
Igor Lukić¹, Nevena Ranković², Dragica Ranković³

ASSESSMENT OF THE RISK FACTORS IN NUTRITION OF ADOLESCENTS CONTRIBUTING TO TYPE 2 DIABETES

Abstract: This paper presents the results of a study on dietary habits of adolescents. The high school or adolescent period is a time of great physical and psychological changes, which cause instability and oscillations in the mood and behavior of high school students. Results obtained by interviewing secondary school students about eating habits and results obtained using a standardized questionnaire for the risk of type 2 diabetes were analyzed using a reliable statistical tool IBM SPSS Statistical, which offers a range of reliable analyses and statistical tests. Previous research has shown that apart from the person who has type 2 diabetes there is another person who is not aware of the fact he/she has this disease. Discovery of pre-diabetes in new potential patients is necessary at the earliest age, when a number of factors affecting lifestyle, such as irregular nutrition and obesity, physical inactivity and stress become important factors for the development of this disease. Detection of the risk levels in potential patients is important for both the individual and public health and everyday clinical practice. After determining the degree of risk for a particular sample group, a set of measures for a particular adolescent population is recommended, so that the disease does not occur, or its onset is delayed to a later period of life.

Keywords: *nutrition, type 2 diabetes, adolescent, risk factors.*

Introduction

Type 2 diabetes is an insulin-independent type of diabetes when insulin secretion is reduced (1). It can occur at any age, but most often it affects obese people. There has been an increase in extreme obesity among adolescents in the past decade due to improper nutrition, insufficient physical activity and stress. (2) Along with

¹ MSc. Igor Lukić, PhD student, Faculty of Medicine, Kragujevac,

² MSc Nevena Ranković, Assistant at the Department of Computer Science, Faculty of Sciences, Novi Sad.

³ PhD Dragica Ranković, Medical School 'Dr Miša Pantić', Valjevo.

the increase in obesity, there is an increase in type 2 diabetes, heart diseases, stroke, diabetes retinopathy which affects the vision, kidney failure resulting in dialysis, poor circulation especially in lower extremities which can result in amputations and many other diseases (3), (4), and (5).

Type 2 diabetes, which used to be prevalent in the elderly, is showing exponential growth, even in children, especially in the period of puberty or adolescence (6), (7). In the last decade, there has been a significant rise in the number of extremely obese adolescents mainly caused by irregular nutrition, insufficient physical activity and stress. (8) In addition to the increase in obesity, type 2 diabetes also occurs (9), (10). Many studies in the country and abroad show that by reducing the intake of certain foods weight can be reduced as well as the risk of this disease (11), (5).

1. The sample group structure

A total of 318 secondary school students from the Kolubara district participated in the research that is presented in this paper. The sample group structure consisted of 145 (45.6%) male students and 173 (54.4%) female students. Classified by the grades the students currently attended the structure comprised 71 (22.3%) students of the first year, 89 (28.0%) students of the second year, 79 (24.8%) students of the third year and 79 (24.8%) students of the fourth year. The environment students came from included 113 (35.5) students from the urban environment, 114 (35.8%) students from the suburban area and the 91 (28.7) students from the rural environment. There were no statistically significant differences in the gender, grade, or the environment they came from (Table 1).

Table 1. Student sample structure

Student sample structure					
		Frequency %	Percent	CS	CS(p)
Gender	male	145	45.6	2.465	0.116
	female	173	54.4		
Grade	1st grade	71	22.3	2.050	0.562
	2nd grade	89	28.0		
	3rd grade	79	24.8		
	4th grade	79	24.8		
Environment	urban	113	35.5	3.489	0.175
	suburban	114	35.8		
	rural	91	28.7		

2. Research subject

In the first part of the research, the students completed an anonymous questionnaire, which showed their eating habits and the consumption of certain foods and beverages. The first part of the questionnaire had some basic inquiries about the gender, the grade they currently attended and the environment they came from as well as some questions to assess and give their opinion on the quality of their nutrition. In the second group of questions, the students evaluated the average consumption of these types of food: fish, meat, milk and dairy products, bread and pastry, fruits, vegetables, cakes, sweets, water, fruit juices, energy and soft drinks. The third group of questions was regarding health problems, hereditary diseases, diets, their opinions and attitude about diets, whether they always had breakfast and the way food affected health(6).

