

## CHILDREN'S NUTRITION

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### Abstract

Proper development of the nervous, immune, bone-joint system and the development of the organism as a whole largely depend on adequate nutrition during childhood. Malnutrition and disorders caused by vitamin and mineral deficiency is one of the most common causes of death in children under 5 years of age in the world. Malnutrition in the first years of life is associated with delayed cognitive development, lower intelligence quotient, lower educational attainment and behavioral problems later in life. The trend of an increase in the frequency of type 2 diabetes at a younger age is considered to be a consequence of the increase in the frequency of overnutrition and obesity in children. The goal of the research is to determine the eating habits of students age 9 and 14 years old.

The study was conducted during 2019 at the Elementary School "Mladen Stojanović" Gradiška, Republika Srpska (Bosnia and Herzegovina). The anonymous survey was conducted using a purpose-built printed survey form, which consisted of 20 questions covering the respondents' demographic data and dietary habits. The obtained results were processed with descriptive statistics, including percentage, mode, median and  $\chi^2$  test methods. 25 fourth grade and 25 ninth grade students participated on a voluntary basis, of which 28 were female and 22 were male.

From the research, it can be noticed that a larger number of IV grade students are directed towards proper nutrition and fruit and vegetable consumption compared to IX grade students who are directed towards inappropriate nutrition. Research has shown that both ages have in common the daily use of refined sugars and unhealthy fats. Based on the data obtained from the research, we can conclude that parents play a big role in the formation of eating habits, especially at a younger age of the child.

During the period of growing up, under the influence of various factors, individuals neglect healthy lifestyle habits. Continuous education of all age groups about the importance of healthy eating and lifestyle habits is the basis for solving the very current problems of obesity and diseases associated with an inadequate diet.

**Key words:** Children aged 9 - 14 years, Eating habits, Differences in nutrition, Malnutrition, Obesity.

### 1. Introduction

The concept of proper nutrition implies the satisfaction of the body's needs for daily energy intake and a sufficient amount of food and protective substances that are necessary to maintain the body's functions and health. During growth and development, there is an increased need for vitamins and minerals, especially for calcium, iron, zinc, vitamin D, B complex vitamins and vitamin C, and insufficient protein needs affect muscle development and energy levels. Proper nutrition and proper eating habits during the growing up period are extremely important for the appropriate physical, psychosocial and cognitive growth and development of the child [1].

Eating habits are formed in early childhood when children learn from the example of adults. Parents must know the nutritional needs of the child at school age and provide him with a diet that meets the required intake of nutrients. Apart from parents, children's eating habits are influenced by everyone in their environment, especially educational institutions. It is important to adopt a healthy diet from the youngest days because healthy eating habits remain for a lifetime and are the best prevention of diseases [2]. A sedentary lifestyle causes an increase in excessive body

weight, numerous chronic degenerative diseases, and postural disorders, which represent one of the biggest public health problems in the world.

The number of obese children and adolescents in the world has increased tenfold in the last forty years, and the growth is accelerating in low- and middle-income countries, especially in Asia (from 11 million to 124 million). This means that almost 8% of boys and almost 6% of girls in the world were obese in 2016 compared to 1% for both sexes in 1975. Changes in the way of life and functioning of modern families, as well as the positive secular increase in body mass, height and body mass index (BMI) have favored the increase in the frequency of obesity in children and adolescents [3]. Year after year, inadequate nutrition begins at an earlier and earlier age, regardless of whether it is a developed country or a developing country. Such health behavior of the population worries society as a whole. Primarily because of the direct impact on the health of the population, and then because of the irreversible changes to health that such behavior causes.

The aim of the work is to examine the eating habits of the students who participated in the research, as well as whether the period of growing up affects the change in eating habits. Research results show that as we grow older, we neglect a healthy lifestyle, primarily including nutrition, and then all other aspects that include health care. Adolescents have a certain degree of knowledge about proper nutrition, but only a small percentage adhere to it.

