

## DO SLOVAK TEENAGERS HAVE OVERWEIGHT?

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**Abstract:** *In the year 2006 we investigated through direct measurement of height, weight and the content of fat in the body of respondents the extent of overweight on chosen primary schools in Slovakia. From the collected data we calculated the Body mass index, which directly measures the extent of overweight on the chosen sample of respondents. After the comparison of our realized BMI with the recommended values for the particular age categories we can state, that in the age category of 12 – 15 years is the number of respondents with underweight higher than the number of respondents with overweight, what indicates that a bigger problem of this category are several forms of losing weight and diets, rather than over eating. In the category of respondents with underweight dominate the girls, which are much vulnerable by „mode“ trends, than boys. On the other hand the highest extent of overweight became evident at 10 years old children, in this category the occurrence of overweight dominated under boys.*

**Key words :** *overweight, students, body mass index, level of fat*

### Theoretical resources

Overweight, the problem of today. From the biological view it is a metabolic illness, the overflow of fat fibre in organism, judged by age, height and gender of a child, in which result many complications occur. The growing trend of overweight occurrence at children forces us to think about possible solutions and to start solving this problem. Numerous scientific studies in this field show, that from the children who have overweight almost 80 % of overweight adults will grow. (Johnson, Birch, 1994; Patrick, Nicklas, 2005; Cullen et al, 2002; Wardle et al, 2001; Davidson, Birch, 2001).

Only at a little percentage of children is the cause for overweight a hormonal illness or a genetic fault. More likely is the overweight of children caused by wrong eating habits and lack of exercise. Even a correlation between overweight of children and overweight of their parents is discovered, whereas, if one of the parents has overweight, it is three times more likely that the child will have overweight too, if both, it is almost ten times. It is obvious that parents determinate the eating and exercise habits of their children and so define their overall lifestyle. (Lori et al, 2007).

What are the most common complications which occur as a result of children overweight? Occurrence of malfunction in material transformation of fats and sugars, invasion of the natural loaf structure and, depending on the fat level in blood the redundant accumulation of fats in the loaf. Children with overweight suffer more frequently under deformations of motion system and chronic illnesses of breath system. Already at a young age, changes in the vessels are created, which at a adult age lead to the loss of their springing. Adolescents with serious overweight have often also high blood pressure. A specification of this problem is a possible malfunction of natural sexual growing if the obesity evolves in the childhood. Worldwide more than 22 millions of children under 5 years a 155 millions of school aged children suffer under serious overweight and obesity. ([www.modernaskola.sk](http://www.modernaskola.sk)).

From reasons mentioned above, level of children obesity is discussed by many studies, in which several authors try trough questionnaires or direct measures to discover the overweight or obesity of a specific sample of children from chosen geographic location, state or city.

Georgias and Nassis (2007) investigated trough a direct measure the level of overweight and obesity under 6–17 years old children from Greece, their sample consisted of 6448 students, and they found out, that the % of overweight is 16,9 % under boys and 17,6 % under girls and the % obesity is 3,8 % under boys and 3,3 % under girls. This values have varied according to age of the respondents, the level of overweight and obesity was higher in the younger age category. (6–9 years old).

A similar study was done by Julliusson et al (2007), who confronted the level of overweight and obesity in the years 2003 till 2006 with the data from 1971 till 1974 found out in Bergene Norway. The age structure of their study sample was 4–15 years. Based on the evaluation of the inclination of the recommended average BMI values and judging the levels of fat we found out that the occurrence of overweight and obesity in Norway increases.

Jakimaviciene - Tutkuviene (2007) judged the evolution of BMI at the pre-scholar youth in Vilnius, Latvia, for the last 20 years. They found out, that the BMI of the observed age category (3–6 years) does not change, except the 6 years old girls, where an increasing character was registered.

Studies of the effect of the one child policy on the level of obesity of chinese children in the nineties were done by Yang (2007). He discovered a direct dependence of increasing overweight and obesity with the decreasing number of children in families.

Probably the biggest expansion of the appearance of overweight and obesity is in the USA, according to the statistics, this data tripled in the comparison of the years 1980 and 2000, the level of overweight and obesity in USA and Great Britain is studied by Ikeda et al (2006), who besides studying the simple occurrence of obesity, studied also the risk factors for its creation and the precaution in schools and family.