The second part of the research dealt with the risk factors contributing to the development of type 2 diabetes. In the study of 318 students, 111 students volunteered to fill in a standardized questionnaire online; 48 (43.2%) male students and 63 (56.7%) female students. Since most of the students did not know their body mass index (BMI) value, they first completed a short online questionnaire in order to calculate it precisely and obtain the exact value. The standardized questionnaire for the assessment of the risk factors contributing to type 2 diabetes contained 8 questions that students could answer. The option `gender` was added so that students` responses could be compared based on this criterion. The sum of the points obtained from the responses provided the data for the risk assessment of the onset of type 2 diabetes (7).

3. Methodology

The results obtained from the questionnaire were analyzed by using a reliable statistical tool IBM SPSS Statistical, which offers a range of reliable analyses and statistical tests. Students` responses were on the 5-point Likert scale: (1 means very bad, 2 means bad, 3 means satisfactory, 4 means good, 5 is very good), Kruskal Wallis`s H Test KW (H) and its significance KW (p) were used for this type of questions. To analyze the questions with Yes/Neutral/No answers, the Chi-Square test (CS) and its significance CS (p) were used. For the analysis of the obtained results in the online test for the risk of diabetes type 2 Mean and Ono-Way ANOVA Test for comparing the answers of male and female students were used. (12), (13), (14).

Research hypotheses:

H1: In adolescents aged 14 to 18, there were no statistically significant differences in consuming different foods based on the gender, age, or the environment they live in.

H2: Small percentage (less than 15%) of adolescents has a risk of diabetes type 2, based on the gender

4. Analysis of the obtained results

The students gave their opinion on their own nutrition in the first question. 12.7% of male students believed that they had proper diet, the vast majority of students, 69.0% had somewhat proper diet, while 18.3% thought they didn't have the proper diet. 12.5% of female students think they had the proper diet; the vast majority of 78.5% of students had somewhat proper diet, while 9.0% think that they did not have the proper diet. There were no statistically significant differences in the students' responses based on the gender (Table 2).

Table 2. Students' opinions about their nutrition by gender, grade and the environment they come from

Students' opinions about their nutrition by gender, grade and environment they come from						
		Yes %	Neutral %	No %	KW(H)	KW(p)
Gender	male	12.7	69.0	18.3	2.538	0.111
	female	12.5	78.5	9.0		
Grade	1 st grade	11.3	70.4	18.3	3.376	0.337
	2 nd grade	20.9	65.1	14.0		
	3 rd grade	9.0	82.0	9.0		
	4 th grade	8.0	80.0	12.0		
Environment	urban	13.7	75.2	11.1	0.810	0.667
	suburban	12.7	72.7	14.6		
	rural	10.0	74.4	14.6		

Among the first-grade students 11.3% thought they had proper nutrition, a large majority of 70.4% considered they had fairly proper nutrition while 18.3% thought they did not have proper nutrition. 20.9% of second-grade students thought that had proper nutrition, the vast majority of 65.1% had fairly proper nutrition while 14.0% thought they did not eat properly. Among the third-grade students 9.0% believed they had proper diet, the vast majority of 82.0% fairly proper, while 9.0% thought they did not have a proper diet. In the group of students of the fourth-grade 8.0% believed they had proper nutrition, the vast majority of 80.0% had fairly proper nutrition, while 12.0% thought they did not have proper nutrition. There were no statistically significant differences in students' responses based on gender (Table 2).

The data obtained based on the environment students come from showed that 13.7% of students who come from the urban environment thought they had proper nutrition, the vast majority of 75.2% had fairly proper nutrition, while 11.1% thought they did not have proper nutrition. About 12.7% of students from the suburban environment thought they had proper diet the majority of 72.7% had fairly proper diet, while 14.6% believed they did not have a proper diet. Around 10.0% of rural school students thought that they ate proper food, the vast majority of 74.4% believed they ate fairly proper food, while 14.6% thought that they did not eat well. There were no statistically significant differences in students' responses based on the gender (Table 2).