## 2. Materials and Methods

The study was conducted in 2020, using an anonymous questionnaire created by the author for research purposes. 50 students of the Elementary school "Mladen Stojanović" Gradiška, Republika Srpska, Bosnia and Herzegovina participated in the research. The respondents were divided into two groups. The first group consisted of 25 respondents who attended the 4th grade (13 females and 12 males), and the second group consisted of the same number of respondents who attended the 9th grade (15 females and 10 males).

The questionnaire contained 20 questions, which were adapted to the age of the sample. The questions included the respondents' eating habits, distribution of meals on school days and weekends, consumption of fruits and vegetables, fast food, sweets, carbonated drinks, dairy products, as well as information on how they usually eat during school days and whether they feel hungry during classes. The obtained results were processed with descriptive statistics, including percentage, mode, median and  $\chi^2$  test methods.

Demographic statistics, which include the percentage method, were used to process the collected data.

## 3. Results and Discussion

### 3.1 Results

From the results shown in Figure 1, we can see that 40% of students in the fourth grade have three meals a day with snacks, and 28% have four meals.

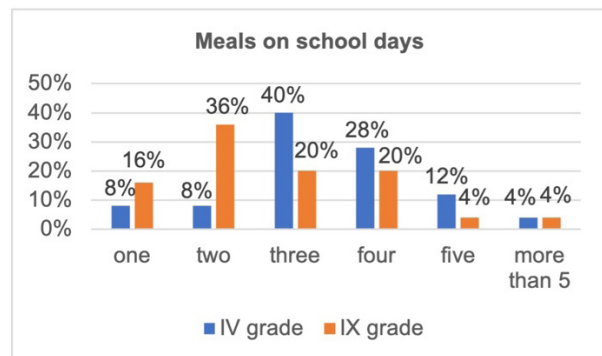


Figure 1. Daily meals during school days

The answers offered for one and two meals with snacks on a daily basis were answered equally, that is, 8% of them. Unfortunately, only 12% answered that they had five meals, and 4% for more than 5 meals. The highest percentage of 9th graders declared that they consume two meals during school days (36%), and 16% of them declared that they consume only one meal per day. Then a smaller percentage (20%) rounded equally for three and four meals, 16% of them just one meal. For the answers offered, five and more than five meals were answered equally, that is, 4% of them.

To the question "How much?" Do you have daily meals on weekends (main meals and snacks)?" the answers were approximately the same (Figure 2).

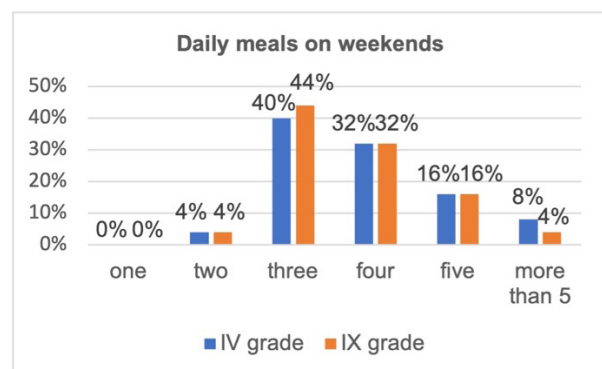
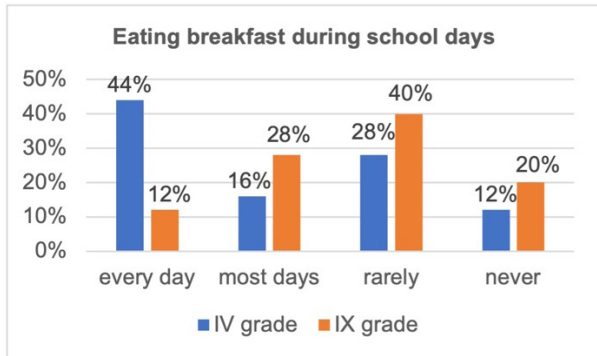


Figure 2. Daily meals on weekend days

IV grade students kept the same percentage of three meals as during school days (40%), while IX grade students, 44% of them, drastically changed their answer compared to school days. Both groups of

respondents gave the same answers to the following answers, namely two meals were answered by 4%, four meals by 32%, and five meals by 16%. 8% of the IV graders and 4% of the IX graders answered the last offered answer of more than 5 meals.

