

UNHEALTHY FOOD BEHAVIOR IN CHILDREN AS A POTENTIAL RISK FACTOR FOR IRON DEFICIENCY ANEMIA

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ABSTRACT: The aim of this study is to evaluate risk factors of nutritional anemia in children aged 9 to 18 years. This research was performed in 918 children (mean age 15.03 ± 2.48 years) living in the city of Timișoara and in surrounding areas. We observed that red meat is consumed more frequently by a higher percentage of boys compared to girls (17.0% versus 9.4%; $\chi^2=1.54$, $p=0.21$). We noticed that boys drink more milk than girls: 18.2% consume more than 2 drinks per day, compared to 8.2% ($\chi^2=55.15$, $p<0.001$). We found a statistically significant difference between boys and girls regarding fruits consumption (28.53% versus 43.01%; $\chi^2=9.58$, $p=0.048$) and juice drinking (34.15% versus 25.9%; $\chi^2=12.77$, $p=0.012$). Finally, we observed that there is no statistically significant difference between boys and girls regarding fast-food consumption (28.8% versus 19%; $\chi^2=5.18$, $p=0.26$).

KEYWORDS: Children; Risk factors; Iron deficiency anemia.

1. INTRODUCTION

Food behaviors in children and young people, due to an insufficient intake of food or due to an unbalanced diet represent an important public health problem. Some diet behaviors acquired in childhood and youth period have repercussions on short-term and long-term health.

In adolescence, iron deficiency anemia is usually due to insufficient dietary intake to meet physiologic needs. Because of their rapid growth and increased need for iron, female adolescents are especially vulnerable [MCB98].

We evaluate risk factors of nutritional anemia in children aged 9 to 18 years living in urban and rural areas (obesity, consumption of meat, consumption of milk and milk production, consumption of fruits and vegetables, juice drinking and fast-food consumption).

2. MATERIAL AND METHODS

This research was performed in 918 children (mean age 15.03 ± 2.48 years) living in the city of Timișoara and in surrounding areas. Parents of children were acknowledged about the study and written informed consent was obtained. Children received a 15-minute questionnaire about their nutrition habits and life style regarding learning and leisure. They gave also information about their weight and height.

In order to evaluate nutrition state, we calculated BMI (Body Mass Index) that is defined as the weight in kilograms divided by the square of the height in meters (kg/m^2). It evaluates the quantitative aspects of diet or more accurately, the balance between energy intake and expenditure. The main cut-off points of BMI are: underweight group (UW) - BMI < 18.5; normal group (N) - BMI between 18.5 and 24.9; overweight group (OW) - BMI between 25 and 29.9 and obesity group (O) - BMI > 30 [***00].

Statistical analysis was performed with Stata version 9.2 (Statacorp, Texas, USA). Means, standard deviations and proportions are presented. Student's t test and Chi squared test were used to compare mean values between groups and proportions as appropriate. A P-value < 0.05 was considered statistically significant.

3. RESULTS

We calculated BMI in 811 children (414 girls and 397 boys) and we found a mean value of 20.82 ± 3.44 with a range from 12.24 to 35.05, median=20.41, mode=18.36.

There is a statistically significant difference ($p<0.001$) between boys (BMI= 21.33 ± 3.3 ; range from 12.88 to 34.26; median=21.06; mode=21.22) and girls (BMI= 20.33 ± 3.49 ; range from 12.24 to 35.05; median=19.77; mode=18.36) as shown in Figure 1.