The second part of the questionnaire referred to students' habits in consuming certain groups of foods. By analyzing the responses of male (2.71) and female (2.66) students, there were no statistically significant differences in the consumption of fish and fish products. There were no statistically significant differences in the answers of the students of the first grade (2.71), the second grade (2.60), the third grade (2.75) and the fourth grade (2.68). In the answers from the students from the urban environment (2.54), from the suburban environment (2.93), and the rural environment (2.53) there were statistically significant differences (Table 3).

Table 3. Answers of students about consuming fish and fish products by gender, grade and the environment the students come from

How often do you eat fish and fish products?				
		Mean	KW(H)	KW(p)
Gender	male	2.71	0.252	0.615
	female	2.66		
Grade	1. grade	2.71	1.182	0.757
	2. grade	2.60		
	3. grade	2.75		
	4. grade	2.68		
Environment	urban	2.54	9.787	0.007
	suburban	2.93		
	rural	2.53		

By analyzing the answers of male students (3.24) and female students (2.87), there were statistically significant differences in the consumption of meat and meat products. In the answers of the students of the first grade (3.01), the second grade

(2.94), the third grade (3.16) and the fourth grade (3.04) there were no statistically significant differences. In the answers of students from the urban environment (3.08), there were no statistically significant differences from the suburban environment (2.99) and the rural environment (3.04) (Table 4).

Table 4. Answers of students about consuming meat and meat products by gender, grade, and the environment students come from

How much meat and meat products do you eat?				
		Mean	KW(H)	KW(p)
Gender	male	3.24	9.667	0.002
	female	2.87		
Grade	1. grade	3.01	2.410	0.492
	2. grade	2.94		
	3. grade	3.16		
	4. grade	3.04		
Environment	urban	3.08	0.211	0.900
	suburban	2.99		
	rural	3.04		

By analyzing the answers of male students (3.74) and female students (3.78), there were no statistically significant differences in the consumption of milk and dairy products. In the answers of students of the first grade (3.80), second grade (3.74), third grade (3.85) and fourth grade (3.67) there were no statistically significant differences. There were no statistically significant differences in the answers of students from the urban environment (3.79), from the suburban environment (3.68), and the rural environment (3.85) (Table 5).

Table 5. Answers of students about consuming milk and dairy products according to the gender, grade and the environment students come from

How much milk and dairy products do you drink and eat?				
		Mean	KW(H)	KW(p)
How much milk and dairy products do you drink and eat?				
		Mean	KW(H)	KW(p)

How much milk and dairy products do you drink and eat?				
		Mean	KW(H)	KW(p)
Grade	1. grade	3.80	1.892	0.595
	2. grade	3.74		
	3. grade	3.85		
	4. grade	3.67		
Environment	urban	3.79	1.576	0.455
	suburban	3.68		
	rural	3.85		

By analyzing the responses of male students (3.61) and female students (3.41), there were no statistically significant differences in the consumption of bread, dough and pastry. In the answers of students of the first grade (3.61), second grade (3.49), third grade (3.66) and fourth grade (3.56) there were no statistically significant differences. In the answers of students from the urban environment (3.58), from the suburban environment (3.62), and the rural environment (3.51) there were no statistically significant differences (Table 6).

Table 6. Answers of the students about consuming bread, dough and pastry according to the gender, grade and the environment students come from

How much do you eat bread, dough and pastries?				
		Mean	KW(H)	KW(p)
Gender	male	3.61	0.565	0.452
	female	3.41		
Grade	1. grade	3.61	1.114	0.767
	2. grade	3.49		
	3. grade	3.66		
	4. grade	3.56		
Environment	urban	3.58	0.672	0.715
	suburban	3.62		
	rural	3.51		

By analyzing the responses of male students (3.47) and female students (3.59), there were statistically significant differences in the consumption of fruit and vegetables. In the answers of students of the first grade (3.01), second grade (2.49), third grade (3.16) and fourth grade (3.04) there were no statistically significant differences. In the answers of students from the urban environment (3.08), from the suburban environment (2.99), and the rural environment (3.04) there were statistically significant differences (Table 7).