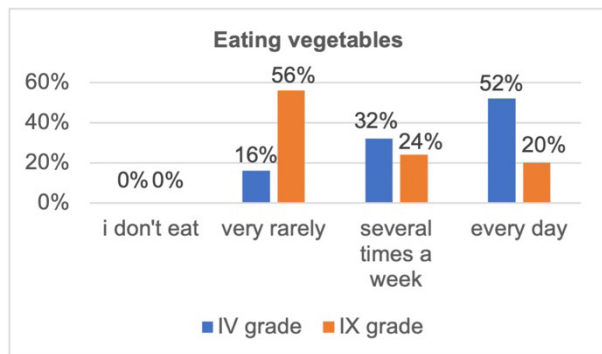
When asked if the respondents have a habit of eating breakfast during the school week (Figure 3), students of the fourth grade declared that 44% of them eat breakfast every day.



**Figure 3. The habit of eating breakfast during the school week**

A small number of 9th grade students declared that they eat breakfast every morning on school days, i.e. 12% of them. In the 4th grade, 16% of them and 28% of the 9th grade respondents stated that they eat breakfast most days of the school week, but not every day. The offered answer "rarely" was answered in a higher percentage by students of the fourth grade, 28% of them, and 40% of the respondents of the ninth grade. 12% of fourth grade students and 20% of ninth grade students said that they never eat breakfast during the school week.

In Figure 4, the results showed that a large percentage of IX graders rarely consume vegetables, 56% of them. Then 24% of them declared that they consume several times a week, and 20% of them every day.

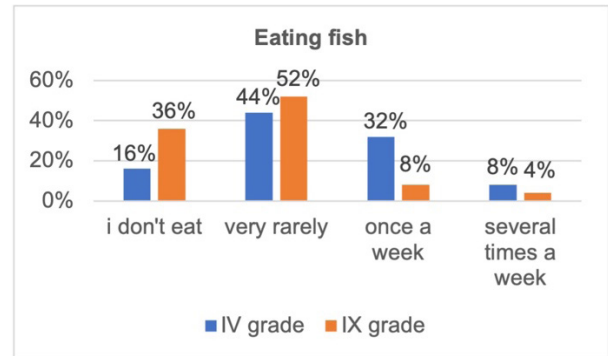


**Figure 4. How often the respondents consume vegetables**

There was no answer to the offered answer that he does not consume vegetables. Fourth grade students

showed a better interest in vegetables, 52% of them answered that they consume vegetables every day, followed by 32% several times a week and 16% very rarely. There was no response to the offered answer that they do not consume vegetables.

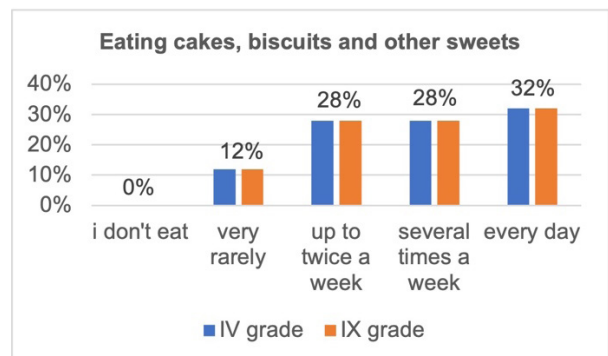
From Figure 5, we can see that both age groups very rarely consume fish, i.e. 44% of class IV and 52% of class IX.