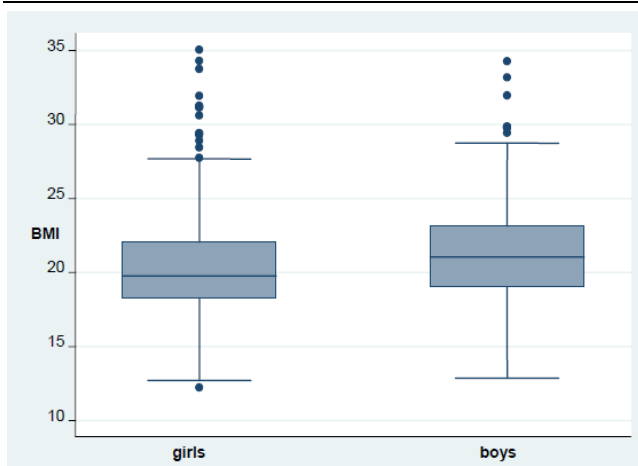


Fig.1. Boxplot of BMI in boys and girls

There is no statistically significant difference ($p=0.79$) between children from urban areas ($BMI=20.8\pm3.49$; range from 12.24 to 35.05; median=20.33; mode=18.36) and rural areas ($BMI=20.88\pm3.26$; range from 12.71 to 31.25; median=20.5; mode=22.03) as shown in Figure 2. A slight increase with age of the percentage of underweight girls and a tendency to decrease with age of the percentage of overweight and obese boys was noticed.

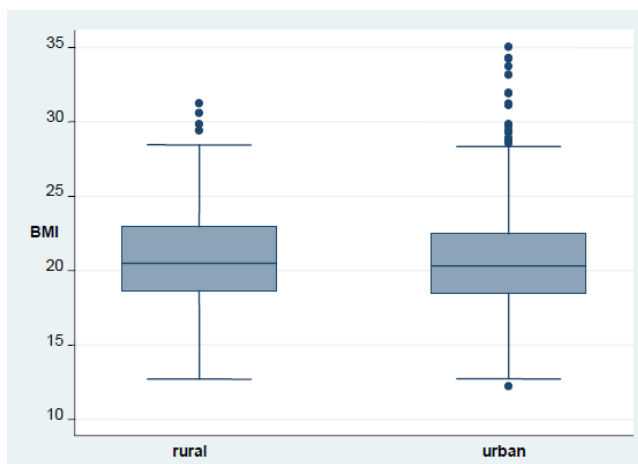


Fig.2. Boxplot of BMI in children from urban versus rural areas

Our study revealed that most young people consume meat 1-3 times per week, with 64.0% (569) of the children eating white meat and 55.1% (320) eating red meat. Daily consumption of white meat is reported by 12.7% (113) of young people, and red meat by 14.5% (129). A percentage of 8.1% (72) do not eat white meat and 13.3% (118) do not eat red meat. The results are similar for both sexes, the differences being not statistically significant ($p=0.08$) in terms of white meat consumption. Red meat is consumed more frequently by a higher percentage of boys 17.0% (75) compared to 9.4% (42) girls ($\chi^2=1.54$, $p=0.21$). The role of meat in diet is linked to iron intake, because of the quantity in which this element is found and achieves favorable conditions for absorption and metabolic use. Iron use is high

during the rapid growth phase of adolescence, when often its depletion is witnessed. Anemia is also encountered because iron needs increase is accompanied by the consumption of foods low in iron or lower iron absorption. All adolescents have a higher need for iron.

In boys, muscle growth is accompanied by increasing blood volume and girls display the monthly loss of iron with the installation of menses. Iron deficiency results in a decrease in immune response with increased susceptibility to infection and impaired learning process (impaired short-term memory) [HRM06, H+01].

Next, we assessed the consumption of milk and dairy products according to the answers given to the questionnaire. The results (Table 1) show that only 13.1% (105) of adolescents consume more than 2 glasses of milk per day, and 32.0% (261) drink at least a glass of milk daily. About one fifth - 18.6% (150) of young people consume between 4 and 6 glasses per week, 26.8% (217) consume between 1 to 3 glasses per week, and 22.6% (183) never drink milk. We noticed that boys drink more milk than girls: 18.2% (81) consume more than 2 drinks per day, compared with 8.2% (24) and only 16.4% (73) of boys never drink versus 28.4% (110) of the girls ($\chi^2=55.15$, $p<0.001$).