Table 7. Students' responses about the consumption of fruits and vegetables by gender, grade, and the environment they come from

How much fruit and vegetables do you eat?				
		Mean	KW(H)	KW(p)
Gender	male	3.47	0.655	0.418
	female	3.59		
Grade	1. grade	3.59	5.389	0.146
	2. grade	3.73		
	3. grade	3.45		
	4. grade	3.33		
Environment	urban	3.58	6.214	0.045
	suburban	3.62		
	rural	3.51		

By analyzing the responses of male students (4.07) and female students (3.94), there were no statistically significant differences in the consumption of cakes and sweets. In the answers of the students of the first grade (4.14), the second grade (3.96), the third grade (4.03) and the fourth grade (3.90) there were no statistically significant differences. There were no statistically significant differences in the answers of students from the urban environment (3.96), from the suburban environment (3.96), and the rural environment (3.92) (Table 8).

Table 8. Answers of students about consuming cakes and sweets by gender, grade, and environment they come from

How many cakes and sweets do you eat?				
		Mean	KW(H)	KW(p)
Gender	male	4.07	1.434	0.231
	female	3.94		
Grade	1. grade	4.14	2.154	0.541
	2. grade	3.96		
	3. grade	4.03		
	4. grade	3.90		
Environment	urban	3.96	1.125	0.570
	suburban	3.96		
	rural	3.92		

By analyzing the responses of male students (3.34) and female students (3.29) there were statistically significant differences in the consumption of water and fruit juices. In the answers of students of the first grade (3.10), second grade (3.41), third grade (3.29) and fourth grade (3.14) there were no statistically significant differences. In the answers of students from the urban environment (3.25), from the suburban environment (3.32), and the rural environment (3.40) there were no statistically significant differences (Table 9).

Table 9. Answers of students about consuming water and fruit juices by gender, grade and the environment they come from

How much water and fruit juices do you drink?				
		Mean	KW(H)	KW(p)
Gender	male	3.34	0.270	0.603
	female	3.29		
Grade	1. grade	3.10	3.272	0.352
	2. grade	3.41		
	3. grade	3.29		
	4. grade	3.14		
Environment	urban	3.25	0.685	0.710
	suburban	3.32		
	rural	3.40		

By analyzing the responses of male students (3.91) and female students (3.78) there were statistically significant differences in the consumption of energy and carbonated drinks. In the answers of the students of the first grade (4.06), the second grade (3.82), the third grade (3.88) and the fourth grade (3.62) there were no statistically significant differences. In the answers of students from the urban environment (3.83), from the suburban environment (3.78) and rural areas (3.92) there were no statistically significant differences (Table 10).

Table 10. Answers of students about consuming energy and carbonated drinks by gender, grade and the environment they come from

How much energy and carbonated drinks do you drink?				
		Mean	KW(H)	KW(p)
Gender	male	3.91	0.510	0.475
	female	3.78		
Grade	1. grade	4.06	4.467	0.215
	2. grade	3.82		
	3. grade	3.88		
	4. grade	3.62		
Environment	urban	3.83	0.047	0.977
	suburban	3.78		
	rural	3.92		

Figure 1. The bar chart below shows the percentage of the eating habits of students related to the different food groups

