RESEARCH ARTICLE

"A matter of health": Evaluation of health habits in pupils in Primary School in Serbia

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ABSTRACT

We interviewed more than 400 primary school pupils from 5th to the 8th grade (aged 11 to 14 years) from the primary school in Belgrade (Serbia) about their habits concerning nutrition, beverage consumption, and time spend in front of a computer, tablet, playing games on consoles, or using a mobile phone. According to the study, a high percentage of students showed a well-established habit of eating breakfast. Also, the overall water consumption prevailed in all grades, since the school ensures students access to safe and free drinking water, as a healthy alternative to consumption of sugar-sweetened beverages. However, we found increasing food consumption from bakery and consumption of carbonated drinks both in boys and girls from senior grades (7th and 8th). Also, they spent considerably more time with a computer, tablet, or mobile phone than the pupils from lower grades. About one-third of all surveyed students have been watching television or using a computer more than 3 hours during the day. We found a significant increase of BMI, as an indicator of the increasing risk of weight gain and obesity both in boys and girls in senior grades. In the current curriculum of Biology, the topic of human health is studied in the 7th grade, but presented results show that one-year education in health topics is not sufficient. It suggests the necessity of introducing the topic of health in all grades of elementary school, starting from the lowest age.

Key words: biology, pupils, school, health habits

Introduction

In the past several decades, considerable attention has been given to the importance of healthy human diet. For a healthy diet, nutritionists recommend a daily intake of moderate quantities of proteins and limited consumption of fats and sugars. Besides providing organic materials and energy, a healthy human diet should also supply minerals, vitamins, antioxidants and other essential nutrients, such as essential fatty acids (used to build the cell membranes), or essential amino acids (for protein synthesis). The simplest way to get all the essential nutrients is to eat a balanced amount of plant-based food and animal products. Even though many textbooks and articles, TV and social media stress the importance of eating fresh food (thought to play a role in protecting us from many diseases, see Roberts, 2007). Everyday experience in Serbia indicates that most adolescents do not follow proposed dietary rules. For that reason in many Serbian schools, principals, teachers and school nutrition staff members collaborate in design and implementation of school education programs that promote healthy eating messages to the pupils.

In the current curriculum of Biology for the Primary School in Serbia, the topic of human health is studied only in the 7th grade (students aged 13-14 years). Health education curricula address various health topics including healthy eating and physical activity, to ensure attainment of national, recommended standards, learning objectives and outcomes, and corresponding competences. The program offers students the opportunity to improve their health knowledge, attitudes, skills and behaviors, and encourage them to make correct and healthy choices both in and out of the school. Many primary schools provide pupils with access to foods and beverages, including meals served in the school cafeteria. However, several competitive venues situated outside the school (i.e. bakery, grocery stores, pastry shops) sell, serve, and offer students snacks, foods, sweetmeats and beverages that are not part of the school meal program.

Besides nutrition, physical activity also plays a significant role in students' everyday routine and influences their health

and academic performance. However, watching TV, computer use, video and DVD viewing and other non-active behaviors are potential mechanisms which lead to low physical activity and lower resting energy expenditure. If this imbalance continues over time, the risk for overweight and childhood obesity increases (Institute of Medicine, Washington, DC, 2004).

Except for the few recently published studies (Paklarčić et al., 2013; Roknić et al., 2017), a collective effect of peers' lifestyle habits in the school environment has not been investigated in Serbia and the region of ex-Yugoslavia. Here, we examine peers' habits and attitudes within different age classes concerning nutrition, beverage consumption, and time spent in front of a computer or mobile devices. We tested if senior students, who have reached the required level of competences from the class curricula and through inclusion in the school's educational activities, will be better in the implementation of healthy habits and in practicing a healthy lifestyle.

Materials and Methods

Survey design

Our study surveyed a representative population of the 408 pupils (198 girls and 210 boys) in the Primary school "Drinka Pavlović" in Belgrade. We designed the survey instrument to collect information concerning age, gender, classroom, and students' attitudes toward their lifestyle habits. The Survey questionnaire included 3 anonymous questions with multiple choice and categorical responses. Participants were asked about their habits concerning 1) nutrition, 2) beverage consumption, and 3) time spent in front of a computer, tablet, playing games on consoles, or using a mobile phone. Data were collected from the randomly selected primary school students from 5th to the 8th grade (aged 11 to 14 years). Further, anthropometric measurements (student's body weight and body height) were used for calculating the body mass index (BMI) of each individual student. BMI is the most widely used and recommended measure to estimate the personal weight status (Nihiser et al., 2007). It is a ratio of weight and height, and is calculated according to the formula:

$$\boldsymbol{BMI = \frac{body\ weight\ (kg)}{body\ height^2\ (m^2)}}$$

BMI was calculated and plotted by age and by sex.