## **Research goal**

The aim of this study was to discuss the level of obesity of the chosen sample of primary school students based on the body mass index identified by the calculation from the measured height and weight of the respondents and the level of fat in their organism.

## Research hypothesis

H1 We assume that the younger students will have better eating habits than the older ones, and also the level of fat and BMI values will be more stabilized.

H2 We assume that a bigger percentage of the girls will reach optimal level of fat and BMI values.

## The research sample characteristics

The research was done on eight primary schools, four city schools – ZŠ Poprad, ZŠ Kežmarok, ZŠ Trnava, ZŠ Hlohovec and four primary schools on the countryside - ZŠ Štrba, ZŠ Spišská Teplica, ZŠ Červeník, ZŠ Trakovice. The research sample consisted of the students of the second grade, year-class 5.–9., while from each year-class one class was investigated. The whole number of respondents was 755. The numbers of students in chosen schools are indicated in table nr. 1.

Tab. 1 The number of students in particular schools

	ZŠ Poprad	ZŠ Kežmarok	ZŠ Štrba	ZŠ Sp.Teplica	ZŠ Hlohovec	ZŠ Trnava	ZŠ Červeník	ZŠ Trakovice
Boys (1)	56	52	41	41	48	46	31	54
Girls (2)	55	67	40	45	63	44	34	38
<b>Together</b>	<b>111</b>	<b>119</b>	<b>81</b>	<b>86</b>	<b>111</b>	<b>90</b>	<b>65</b>	<b>92</b>

## The research method and process

The research on the mentioned primary schools was realized in the beginning of 2006. After the filling of the questionnaire, we measured the height of the students and with the help of special digital wages their height and level of fat in percent. To find out the level of fat it was necessary to put in the weights, heights and age and gender data. The measured values were written into the questionnaire.

The questionnaire that we used in our research was quantitative analyzed. It was the same for all age groups and all schools. Its content consisted of personal data of the student, (sex, age, height, weight) and a table, where the respondents indicated a preference to chosen foods based on the frequency of consummation.

From the data in the questionnaire we counted individual BMI for every student, using the following formula :  $BMI = \text{current weight in kilograms} / (\text{height in meters})^2$ . The formula for the BMI and the table with recommended BMI values for individual age categories was obtained on the web page <http://romana.webzdarma.cz/> (table nr. 2).

**Tab. 2 BMI values for boys and girls**

Age	Boys	Girls
11	16-19	16 - 19
12	16,5 -19,5	17 - 20,4
13	17 - 20	18 - 21
14	18 - 21	18,5 - 22
15	19 - 21,5	19 - 23
16	19,5 - 22	19,5 - 23
17	20 - 23	20 - 23

When evaluating the eating habits, we assigned to every answer in the table a numeral value according to their accuracy. Then we statistically evaluated all our obtained values. This evaluation was realized with the computer program Statistica, using the Wilks test, which states the influence of individual factors on obtained BMI, level of fat and eating habits.

### **The results of the research and discussion**

In our research we wanted to realize how the eating habits of the respondents of the chosen primary schools with the levels of fat in their bodies and the BMI values. Based on the obtained outcomes we calculated the correlations between them, whereas we did not consider the age, gender, and place of living. The correlation values between the content of fat, BMI value and eating habits can be seen in table nr. 3.

**Tab. 3 Correlation between content of fat, BMI and eating habits**

Correlation	BMI	FAT	HABITS
<b>BMI</b>		0,9458	0,0849
		P=0,00013**	P=0,091
<b>FAT</b>	0,9458		0,1022
	P=0,00013**		P=0,042*
<b>HABITS</b>	0,0849	0,1022	
	P=0,091	P=0,042*	

Like we expected the correlations between the BMI values and level of fat are highly provable, which is indicated by the value  $P = 0,00013$  as shown in tab. nr. 3. Simultaneously we assumed that the eating habits will markedly influence the level of fat and BMI values, meaning that due to wrong eating habits, the level of fat in the body of respondents and BMI values will increase. We found out, that the relationship between eating habits and level of fat is proven ( $P = 0,042$ ), so this proves the importance of influencing the correct eating habits. The correlation between eating habits and BMI values reached the value of  $P = 0,091$ , what we consider as the border of proving of this