**Figure 5. How often respondents consume fish**

16% of 4th graders and 36% of 9th graders answered the offered answer that they do not consume fish. 32% of 4th graders responded to the offered answer that they consume once a week, and 9th graders responded in a much smaller percentage, only 8% of them. To the last answer offered, that they consume fish several times a week, the answers were approximately the same for both ages, 8% of IV grade students and 4% of IX grade students.

Figure 6 shows the consumption of cakes, biscuits and other sweets on a weekly basis.

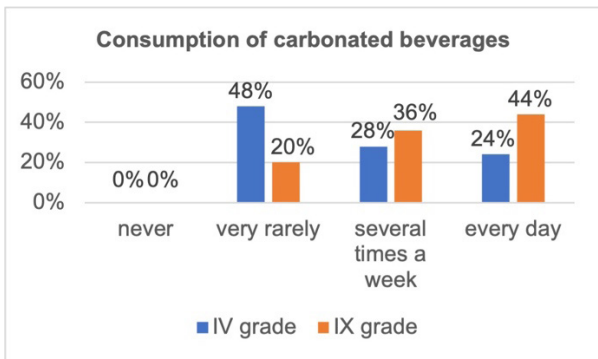


**Figure 6. How often respondents consume cakes, biscuits and other sweets**

The results showed that students of the IV and IX grades have the same attitude towards the mentioned type of food products. 32% of both age groups responded to the question of whether they consume cakes, biscuits or other sweets every day, and 28% of both age groups responded to the two questions "several times a week" and "up to twice a week". Very

rarely, only 12% consume the mentioned foods, and there was no response to the offered answer that they do not consume the mentioned type of foods.

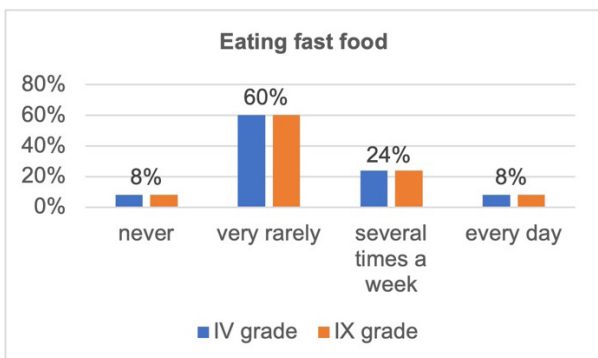
From Figure 7, it can be seen that carbonated juices are widely used by both ages. Although a large percentage (48%) of IV graders answered the offered answer “very rarely”, the results of the remaining offered answers are not negligible.



**Figure 7. How often respondents consume carbonated beverages**

Regarding the offered answers that they consume several times a week (28%) and every day (24%), students of the fourth grade gave almost the same answer. None of the respondents answered the offered answer “never”. The age group IX proved to be a higher consumer of carbonated beverages. The results of the offered answers are as follows: 44% of respondents consume carbonated beverages every day, 36% of respondents more than once a week, 20% of respondents very rarely and there was no answer to the offered answer “never”.

From Figure 8, we can notice one positive characteristic, namely that both age groups rarely use fast food, that is, 60% of them.

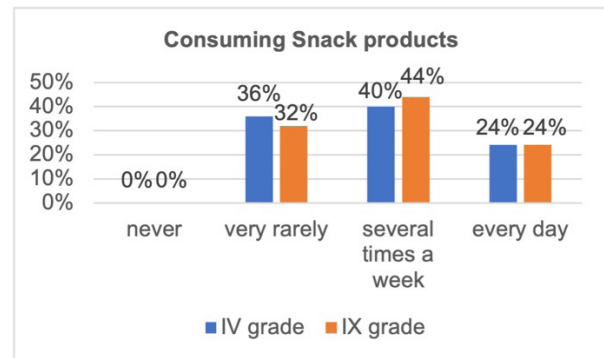


**Figure 8. How often respondents consume fast food**

Also, on this issue, the opinions are the same for both ages, i.e. 24% of them consume fast food several times

a week, every day and never 8% for both answers offered.

