Risk Factors for Obesity and Overweight in Children and Adolescents from Romania

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RESEARCH ARTICLE

Abstract
The fact that more and more people are suffering from obesity and that this condition is more and more common among children is an alarm signal and some measures must be taken in this direction. Nowadays, the most incriminating factor responsible for the development of childhood obesity is the excessive consumption of fast food, sweets and juices, as at the market there is a wide range and easily accessible. This study aims to evaluate the association between frequent consumption of fast food and other lifestyle factors with the presence of obesity and overweight in children of different ages in Romania. Applying a questionnaire with 31 questions we collected data from 328 people, 170 boys and 158 girls, residing in Romania. The analysis of the data collected showed a higher number of overweight children, compared to the number of mothers who consider that their children are overweight, for this we identified the factors with potential obesity and we looked for the associations between the lifestyle and obesity. The higher prevalence of fast food consumption and sedentary activities among overweight and obese children, highlighted in this study, further confirms the need to promote health through education for healthy eating and lifestyle behavior.

Keywords: obesity; fast food consumption; lifestyle factors.

INTRODUCTION
Over the years, the incidence of obesity has increased significantly both in Romania and in other more developed countries. The fact that more and more people are suffering from obesity and that this condition is more and more common among children is an alarm signal and some measures must be taken in this direction. The prevalence of obesity is constantly increasing and it has been estimated that around 2038 about 38% of the world's population will be overweight and 20% will be obese. A study conducted in Romania between 2012-2014 showed that the prevalence obesity is of 31.9% (Popa, et al.,2020). Thus, it is expected that in the absence of prevention and treatment measures over 50% of the world's population will be obese by 2025 (Overweight and obesity - BMI statistics, 2021). Given the increasing trend of overweight people, over time many studies have been conducted on obesity, its factors, the connections between obesity and the multiple comorbidities for which it is responsible, but also studies related to ways of combating (Ogden, 2010). Obesity has been shown to be associated with chronic inflammation due to the formation of proinflammatory cytokines, endothelial dysfunction, increased oxygen free radical production, activation of the sympathetic nervous system and activation of coagulation
resulting in a high incidence of type 2 diabetes, dyslipidemia, hypertension and atherosclerosis (Overweight and obesity - BMI statistics, 2021; Cercato, Fonseca, 2019).

Nowadays, the most incriminating factor responsible for the development of childhood obesity is the excessive consumption of fast food, processed foods, sweets and juices, as at the market there is a wide range and easily accessible. All parents should educate their children towards a healthy and balanced diet, especially since this pathology is more and more common (Huang 2015). Among the factors favoring obesity are the genetic, socioeconomic, and environmental factors. Food consumption, urban development, lifestyle and old age also influence the prevalence of obesity (Hemmingsson, 2018).

For the diagnosis of obesity, a variety of anthropometric measurements are used, and the most used indicators are: height, weight, cranial and thoracic perimeter for infants and children up to 2 years. The abdominal and buttocks circumferences, abdominal and triceps skinfolds are also used (Lobstein, 2004).

The consumption of fast food shows a dramatic increase due to the convenience of the population, low costs, various menu options, aroma and special taste, so children are the first to fall into the “trap of fast food” (Shah, 2014). Substantial changes in eating habits are the most important factors in the obesity epidemic (Huang 2015).

Another reason for consuming fast food is the family structure changes, as they have less time to establish and cook a healthy and balanced menu and family meals are neglected (Williams 2018). As a result, they use faster methods of serving meals including food prepared in supermarkets or partially prepared food that does not require as much time and energy, but there is also a tendency for fast food (Pace, 2016). Prolonged consumption of fast food is associated with the distribution of adipose tissue in the abdomen (Mohammadbeigi 2018).

This study aims to evaluate the association between frequent consumption of fast food and other lifestyle factors with the presence of obesity and overweight in children and adolescents in Romania, as well as the evaluation of mothers' perception regarding the weight of their children.

**MATERIALS AND METHODS**

**General data on the study**

This research is based on a cross-sectional study on a group of children in Romania, using an online questionnaire on social networks, in specific groups for mothers in Romania, using Google Forms. It is an anonymous questionnaire in compliance with the terms of confidentiality. The application period was between October 2020 and December 2020, and the subjects studied expressed their agreement to participate, by completing it.

The questionnaire included 31 questions, through which we highlighted the eating habits of children in Romania. The first part of the questionnaire contains general data provided by mothers about their children, while the second part analyzes the data on their children.