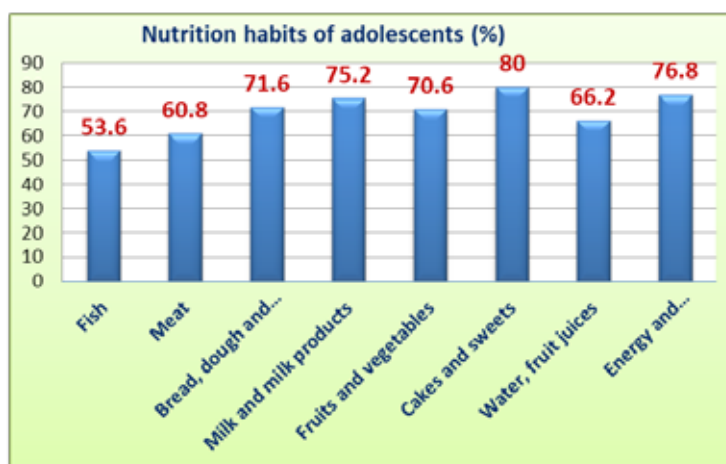


Figure 1. Eating habits of adolescents by groups of food tested

The third group of questions was related to eating habits. By analyzing the responses of male students (3.73) and female students (3.61), there were no statistically significant differences in the nutrition at home or outside of their home. In the answers of the students of the first grade (3.85), the second grade (3.69), the third grade (3.38) and the fourth grade (3.71) there were no statistically significant differences. In the answers of students from the urban environment (3.72), from the suburban environment (3.41), and the rural environment (3.94) there were statistically significant differences (Table 11).

Table 11. Answers of students about diet by gender, grade and the environment they come from

Do you eat more often at home or do you eat out?				
		Mean	KW(H)	KW(p)
Gender	male	3.73	0.536	0.215
	female	3.61		
Grade	1. grade	3.85	6.577	0.087
	2. grade	3.69		
	3. grade	3.38		
	4. grade	3.71		
Environment	urban	3.72	6.266	0.044
	suburban	3.41		
	rural	3.94		

By analyzing students' responses regarding the existence of health problems or hereditary diseases, there were no statistically significant differences among male students (1.59) and female students (1.68). In the answers of the students of the first grade (1.68), the second grade (1.73), the third grade (1.56) and the fourth grade (1.64) there were no statistically significant differences. In the answers of students from the urban environment (1.73), from the suburban environment (1.64) and the rural environment (1.52) there were no statistically significant differences (Table 12).

Table 12. Student's responses to health problems or hereditary diseases by gender, grade and the environment they come from

Do you have health problems or inherited diseases?				
		Mean	KW(H)	KW(p)
Gender	male	1.59	0.739	0.390
	female	1.68		
Grade	1. grade	1.73	0.453	0.929
	2. grade	1.56		
	3. grade	1.65		
	4. grade	1.64		

Environment	urban	1.73	0.090	0.956
	suburban	1.64		
	rural	1.52		

By analyzing students' responses regarding diet, among male students (1.62) and female students (2.04), there were statistically significant differences. In the answers of students of the first grade (2.04), second grade (1.80), third grade (1.72) and fourth grade (1.87) there were no statistically significant differences. There were no statistically significant differences in the answers of students from the urban environment (1.87), from the suburban environment (1.87), and the rural environment (1.77) (Table 13).

Table 13. Answers of students about diet by gender, grade and the environment they come from

Have you ever been on a diet?				
		Mean	KW(H)	KW(p)
Gender	male	1.62	10.436	0.001
	female	2.04		
Grade	1. grade	2.04	3.713	0.294
	2. grade	1.80		
	3. grade	1.84		
	4. grade	1.72		
Environment	urban	1.87	0.771	0.680
	suburban	1.87		
	rural	1.77		

By analyzing students' responses regarding the effect of diets on health, there were no statistically significant differences between male students (2.54) and female students (2.55). In the answers of students of the first grade (2.56), second grade (2.61), third grade (2.42) and fourth grade (2.58) there were no statistically significant differences. In the answers of students from the urban environment (2.53), there were no statistically significant differences from the suburban environment (2.48) and the rural environment (2.67) (Table 14).