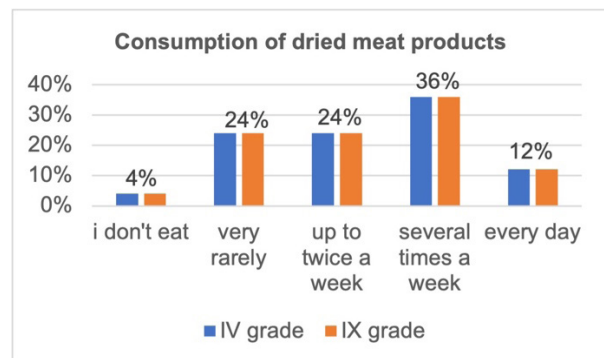
The results showed that the use of snack products is very common among both ages. There was no answer to the offered answer that they never consume the specified type of product (Figure 9).



**Figure 9. How often respondents consume snack products**

It is very rarely consumed by 36% of IV graders and 32% of IX graders. 40% of IV graders and 44% of IX graders consume several times a week. The same percentage is consumed every day for both ages, i.e. 24% of them.

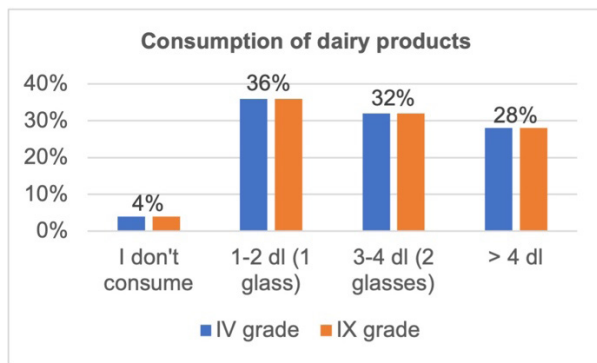
When asked about the consumption of dried meat products, the results were the same for both ages (Figure 10).



**Figure 10. How often respondents consume dried meat products**

The following responses were given: 4% of respondents do not consume the specified type of product, 24% very rarely, 24% up to twice a week, 36% several times a week, and 12% of respondents consume it every day.

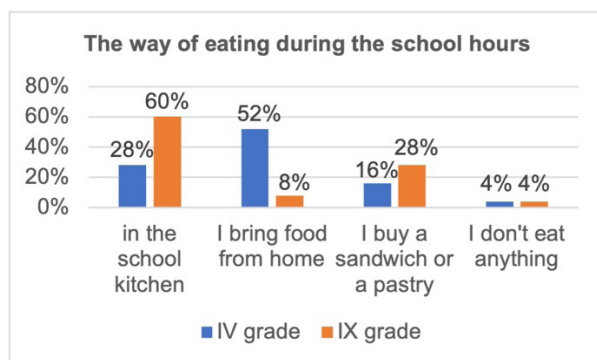
The answers to the question about the consumption of dairy products were also the same for both ages (Figure 11).



**Figure 11. How often respondents consume dairy products**

The results of the answers offered are as follows: 1 - 2 dL or 2 glasses are consumed by 36% of respondents, 2 glasses (3 - 4 dL) are consumed by 32% of respondents, more than 4 dl by 28% of respondents and 4% do not consume dairy products.

When asked how the respondents eat during school hours (Figure 12), a small and equal percentage for both ages answered that they do not eat anything, that is, 4% of them.