Statistical analysis

We used a Chi-square test ($\chi 2$) of Independence to determine if there is a significant relationship between genders/ages and three rated habits.

Weight status is determined by comparing the BMI for all students. The assumption of normality of variances was confirmed using Kolmogorov-Smirnov test for both gender and age. Two-Way ANOVA was used to analyze the effects of two factors: grade, gender and their interaction on BMI. Statistical analyses were performed using STATISTICA®, ver. 5.0 (StatSoft).

Results

Answers from all interviewed students were collected and included in the overall statistical analysis. The first part of the survey was composed of answers related to the habits of meals in students. When asked "Where do you usually have breakfast?"(Question1), a high number of students answered that they usually eat at home (above 50% in 5th, 6th, and 7th grades and above 40% in 8th grade, Figure 1). In total sample, the students answers were significantly different among ages ($\chi 2 = 39.169 > \chi 2$ (12 and 0.05) = 21.026, $p<0.05$). Obtained results also show that there were no differences between boys and girls within each of the four class levels in habits related to breakfast.

According to the liquid consumption (Question 2: "*Which beverage do you drink most often?*"), the consumption of drinking water (both the tap water and bottled water) prevailed in all classes (Figure 2). However, we also found a significant difference in consumption of various beverages between genders in all grades, as well as among grades, in both boys and girls (boys: $\chi^2 = 88.387 > \chi^2$ (21 and 0.05) = 32.670, $p<0.05$; girls: $\chi^2 = 62.130 > \chi^2$ (21 and 0.05) = 32.670, $p<0.05$).

Difference between boys and girls in time spent using a mobile phone or computer devices (Question 3: "*How much time do you spend per day on your computer, tablet or mobile phone?*") is shown in Figure 3. Difference was observed only in the 7th grade ($\chi^2 = 11.659 > \chi^2$ (3 and 0.05) = 7.815 and $p<0.05$). Boys of different grades spent significantly different time per day on computer, tablet or mobile phone: $\chi^2 = 60.139 > \chi^2$ (9 and 0.05) = 16.919, $p<0.05$. Similar differences were observed between girls of different grades: $\chi^2 = 298.970 > \chi^2$ (9 and 0.05) = 16.919, $p<0.05$. In this survey, 40-50% of 7th- through 8th-grade students reported watching television or using a computer on average 2-3 hours during school days. Also, about 30% of these students reported watching television or using a computer more than 3 hours during school days.

The weight status in a reference population of tested students is determined directly by body mass index (BMI) which is shown in Table 1.

Two-way ANOVA confirmed that there were significantly differences in BMI between grades as well as between genders but not in their interaction (Table 2). Tukey's HSD post hoc test showed that girls from 7th grade

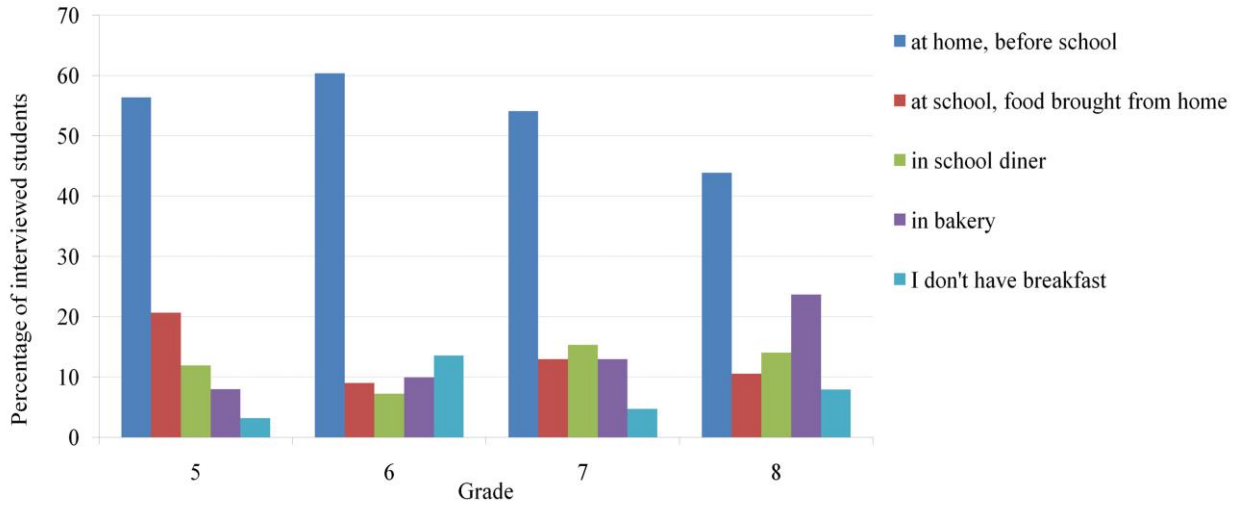

Figure 1. *Students' answers to the question "Where do you usually have breakfast?". Figure presents pulled data for boys and girls.*