Table 14. Answers of students about diet by gender, grade and environment they come from

Do you think that the diet affects health?				
		Mean	KW(H)	KW(p)
Gender	male	2.54	0.004	0.949
	female	2.55		
Grade	1. grade	2.56	4.467	0.215
	2. grade	2.61		
	3. grade	2.42		
	4. grade	2.58		
Environment	urban	2.53	4.916	0.086
	suburban	2.48		
	rural	2.67		

By analyzing the student's answer to the question of whether proper diet can alleviate or prevent some diseases, such as diabetes, cholesterol, and others, there were statistically significant differences between male students (4.29) and female students (3.95). Male students were more aware that healthy food can help prevent certain diseases. There were statistically significant differences in the answers of the students of the first grade (4.46), the second grade (4.10), the third grade (3.77) and the fourth grade (4.12). In the answers of students from the urban environment (4.10), from the suburban environment (4.05), and the rural environment (4.20) there were no statistically significant differences (Table 15).

Table 15. Answers of students about diet by gender, grade and the environment they come from

Do you think that proper nutrition can alleviate or prevent some diseases such as: diabetes, cholesterol, and others?				
		Mean	KW(H)	KW(p)
Gender	male	4.29	6.985	0.008
	female	3.95		
Grade	1. grade	4.46	11.686	0.009
	2. grade	4.10		
	3. grade	3.77		
	4. grade	4.12		

Environment	urban	4.10	0.396	0.821
	suburban	4.05		
	rural	4.20		

By analyzing students' responses to having breakfast regularly, there were statistically significant differences between male (4.10) and female students (3.80), meaning that male students were more aware that healthy food can prevent certain diseases. There were statistically significant differences in the answers of the students of the first grade (4.46), the second grade (4.10), the third grade (3.77) and the fourth grade (4.12). In the answers of students from the urban environment (4.10), from the suburban environment (4.05), and the rural environment (4.20) there were no statistically significant differences (Table 16).

Table 16. Answers of students about diet by gender, grade and the environment they come from

Do you have breakfast regularly?				
		Mean	KW(H)	KW(p)
Gender	male	3.99	6.771	0.009
	female	3.63		
Grade	1. grade	3.74	0.163	0.983
	2. grade	3.82		
	3. grade	3.80		
	4. grade	3.81		
Environment	urban	3.93	3.064	0.216
	suburban	3.82		
	rural	3.60		

The second part of the research was done in order to examine the risk of developing type 2 diabetes, using a standardized questionnaire, which students filled out voluntarily. A total of 111 students, 48 (43.2%) male, and 63 (56.7%) female completed the online questionnaire and there were no statistically significant differences in the ratio of male and female respondents in the sample group related to the risk of diabetes type 2. The risk results were as following: 79.2% of male students had the low risk of developing type 2 diabetes, 14.5% had medium low level, 2.1% of students had a moderate risk level and 4.2% were at high risk for type 2 diabetes, while there were no students at very high-risk degree. In the low-risk group were 76.2 %

of female students, 15.9% were medium low, 3.2% of students had a moderate risk level, and 4.7% had a high risk of type 2 diabetes, while there were no students at a very high risk (Table 17).

Table 17. The results of examining the student's risk of developing type 2 diabetes by gender

Gender	Percentage	Risk	KW(H)	KW(p)
male (48) (43.2%)	79.2	Low	2.027	0.155
	14.5	Medium low		
	2.1	Moderate		
	4.2	High		
	0.0	Very high		
female (63) (56.7%)	76.2	Low		
	15.9	Medium low		
	3.2	Moderate		
	4.7	High		
	0.0	Very high		

Measured values of BMI greater than 30 were found in 6.2% of male students and 7.9% female students; values between 25 and 30 were found in 14.6% of male students and 22.2% female, and with less than 25, the vast majority of male students 79.2% and 69.9% of female students had these results. Measured values of waist circumference greater than 102 were found in 6.2% of male students, values between 94 and 102 were found in 14.6% of students, and the vast majority of 79.2% had less than 94. Measured values of the waist circumference greater than 88 were found in 7.9% of female students; values between 80 and 88 were found in 7.9% female students, and 79.4% of female students had the value smaller than 80. There were no statistically significant differences in BMI values and measured values of waist circumference for male and female students (Table 18).