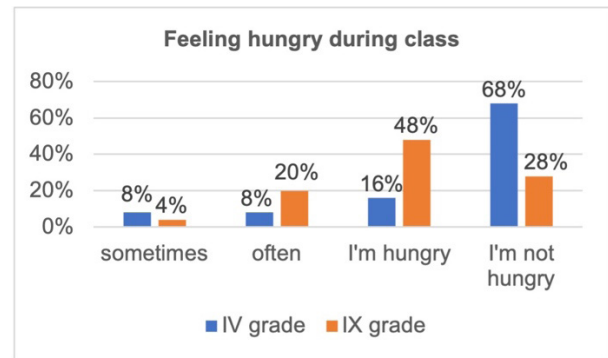


**Figure 12. How the respondents eat during school hours**

16% of IV graders answered the offer to buy a sandwich or pastry, and 16% of IX graders answered. 52% of 4th graders and 8% of 9th graders declared that they bring food from home. 28% of 4th graders and 60% of 9th graders eat in the school kitchen.

The question "Are you hungry during class?" (Figure 13) showed different results.

68% of IV graders and 28% of IX graders responded to the offered answer that the respondent was not hungry during class. 16% of 4th graders and 48% of 9th graders responded that they were hungry during class. 8% of IV grade students and 20% of IX grade students answered "often". A very small percentage answered the offered answer "sometimes", 8% of the age group IV and 4% of the age group IX grade.



**Figure 13. Are the respondents hungry during class?**

The last question included the possibility of different answers, that is, for respondents to write what they ate at school on the day of the survey. Respondents who ate in the school kitchen to write what they had on the menu that day. Most of the answers were related to dough products, such as pastries, puff pastry, sandwiches, doughnuts. Some respondents combined dough products with yogurt or chocolate milk. Some answered that they ate fries and a burger, but there were also those who answered that they ate a boiled egg with fresh cheese.

### 3.2 Discussion

Observing the obtained results, we can notice that the research showed patterns of certain bad eating habits among the respondents, as well as a certain degree of lack of education about the correct arrangement of meals and the impact on the state of the body. According to numerous guidelines, it is recommended that children up to the age of ten have meals every few hours in order to ensure the necessary amount of glucose necessary for the brain and nervous system [4]. A child's diet should consist of three main meals - breakfast, lunch, dinner - and two smaller snacks [5]. Adolescence is the period when various patterns of behavior are formed, including health behavior, independent self-care, as well as the development of a young person's lifestyle, and thus eating habits.

The importance of educating the parents and guardians of the respondents about eating habits should be put first. At a younger age, children spend more time with their parents. The methodical approach of parents should result in educated children and adolescents capable of making conscientious decisions about personal nutrition. According to the World Health Organization, the recommended daily energy intake for the age of 15 for males is 2,200 - 2,600 kcal/day, and for females 1,800 - 2,000 kcal/day, depending on the level of activity [6]. From the presented results for the age group IX, we can conclude that 36% of respondents who stated that they have two meals with snacks do not have adequate nutritional and energy intake. At

such an age, they usually consume two meals that are too high in calories and poor in nutrition. Age IV class according to the results most often consume three meals with snacks, therefore according to the mentioned guidelines it is an inadequate intake of food, due to an inadequate amount of glucose and other substances that are needed at the given age.

From the result shown in Figure 2, we can conclude that regardless of age, respondents have a healthier attitude towards the number of meals during the weekend compared to school days. The school meal is not only about satisfying energy-nutritional needs, but also an important educational and social event that influences the adoption of hygienic hand-washing habits, proper eating habits, as well as the rules of good behavior at the table. Research shows that shared meals in schools that mimic traditional family meals, which are becoming less frequent and mostly reserved for weekends. Shared meals also improve interpersonal relationships and create feelings of well-being, while at the same time reducing the risk of eating disorders (obesity, anorexia, bulimia, etc.) [7].