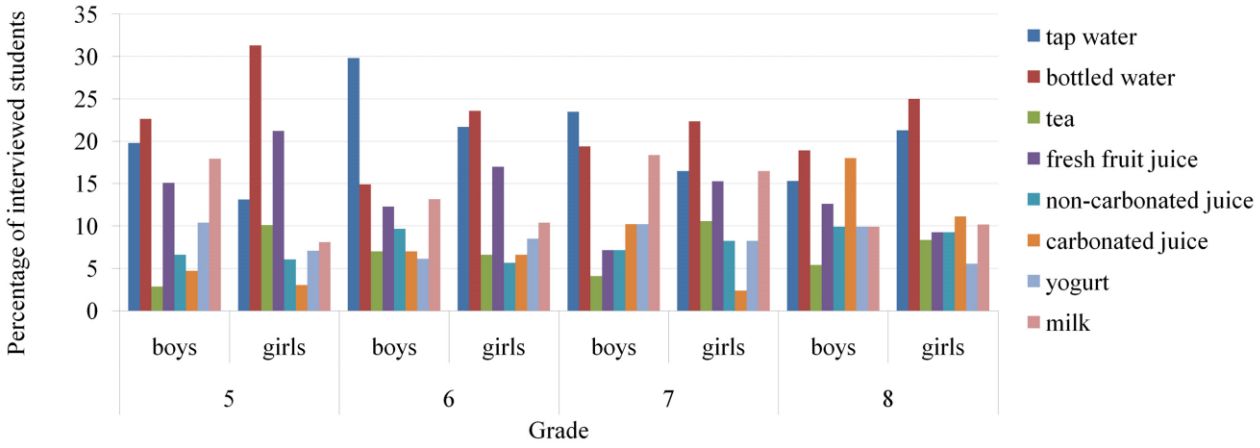

Figure 2. *Students' answers to the question "Which beverage you drink most often?" by sex and grades.*

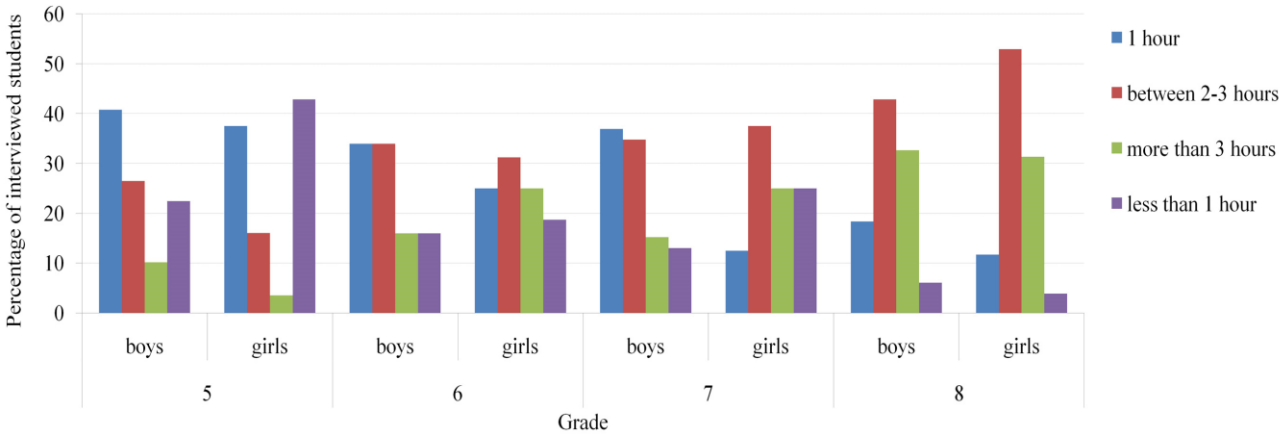

Figure 3. *Students' answers to the question "How much time do you spend per day on your computer, tablet or mobile phone?" by sex and grades.*

has a significantly larger BMI than girls from 5th grade

Table 1. *The body mass index (BMI) values of students from 5th- 8th grades.*

Grades	5th		6th		7th		8th	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Min.	13.3	10.8	14.9	14.8	13.2	14.2	15.2	15.5
Max.	25.2	25.1	26.6	23	29.3	25.4	29.3	37.5
Average	19.25	17.95	20.75	18.9	21.25	19.8	22.25	26.5