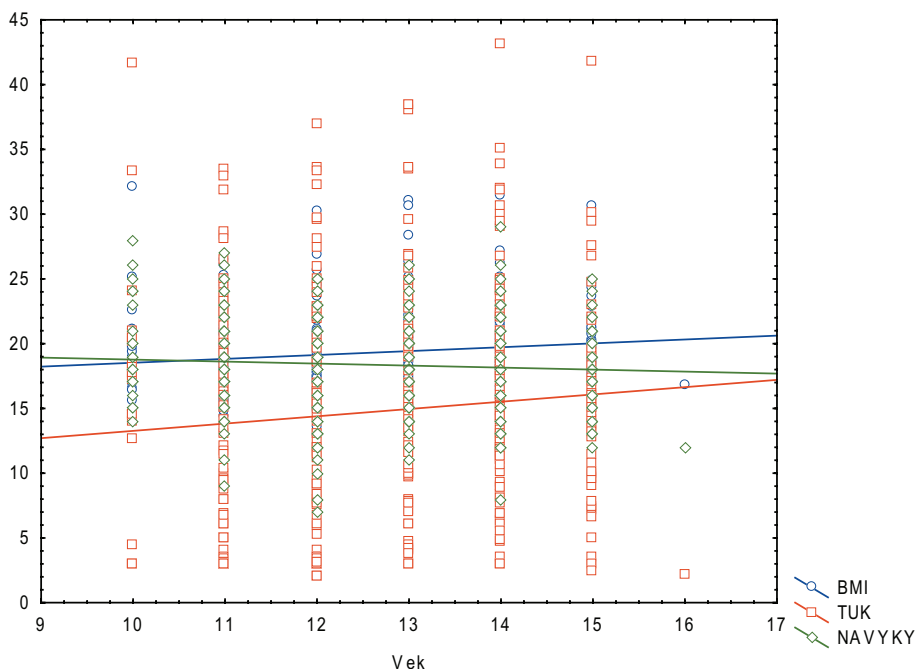
relationship, but we assume, that if we had a larger sample or by keeping the preferences of nourishments in some questionnaires the value could be demonstrated even more.

## Evaluation of hypothesis

Based on statistical analysis we evaluated the given hypothesis, herewith we compared the influence of age and gender on eating habits, level of fat and BMI.

In hypothesis 1 we assumed that younger students will have better eating habits than the older ones and also that the level of fat and BMI values will be well-balanced. Our supposal was based on the fact that older students prefer fast food more then the younger ones, who are in terms of eating influenced more by their parents.

Graph 1 The influence of age on the level of fat, BMI and eating habits

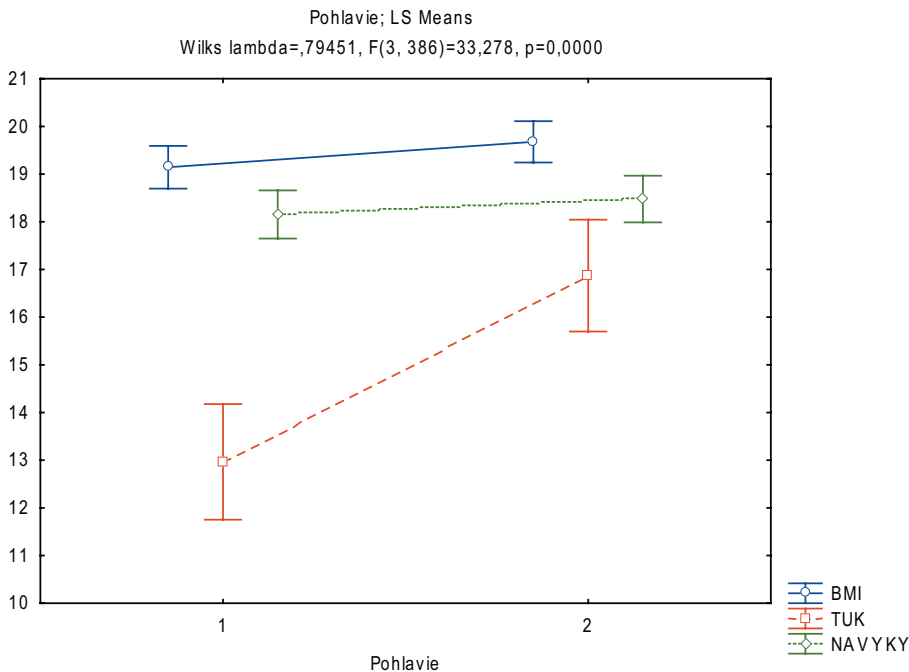


Hypothesis 1 was proven. We found out that the age had a statistical influence on eating habits, level of fat and BMI, which can be seen on graph 1. Eating habits got worse with age, that means the younger students were eating better, what is also indicated by lower BMI values and level of fat, which can also hang together with more influence of eating habits by the parents at younger age.