We can notice that in the results so far, young people do not have knowledge about the benefits of breakfast and the body's needs for nutritional ingredients that are necessary to meet the body's daily needs. IX graders in 40% of cases rarely eat breakfast, and only 12% every day, compared to IV graders who have breakfast every day in a large percentage (44%). Skipping breakfast often causes morning sickness and interferes with learning and memory processes. Breakfast, especially one rich in cereals, is a good start to the day, and contributes to a better mood, attention and achieving better school results. People who skip breakfast due to a strong feeling of hunger that occurs during the rest of the day more often consume food rich in fats and simple sugars, but poor in fiber and nutrients [8]. According to research carried out in 2019 in an elementary school in Popovača, where a total of 27% of children eat breakfast before school, while according to research from Zagreb County, the habit of eating breakfast is present to a greater extent in the population of fifth-grade students, where 81.6 % eat breakfast regularly, while only 49% of students in the eighth grade eat breakfast [9]. The following trends have been observed in the largest number of studies: the number of adolescents who skip breakfast is increasing year by year, and it is especially pronounced among the female population. In addition to skipping breakfast, a decreasing number of meals in one day and an insufficient intake of fresh vegetables and fruits were observed. A Canadian survey of over twenty thousand children and adolescents found that 70% of students from fifth to eighth grade and 51% of students from ninth to twelfth grade eat breakfast every day.

Research in the Netherlands and Portugal shows that almost 90% of children aged 11 and 70% of children aged 15 eat breakfast regularly. The percentage of children and young people who regularly eat breakfast in Slovenia, Greece, and Malta is less than 40% [10].

The research proves that the consumption of vegetables is very different among the ages included in the study. Based on these results, we can conclude that parents play a big role in the nutrition of the fourth graders. Also, the results prove to us that with the period of growing up and independence of a person, in most cases, the guidelines for a healthy way of eating disappear. According to the National Guidelines for Children, fruits and vegetables should be consumed several times a day, more precisely with each meal. Fruits and vegetables should be provided to children every day, for example before physical activity or between lunch and dinner, in order to ensure a sufficient daily intake of vitamins and minerals [11].

Regarding the consumption of fish, the largest number of respondents declared that they consume it very rarely (44% of the IV grade and 52% of the IX grade), which is another devastating data. 32% of age IV and 8% of age IX consume once a week. The importance of regular fish nutrition is visible through the nutrients that fish contains, so that it provides all essential fatty acids, meets the body's needs for vitamins A and D, minerals, iron, iodine and zinc. The habit of consuming fish can be related to the place where the respondent grew up and the availability of fresh fish in that area, and the price range of blue fish is large and available to the entire population [12]. We can conclude that the 9th graders, regardless of the fact that they are at the age when they can independently choose food for their personal nutrition, do not have the habit of consuming fish.

In the research, we received another very devastating piece of information. Eating cakes, biscuits and other sweets are almost everyday foods that our respondents (28%) consume, and the highest percentage of them, 32% in both groups, consume them every day. Eating snacks products yielded approximately the same results between the two groups of respondents. The largest percentage offered the answer "several times a week", that is, 40% of the IV graders and 44% of the IX graders. According to the research conducted in Rijeka in 2020, where 826 pre-school respondents participated, it also showed devastating data, where as many as 43.7% of children consume snacks and sweets every day, 38.3% take these foods three to four times a week children, and once a week 13% of children. These data show devastating results because numerous studies indicate that this type of food certainly has a decisive influence on the occurrence of children's

caries, diabetes and obesity. Data from Japan suggest that sugar intake should be below 3% or at most 5% of total energy to prevent dental caries. In their research, Henriksen and Kolset state that the consumption of sugar in drinks and sweets can lead to an increased amount of fat in the body [13].

We got positive results on the question about the consumption of fast food, where 60% of respondents declared that they very rarely consume fast food. Research in Saudi Arabia on a sample aged 11 - 16 years proved that increased consumption of fast food affects obesity in girls, but not in boys, which was explained by a higher proportion of the female population's sedentary lifestyle [14]. Children and adolescents' school-age children spend half of their day at school and in the school grounds, therefore they are exposed to the sun and the sun establishments that sell food, and are located near the school. Nutritional the environment of the school that adolescents attend has a significant impact on their nutritional intake and plays a role in creating their eating habits. The food environment of the school considered a key factor that affects the prevention of obesity, but also the increase in body weight in children and adolescents. Adolescents often leave the school building during recess in order to buy food and drink. Therefore, adolescents who attend school will which is located in a location that is densely populated with fast food restaurants and other shops that sell food, and consume such food more often [15].