Table 1. Frequency of milk consumption by gender

Answers	Girls, no (%)	Boys, no (%)	Total, no (%)
\geq twice daily	24 (8.2%)	81 (18.2%)	105 (13.1%)
once daily	81 (18.2%)	87 (19.6%)	156 (18.9%)
4-6 times a week	62 (13.9%)	105 (23.6%)	150 (18.6%)
1-3 times a week	138 (31.2%)	99 (22.2%)	217 (26.8%)
never	110 (28.4%)	73 (16.4%)	183 (22.6%)

Non answers: 29

Compared with Nutritional Guidelines for Americans 2005 dietary recommendations of at least 3 servings of dairy/day, this category of food intake does not meet the needs of adolescents [DRB98].

A low calcium intake during adolescence is a reason for alarm because adolescence is a period of rapid skeletal growth, approximately 85-90% of total adult bone mass being acquired up to 18 years for girls and 20 years for boys [***05].

When asked about fruit consumption, 364 children (40.9%) from a total of 889 answered they eat fruits daily. We found a statistically significant difference between boys (445) and girls (444) ($\chi^2=9.58$, $p=0.048$) as shown in Table 2.

Table 2. Frequency of fruit consumption by gender

Answers	Girls, no (%)	Boys, no (%)	Total, no (%)
Once a week	41 (9.23%)	45 (10.11%)	86 (9.67%)
Twice a week	62 (13.96%)	89 (20%)	151 (16.98%)
3-4 times a week	143 (32.2%)	124 (27.86%)	267 (30.03%)
Daily	191 (43.01%)	173 (28.53%)	364 (40.94%)
Never	7 (1.57%)	14 (3.14%)	21 (2.36%)

Non answers=29

The 2005 Nutritional Guidelines for Americans recommend daily consumption of at least 2 portions of fruits. Because fruits are rich in vitamin C, their consumption improves iron absorption in the body [PM03].

The study showed that 30% (267) of children use to drink juice. There is a statistically significant difference between boys (445) and girls (444) ($\chi^2=12.77$, $p=0.012$) as shown in Table 3.

Table 3. Frequency of juice drinking by gender

Answers	Girls, no (%)	Boys, no (%)	Total, no (%)
Once a week	95 (21.39%)	65 (14.6%)	160 (17.99%)
Twice a week	98 (22.07%)	94 (21.12%)	192 (21.59%)
3-4 times a week	108 (24.32%)	115 (25.84%)	223 (25.08%)
Daily	115 (25.9%)	152 (34.15%)	267 (30.03%)
Never	28 (6.3%)	19 (4.26%)	47 (5.28%)

Non answers=29

When asked about fast-food products, 256 children (28.8%) answered they use these products once a week, 186 children (20.9%) twice a week, 169 children (19%) reported daily use, 147 children (16.6%) never eat fast-food products and 130 children (14.6%) three or four times a week. There is no statistically significant difference between boys (445) and girls (444) regarding fast-food products consumption ($\chi^2=5.18$, $p=0.26$).

4. DISCUSSION AND CONCLUSIONS

i. We found a slight increase with age of the percentage of underweight girls and a tendency to decrease with age of the percentage of overweight and obese boys;

- ii. In boys, muscle growth is accompanied by increasing blood volume and the girls show the monthly loss of iron with the installation of menses. Iron deficiency results in a decrease of the immune response with increased susceptibility to infection and impaired learning process (impaired short-term memory);
- iii. Decreased consumption of milk and dairy products, especially among girls reduces the intake of calcium and quality proteins. A low calcium intake during adolescence is a reason of concern because adolescence is a period of rapid skeletal growth;
- iv. Decreased consumption of fruits limits the intake of vitamins, minerals and dietary fiber;
- v. Increased drinking of juice leads to a greater energy intake;
- vi. Increased consumption of fast food products leads to increased energy intake, but has a low nutritional value due to unhealthy cooking methods.

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