In the hypothesis nr. 2 we assumed, that the girls will have better eating habits than the boys, what will be indicated by the level of fat and BMI values. Our supposal was based on the fact that women in general care more about their health then men. This fact is proven by several foreign researches for example a research realized in Turkey, which focused on the consumption of fruit and vegetables by students. The research

sample consisted of accidental chosen students of both genders from seven universities. It was found out that women consumed much more fruit and vegetables than men (Unusan, 2004).

**Graph 2 The influence of gender on the level of fat, BMI and eating habits**



This hypothesis was proven only partly. The girls had better eating habits than boys, even if not so markedly as we expected, but their level of fat was visible higher compared to the boys, what can also be based on physiological development in this age group. Also the BMI values were higher at girls than boys which can be seen in graph nr. 2.

To avoid the influence of age on the definition of influence on gender, we calculated the influence of age on eating habits, level of fat and BMI values for individual age groups of girls and boys. Their results can be seen in graph nr. 3.

**Graph 3 Influence of age and gender on level of fat, BMI and eating habits**

We were also interested in particular occurrence of malnutrition and obesity of individual respondents, we decided to evaluate individual age groups based on gender from the BMI values point of view. We calculated average, also minimal and maximal BMI values, which we compared with recommended values for individual age groups as seen in tab. 2. We did not find out the recommended BMI values for 10 years old, we used the ratings of 11 years old, because we did not assume any difference in these values.

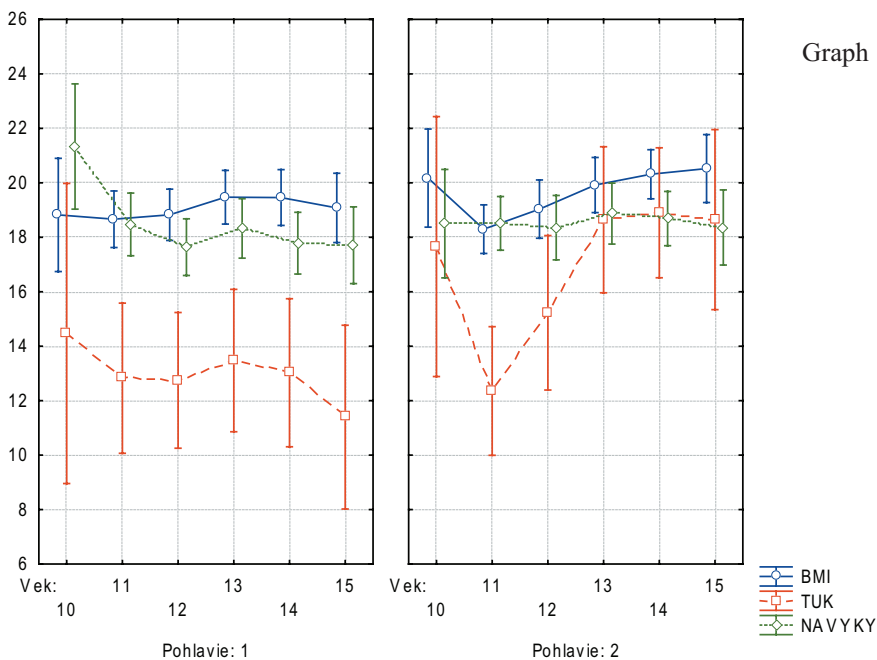


Table 4 Calculated BMI values of students

Age	Gender	BMI Average	BMI min.	BMI max.	Recommended BMI	Number of students
10	1	18,82074	16,74112	20,90037	16 – 19	18
10	2	20,17459	18,37358	21,97560	16 – 19	30
11	1	18,66240	17,62259	19,70221	16 – 19	63
11	2	18,29805	17,40679	19,18932	16 – 19	74
12	1	18,82558	17,88503	19,76612	16,5 – 19,5	82
12	2	19,03447	17,96451	20,10442	17 – 20,4	66
13	1	19,47066	18,48420	20,45711	17 – 20	72
13	2	19,91973	18,90766	20,93181	18 – 21	74
14	1	19,45946	18,43379	20,48512	18 – 21	80
14	2	20,31391	19,41340	21,21441	18,5 – 22	89
15	1	19,07850	17,80499	20,35200	19 – 21,5	52
15	2	20,52414	19,27636	21,77191	19 – 23	55

Comparing the average BMI values of both genders at all age groups with the recommended BMI values we found out, that only the average BMI value of 10 year old girls was higher (BMI = 20,17459), than the designated value range for this age group (BMI 16–19). This means that some of the girls from this age group had overweight.