Table 2. *Two-Way ANOVA for BMI for all grades and both sexes.*

	df	MS	F	p
Grade	3	130.5	15.83	< 0.0001
Gender	1	162.0	19.65	< 0.0001
Grade × Gender	3	10.9	1.33	
Error	400	8.2		

($p<0.01$), also girls form 8th grade has a significantly larger BMI than girls from 5th and 6th grades ($p<0.001$ and $p<0.05$, respectively). Further, boys from 8th grade has a significantly larger BMI than boys from 5th grade ($p<0.001$). Tukey's post hoc tests also indicated that BMI is significantly different between boys and girls in 6th grade ($p<0.05$).

Discussion

Results from our study revealed association among age of pupils and health habits, in a representative sample from one urban primary school from Belgrade, Serbia. The positive side of results obtained from the survey is a high percentage of children with a well-established habit of eating breakfast, which is consumed, in most of the cases, at home (or is brought from home and consumed in school). It is very important because regular breakfast affects overall health and cognition (especially memory) in students (Hoyland et al., 2009). Also, the overall water consumption prevailed in all grades, since school ensures students access to safe and free drinking water during the stay in school, as a healthy alternative to consumption of sugar-sweetened beverages (Kaushik et al., 2007). However, increasing food consumption from bakery and consumption of carbonated drinks was noticed in boys and girls from senior grades (7th and 8th). Also, they spent considerably more time with a computer, tablet, or mobile phone than the pupils from lower grades. As typical millennials, today's students are entitled as glued to their iPhones and associated with more hours spent on watching television, using computers or engaged in playing video games. Rideout et al. (2010) called persons aged 8–18 years as a *Generation M*, since they spend several hours a day on different media: watching television, using computers, and playing video games. Students from our study exhibited similar behavior, given that about one-third of the surveyed students have been watching television or using a computer more than 3 hours during the day. Older students (age 13-14) spent considerably more time with a computer, tablet, or mobile phone than the pupils from lower grades. These results are close to the data from the USA, where 33% of adolescents reported watching about 3 hours of television, and 25% reported using a computer 3 hours on an average school day (CDC, 2010). Increased watching television, using a computer, or playing video games are commonly associated with consumer products such as fast food, soft drinks, and high-fat snacks, bringing adolescents into the circle of unhealthy eating behaviors (Utter et al., 2006). If this behavior continues over time, students expend less energy through physical activity than they consume through diet (Epstein et al., 2008). The risk for weight gain and obesity increases, as we demonstrated in the present study, through a significant increase of BMI both in boys and the girls in senior grades, compared to the lower aged students.

Most of the Serbian students know that consuming healthy food (cereals and grains, dairy products, fruits, vegetables…) is desirable for them. Furthermore, both the first and the second semesters of grade 7th are dedicated to the topic of the human body, when pupils could study the organ systems, grasp the principles of healthy habits, and critically analyze their own lifestyles. Nevertheless, the consumption of food from bakery and consumption of carbonated drinks increased in this age. Even though schools can be supportive environments for health promotion and for learning and practice healthy behaviors, many students do not tend to follow dietary guidelines and school lessons. This could be explained, at least partially, by the fact that teenagers at this age are very sensitive to the society opinions and tend to 'copy' behaviors of their peers. Recent studies indicate that school pupils and adolescents from foreign countries exhibit a similar behavior, with increased frequency of eating food away from home. This is further associated with consuming more products with increased fats and sodium intake, such as fast food and different kind of salty snacks or other processed foods. Also, they tend to use drinks with added sugar, such as soft drinks and the carbonated and sugar-sweetened beverages (American Heart Association Nutrition Committee et al., 2006; Reedy & Krebs-Smith, 2010). At the same time, they insufficiently consume fruits and vegetables, and other fresh food dietary (Boynton-Jarrett et al., 2003). Overall, there is a somewhat better situation in rural than in urban areas (Paklarčić et al., 2013).

The present survey shows that one-year elementary school education related to health topics is not sufficient. For the implementation of healthy habits and practicing healthy lifestyles, it is necessary to introduce the health topics in all grades of elementary school, starting from the lowest age. Along with a permanent education at school, intense social

activities and the 'healthy lifestyle' campaign outside the school curricula are also welcome.

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