The questionnaire was completed by 591 subjects, of which only 328 had all the complete data. Thus, this study was conducted on a sample of 328 subjects domiciled in Romania, from whom a series of data on children were collected: age, weight, height, data that were extracted and interpreted statistically. Those who answered this questionnaire are 170 boys (51.83%) and 158 girls (48.17%).

The inclusion and exclusion criteria that formed the basis of the study group of the total sample are the following: the mother to be domiciled in Romania, to be the parent of a 2–18 years old.

**Statistical analysis**

The data were analyzed using the statistical program GraphPad Prism vers. 9; for the determination of the statistical significance, the square CHI test was used.

A descriptive statistic was made, which highlighted the opinion of the respondent parent on obesity, about the general aspects of nutrition as a risk factor for obesity. Respondents were asked if they had any knowledge on safety of the food diet, which is the importance of food costs and food taste in food choices for their children, the amount of food consumed, if they know the benefits of physical activity for their children, and the importance of the child's weight for parents were also assessed.

In order to identify factors with obesogenic potential and the associations between lifestyle and obesity, the exact weight of the child, his height and age, lifestyle, frequency of consumption of fast food, juices were taken into account, sweets, frequency of physical activity and hours spent on various devices. To identify the associations between various factors we used the square CHI test, and the significance threshold was chosen for a p value ≤ 0.05.

The WHO Growth Charts were used to define weight status. Regarding physical activity, the parent was asked: How many times a week does their child play or engage in physical activity intense enough to sweat? Answer options are: rarely or never / 12- times a week / 3-4 times a week / 5 times or more a week / I don't know, I'm not sure.
RESULTS AND DISCUSSIONS

The eating habits of the children and their families were analyzed. Using the collected data, the difference between the child's weight index and the mothers' perception of the child's weight was calculated. By calculating the BMI, we observed that 63.11% of the children included in the questionnaire had a normal weight, and 82.32% of the mothers considered that their children had a normal weight. The analysis of the data collected showed a higher number of overweight children, compared to the number of mothers who consider that their children are overweight (8.54% of children had BMI values indicating obesity, and 1.22% of mothers' respondents considered that their children were obese). The same difference was observed in the case of obese children (Figure 1).

![Figure 1. The difference between the value of the body mass index in children and the perception of mothers to the weight of their children.](image)

Most of the children who do not consume fast food or rarely consume fast food, are part of the category of those with suboptimal body weight, with a percentage of 98.3%, while children with obesity have the highest percentage of fast food consumers. food (17.8%). It can be seen that children who are underweight have a very low consumption of fast food, out of the 59 children who fall into this category, only one consumes fast food. (Figure 2).

![Figure 2. Fast food consumption related to body weight among children.](image)
In the category of children with normal weight, there are the most answers “never or rarely consume” carbonated drinks (83.09%), and the highest consumption of carbonated drinks is the category with obesity 26.08%. It can be seen that obese children also have a high consumption of carbonated drinks. 10 of them consume 1-4 carbonated drinks. Children who are underweight have a low consumption of drinks, only 12 of them consume 1-4 drinks per week and only one child consumes more than 8 carbonated drinks per week (Figure 3).

Figure 3. Frequency of carbonated drinks in children

The highest number of children who spend most of the time in front of electronic devices is found in the category of the overweight (15%) and obese (21.4%) Due to the various activities that children do, it can be seen that even those with normal weight spend time on various electronic equipment, 88 of them spend at least 1-2 hours in front of devices and 45 stay even 3-4 hours in front of these devices. (Figure 4).

Figure 4. The time children spend in front of electronic devices in relation to BMI
The highest number of children who do not do any physical activity is in the category of obesity (16%). In each category, the number of children who have no or rare physical activity in relation to BMI is small. In children with normal BMI, physical activity increases from 1-2 times a week to the highest number, i.e., 65 in those who have almost daily physical activity. It can be seen that overweight children and those with obesity the number of those who have activity 1-2 times a week is identical to that of people who have almost daily physical activity. (Figure 5).