All other average BMI values corresponded with the designated value ranges for correspondent age groups.

The same way we compared minimal and maximal BMI values. We found out that malnutrition occurred only at 15 year old boys. Their minimal BMI value was lower than BMI = 19. In comparison a light overweight was spotted at more age groups particular 11 year old boys and girls, 12 year old and 13 year old boys. Obesity occurred surprisingly at the lowest age group, the 10 years old boys and girls.

## **Conclusion**

If we want our children to grow up as healthy adults, we should teach them how to live healthy and eat correctly. An important role is hereby played by systematic upbringing to healthy nourishment and eating. Particular emphasis is concentrated on the person and work of the teacher. Every teacher should eat healthy, follow the rules of a healthy lifestyle and be a positive example for the students. He should support positive attitudes of the students to healthy nourishment and be a very good source of information in this field.

The school authorities also have an important role in the influencing of healthy nourishment of the children. They can influence the structure of food in the dining hall and it can influence what sort of food and drinks will be sold to the children in the school cafeteria (if the school has one) and so on. Another possibility is the cooperation with parents. Here the school has some possibilities. It can provide the parents with lectures and discussions from experts on the topic “healthy nourishment”.

The goal of this study was to find out through direct measuring of the respondents their BMI values and levels of fat in their bodies and with the help of an questionnaire to discover their eating habits. Based on our measures, calculations and responses from the questionnaire we came to the conclusion that the eating habits of students got worse with the increasing age. The older students ate worse than the younger ones, which was indicated by higher level of fat and BMI values. Considering the gender, girls had better eating habits than the boys, but the level of fat was visible higher in their bodies compared to the boys. The biggest level of fat was spotted at the 10 year old boys, the girls had the highest level of fat at age 14. The girls in this age are in the pubescence, which is characterized by a rapid growth and laying on bigger fat reserves in the organism. Physiogenic factors can be therefore considered as one of the reasons why the girls had higher level of fat than boys. Another reason can be the overpassing of the nourishment norms, which leads to fatness.

In the end we would like to underline the importance of teaching children to healthy nourishment from the youngest age. If we will support the correct nourishment habits, lead our children to consummation of fruits and vegetables and care about their regular exercise, we will create conditions for healthier life in adulthood. It would be effective, if the cooperation of school and family would spread and expand also in this way. We want to emphasize, how important the activity of teachers and parents on the youth is, on their healthy physical and psychical development. Therefore the teachers should, with the active help from parents, prepare the most possible activities focused on healthy nourishment. This could be trips, sporting days, or discussions about healthy



nourishment. For realization of such activities there should always be financial resources and a willingness to cooperate should not be missing.

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## JE ŠKOLSKÁ MLÁDEŽ NA SLOVENSKU OBÉZNA?

**Súhrn:** V roku 2006 sme priamym meraním výšky, hmotnosti a obsahu tuku v tele respondentov zisťovali mieru obezity na vybraných základných školách na Slo-

vensku. Zo zistených údajov sme vypočítavali Body mass index (BMI), ktorý priamo určuje mieru obezity vybranej vzorky respondentov. Po porovnaní nami zistených BMI s odporúčanými hodnotami pre jednotlivé vekové kategórie môžeme skonštatovať, že u vekovej skupiny 12 – 15 rokov je počet respondentov s podváhou je vyšší ako počet respondentov s nadváhou, čo naznačuje, že väčším problémom pre túto vekovú skupinu sú rôzne formy chudnutia a diét než prejedanie sa. V kategórii respondentov s podváhou dominujú dievčatá, ktoré sú oveľa zraniteľnejšie „módnymi“ trendami než chlapci. Naopak najväčšia miera obezity sa prejavila u 10 ročných detí, v tejto kategórii dominoval výskyt obezity u chlapcov.

**Kľúčové slová:** obezita, žiaci, body mass index, obsah tuku