χ^2, is 38,168 and the probability associated with this value $p < 0.001 < \alpha = 0.05$, it was accepted that there was a link between *Z* scores and the frequency of breakfast.

Usually, the absence of breakfast is offset by the consumption of fast foods during breaks between school hours, which also lead to excessive weight gain. Similar results have also been observed by Janssen et al., 2005 (15) and Barlow 2007, (16) who appreciated that the global increase in the prevalence of obesity and overweight is due, on the one hand, to an increase in energy intake, especially high-calorie foods rich in fat and sugars, by so-called fast food or junk food, and, on the other hand, the decrease in physical activity due to the increase in sedentary prevalence.

The incidence of digestive disorders depending on fast food consumption was also investigated. The centralization of results can be seen in the chart in Figure 1.

There was an increase in the incidence of digestive disorders especially in children who ate fast food daily by about 6.13% for boys and by 4.72% for girls who eat fast food only two to three times a week. Children,

Table 1. *Z* scores according to the frequency of breakfast.

Z scores	Less than –2		Between –2 and 1		Between 1 and 2		Over 2	
Gender	**Boys (%)**	**Girls (%)**	**Boys (%)**	**Girls (%)**	**Boys (%)**	**Girls (%)**	**Boys (%)**	**Girls (%)**
Daily	0.94	0.94	10.85	10.38	3.30	2.83	0.94	0.47
3–6 days a week	1.42	1.89	5.66	5.66	6.60	6.13	1.89	1.42
0–2 days a week	2.83	3.30	4.25	3.30	9.91	8.96	3.30	2.83

who ate fast food once a week or less, have had digestive disorders more than three times a year only in the proportion of 3.77% boys and 2.83% girls.

Other authors have found as well, the undesirable effect of fast food consumption. It has been underlined by Shau et al. in 2016 (17) that the fast food consumption may contribute to a positive association with the development of functional gastrointestinal disorders. For instance, junk food is unhealthy for the digestive system as it slows down the digestion process making the stomach bloated. In Shau's study, it has been reported that 26.8% had a history of at least one gastrointestinal disorder and 88.1% of the subjects reported fast food consumption. Another inconvenience is that fast food can replace other, more nutritious and healthier products (18).

It was investigated also if there was a link between the incidence of food allergies in children and the consumption of carbonated beverages. The data centralization results can be seen in the graph in Figure 2.

There was an increase in the incidence of food allergies by 8.96% among boys and 6.60% among girls in case of daily consumption of carbonated drinks compared to children who have this type of beverages only once a week or less.

However, increasing the incidence of food allergies to less than three per year was likely to be influenced by other factors such as genetic ones because the same dependence on the frequency of carbonated beverages was no longer observed.

The literature provides reports of carbonated drinks that can cause a change in the child's immune system that can cause allergic reactions (19). Another study showed that carbonated beverages not only favored weight gain but also affected the body's ability to process sugar and thus, the increased risk of developing diabetes (20).

Finally, the link between eating habits in terms of fresh fruit and vegetables and obesity in children was analyzed. The results of the centralized data can be tracked in the graph of Figure 3.

From the chart in Figure 3, it is noticeable that in the case of overweight children (percentile 85–97), the consumption of fresh fruit and vegetables with a frequency of fewer than two times a week is with 5.19% more common for boys and with 4.71% for girls than

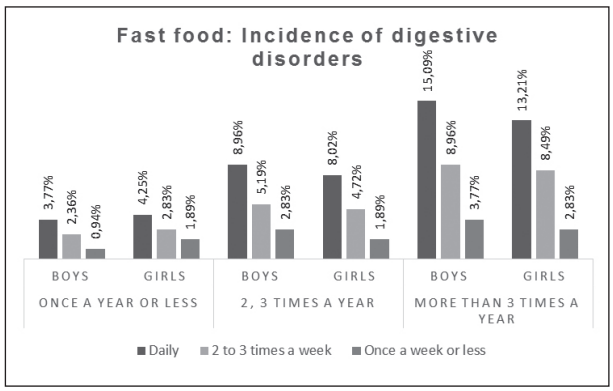

Figure 1. The incidence of digestive disorders and fast food consumption.

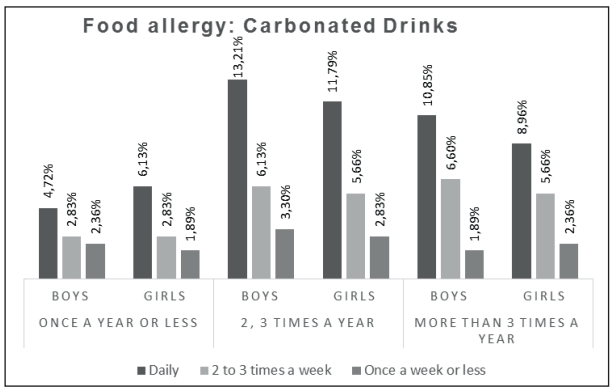

Figure 2. The incidence of food allergy and carbonated beverages consumption.

the daily consumption of these products. It is also observable in the case of obese children (over 97 percentile), that the consumption of fresh fruit and vegetables less than two times a week is 3.01 times more common for boys and 5.02 times for girls than the daily consumption of these products.

Regarding prevention, European Union dietary guidelines recommended that every child should consume vegetables and fruits daily, along with cereals (including bread, rice, pasta, and noodles) preferably whole, lean meats, fish or poultry, milk, yoghurt, and fresh cheese; to choose the water as a drink; to choose low-salt foods, sugar, and additives in the menu, and also very important, to do daily outdoor exercise (21).

Thus, a healthy diet and physical activity reduce the risk of obesity in adult life, also ensuring a harmonious development in the child (22). Increased consumption of fruit and vegetables has been postulated to be associated with a decrease in the prevalence of asthma and rhinitis through their antioxidant properties, which may protect against inflammation (23).

Conclusions

The results obtained showed that it was an increase in the incidence of digestive disorders especially in children who eat daily fast food by about 6.13% for boys and by 4.72% for girls who eat fast food only two to three times a week. It was observed also an increase in the incidence of food allergies by 8.96% in the case of boys and 6.60% in the case of girls in case of daily consumption of carbonated drinks compared to children who consume this type of beverages only two to three times a week. In the case of overweight children (percentile 85–97), the consumption of fresh fruit and vegetables with a frequency less than two times a week was 5.19% more common for boys and 4.71% for girls than the daily consumption of these products.

This data has been confirmed by other researchers in the literature. In terms of prevention and the continuous education, children who will be educated early on to eat breakfast daily, to eat fruits and vegetables, but also to do physical exercise, to treasure their health, they will practice these skills in their adult life and they will educate their own children based on these principles (24).

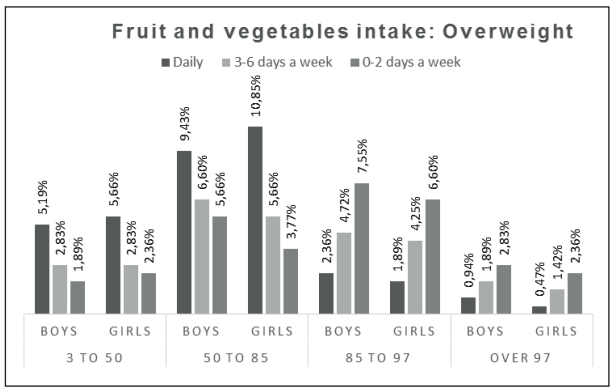

Figure 3. Fruit and vegetable intake and overweight at children.

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