Table 18. Percentage of students according to BMI and waist circumference by gender

	BMI (%)	Values		Waist size (%)	Values	
male	6.2	> 30	3	6.2	> 102	4
	14.6	25 – 30	1	14.6	94 – 102	3
	79.2	< 25	0	79.2	< 94	0
female	7.9	> 30	3	7.9	> 88	4
	22.2	25 – 30	1	12.7	80 – 88	3
	69.9	< 25	0	79.4	< 80	0
	KW(H)	KW(p)		KW(H)	KW(p)	
	0.318	0.573		0.000	0.983	

The percentage of students who used antihypertensive drugs was 4.2% for males and 3.2% for females. 95.8% and 96.8% accounted for the male and female students respectively who did not use any antihypertensive drugs. The percentage of students who had an increased level of sugar was 4.2% for male students and 4.8% for female students. 95.8% of male students and 95.2% of female students did not have an increased level of sugar. There were no statistically significant differences in the percentage of students using antihypertensive drugs or in the percentage of students who had the increased level of sugar based on gender (Table 19).

Table 19. Percentage of students who use antihypertensive drugs and students who measured the sugar level by gender

	Antihypertensive (%)	Values		Sugar (%)	Values	
		Yes	No		Yes	No
male	4.2	Yes	2	4.2	Yes	5
	95.8	No	0	95.8	No	0
female	3.2	Yes	2	4.8	Yes	5
	96.8	No	0	95.2	No	0
	KW(H)	KW(p)		KW(H)	KW(p)	
	0.022	0.881		0.076	0.782	

The greatest impact of hereditary risk factors for the development of type 2 diabetes in male students from the immediate family was 16.7% and for the female students 7.9%. The impact of hereditary factors from members of the extended family in male students was 18.8%, and 12.7% in female students. 64.5% of male students and 79.4% of female students were without any influence from hereditary factors (Table 20).

Table 20. Percentage of students with inherited risks of type 2 diabetes by gender

	Hereditary factors (%)	Points		KW(H)	KW(p)
		Yes	No		
male	16.7	Yes (close family)	5	3.173	0.075
	18.8	Yes (extended family)	3		
	64.5	No	0		
female	7.9	Yes (close family)	5	3.173	0.075
	12.7	Yes (extended family)	3		
	79.4	No	0		

Conclusion

Analyzing the eating habits of adolescents, it can be concluded that they do not differ too much, depending on the gender of the students. (15) Fewer gender differences exist in the habits of consuming certain foods. From the previous analysis, it can be concluded that male students consume more meat by about 7.5% more when compared to female students. Also, female students go on a diet more often, by 8.3% more than male students. Male students have breakfast regularly by 7.2% more than female students. Based on the environment they come from the results showed that students from the suburban environment consumed fish by 8% more and fruits and vegetables by 2.5% more than the students from the urban and rural areas. The largest percentage of 10% of rural students consumed food at home comparing to students in urban and suburban environments. Attitude towards the impact of proper nutrition on the developing of chronic non-infective diseases differed in both the gender and the environment they come from. (16), (17). Our assumption is not sustainable, and we accept the alternative hypothesis of the first hypothesis H1.

Generally speaking, the eating habits of adolescents are not good since they consume the following foods: cakes and sweets 80%, energy and carbonated drinks 76.8%, bread and pastry bread 71.6% (**Figure 1**). The results of the standardized questionnaire show that 4.2% of male students and 4.7% of female students are at a high risk for developing of type 2 diabetes (18). 2.1% of male students and 3.2% of female students are at moderate risk level. 14.5% of male students and 15.9% of female students have a medium low risk (**Table 15**).

Taking into account the eating habits and the current results of risk assessment for developing of diabetes in students aged 14 to 18, preventive measures are necessary, (19) in order to reduce and lower the risk as much as possible (14). We can confirm that the implied assumption that the risk of developing type 2 diabetes in both males and females is lower than 15% and that the H2 hypothesis can be accepted.

It is essential to suggest to students who were at a high and moderate risk to do the OGTT test in order to resolve or confirm the above-mentioned concerns about diabetes. (20), (21). All students should learn about the consequences of unhealthy diet and the diseases that can occur as a result.

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