![Figure 5. Physical activity in relation to BMI in children](image)

In Table 1 we tried to identify if there is an association between various factors (fast food consumption, frequency of carbonated beverage consumption, time spent in front of devices and daily activity) with children's BMI. It can be seen that there is an association between BMI status in children included in the study group and the frequency of carbonated beverage consumption ($p < 0.005$) and time spent in front of devices ($p = 0.005$) (Table 1).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Status BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast food</td>
<td>$p = 0.053$</td>
</tr>
<tr>
<td>Frequency of carbonated beverages</td>
<td>$p &lt; 0.001$</td>
</tr>
<tr>
<td>Time spent in front of electronic devices</td>
<td>$p = 0.005$</td>
</tr>
<tr>
<td>Daily activity</td>
<td>$p = 0.628$</td>
</tr>
</tbody>
</table>

Some parents do not recognize that their children are overweight or obese, a situation highlighted in our study. Effective public health strategies to raise parents' awareness of their children's weight gain could be the first key steps in an effort to prevent childhood obesity. (He 2007).

This study was conducted in order to better understand how the consumption of an unhealthy and unbalanced diet influences the development of obesity in children aged 2-18 years. This research studied the relationship between the frequency of fast food consumption and the occurrence of obesity, the frequency of consumption of sweetened beverages, but also the influence of sedentary lifestyle on obesity, thus studying the main risk factors leading to obesity and their impact on the health of the subjects, the lifestyle, the eating habits, as well as the usefulness of health education in the prevention of obesity.

In one of the oldest studies, Asfaw tried to show the link between obesity and intensely processed food in a group of 21,803 subjects, including children and adults, from Guatemala. It found that people who frequently consume processed foods have a higher BMI and a higher probability of developing obesity than people who do not have this lifestyle (Asfaw, 2011; Poti, 2017). The continuing prevalence of nutritional imbalance behaviors in children, which continues today, justifies the need to continue to promote healthy eating behaviors, correct food choices (Avram, 2021), education for active leisure and avoidance of sedentary lifestyle through national educational policies, intended for children and parents alike (Avram, 2021).
In the big cities of China (Beijing, Shanghai, Nanjing), in 2015, a similar study was conducted to see if high consumption of fast food has an influence on weight (Zhao, 2017). Data were collected from 1626 children aged 7-16 years. Compared to the present study, one in China was conducted on a large sample of people in cities with a developed economy. It has been shown that obesity is more common among boys, that there is a direct link between food and obesity, but also that this pathology is more common in large, more economically developed cities (Zhao, 2017).

Another study that intended to highlight the association between fast food consumption and obesity, conducted on a sample of 2900 children and 199,135 adolescents, indicates that fast food consumption is high in children and it increases with age, being more common among adolescents. Compared to a rare consumption of fast food, it has been shown that frequent and continuous consumption of fast food is associated with a high BMI. This study analyzed the consumption of fast food by sex, and it was found that it is consumed by both sexes equally, so 25% of children around the world consume fast food frequently or very frequently, and 50% of adolescents. Therefore, the conclusion of this study was that there is a significant positive association between frequent fast food consumption and increased body mass index (Braithwaite, 2014).

Once with the evolution of technologies and a modernized sedentary lifestyle, various pathologies associated with inactivity appeared (Hoare, 2016). Adopting a healthy lifestyle, with a balanced diet, regular physical activity and reducing sedentary activities, all these are recommended in the treatment and prevention of obesity. Since the perinatal period, the mother needs to adopt a healthy lifestyle. Health promotion is necessary for the improvement of cognitive functions, later, during the development of children (Voidazan, 2018). Evidence has been provided that following a healthy lifestyle improves cognitive functions and school activity in children, with a better performance (Martin, 2018)[16]. Most of the participants play football, volleyball, basketball or swim. Moreover, it has been found that boys are much more active than girls. A strong association was found between physical appearance, body weight and playing a sport at least once a week. In inactive adolescents, the risk of developing obesity increases by at least 2% compared to the active ones (Glinkowska, 2018).

The change in lifestyle in children is closely linked to changes in the lifestyle of parents, especially the mother. A balanced diet, avoiding nutritional and health risk factors, applied since the pregnancy of the mother and even in the prenatal period of the young woman who is preparing to become a mother, has an impact on the subsequent evolution of the newborn, both in terms of health in general, as well as nutritional status, in particular (Iacob, 2018).

Further research on the harmful effects of fast food consumption can be made by formalizing this process to allow an understanding of this mechanism by the general public (Avram, 2020). The creation of the formal model allows the identification of all the stages that can be related to the fast-food type diet, but also a forecast of the evolution of the negative effects in time of this type of diet (Calin, 2012; Calin, 2014).

CONCLUSIONS
The prevalence of obesity has been higher among children with the highest consumption of fast food and the lowest physical activity. Subjective assessment of a child's weight by parents may also be a risk factor for the progression of overweight and obesity in children.

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Conflicts of Interest
The authors declare that they do not have any conflict of interest.
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