When asked about the consumption of dried meat products, most respondents circled that they consume several times a week, 36% for both ages, while 24% of respondents for both groups consume up to twice a week. According to research conducted in three lower grades of primary schools in Lika - Senj County, more than half of the students consume dried meat products 2-3 times a week or daily. Increased intake of salt in the body is a risk factor for the development of cardiovascular diseases and the appearance of hypertension already in the adolescent period, as well as the occurrence of other chronic non-communicable diseases. Cured meat products are also an important source of salt, and their consumption is significant within the recommended limits [16].

The answers to questions about the consumption of dairy products were the same for both groups. The majority of respondents answered that they consume 1 cup of milk a day, while 3 or more cups were rounded up by 28% of respondents. According to the US Department of Agriculture (USDA), children from 9 to 18 years of age and adults are recommended to consume three servings of milk and milk products per day, which corresponds to three cups of milk [17]. The consumption of milk and milk products is very

important for children of this age, in the period of growth, as a source of calcium needed for the growth and development of their bones. Therefore, it is recommended that children drink a cup of milk, yogurt before breakfast. The result of research conducted in one primary school in Zagreb County show that more than 50% of children consume milk in the morning (32.6% milk and 20.9% milk drink). Milk drinks should definitely be consumed in moderation, given that they are often rich in simple sugars and provide empty calories [4].

When asked how the respondents eat during classes, the answers were different for the two examined groups. Also, in these answers, we can notice the influence of parents on the age of 4th graders and the way they eat during school hours. The mentioned age most often brings food from home (52%) and in this way it is possible to direct the diet in the appropriate direction. In order to achieve that direction, it is very important that parents are also educated about proper nutrition and the distribution of meals. The age group of IX grade declared in the highest percentage (60%) that they eat in the school kitchen, which should respect the norms for the production of food for the age they serve. According to the research that covered the age of 1 to 4 grades in 9 elementary schools in Pula, students most often consume sandwiches that they prepare at home, while 38.2% eat in the school kitchen and consume a variety of food, depending on the daily menu, and the least number of students consume other types of food (12.2%) which includes fruit, various croissants, pastries, as well as healthy food [18].

#### 4. Conclusions

- Based on all the research results, we can conclude that there is a difference between the nutrition of the IV and IX grades. Respondents are connected by equal or approximately equal answers about the consumption of sweets, snacks and dried meat products, and in a positive sense, not consuming fast food and consuming an adequate amount of milk.
- From the research, we can conclude that 9th graders pay less attention to properly distributed meals, the importance of fatty acids, as well as the consequences of frequent consumption of sweets and carbonated drinks. The great advantage of the age group IV is that a large percentage of breakfast is brought from home, in addition to the fact that parents are informed about the content of the child's breakfast, according to the results of the research, the mentioned age group is not hungry during classes, therefore the child will not consume fast food and less useful foods that are found in the environment schools.
- It is of great importance if parents are educated about healthy eating and adhere to it, because parents are

role models for children. Therefore, if parents adhere to the food pyramid and regular physical activity, children will inherit such a pattern of behavior in preschool age and most often will keep such a pattern of behavior throughout their life and pass it on to the next generation.

- Education of children and adolescents in schools about the importance of healthy nutrition is a big step for children and young people who do not follow the guidelines at home. Very often, children and young people are influenced by other people who are their age and from their environment, and the food industry and marketing in the individual's environment also play an equal role. If the majority of people in the class adhere to the guidelines of a healthy lifestyle, very often there will be a change in thinking and understanding of the importance of food in maintaining health and vitality. The importance of education on guidelines for improving health is of great importance, because such a step is a prerequisite for good health of the country's population, its working abilities, longer life and demographic reproduction, which favorably reflects on the overall economic and social development.

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