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# Differences in Eating and Lifestyle Habits between First- and Sixth-Year Medical Students from Zagreb

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## ABSTRACT

*Eating and lifestyle habits of first (n=169) and sixth (n=272) year students, aged 18 to 26 years, attending a Medical School in Zagreb, were compared related to the years of study. A self-administered questionnaire created for this study incorporated a food frequency questionnaire. Both year students reported similar number of meals per day, irregular consumption of meals, skipping breakfast, frequency of vegetables, fruits, cereals, sweets, milk and dairy products consumption, body mass index (BMI) calculated from self-reported weight and height and alcohol consumption. Significant differences between groups were observed in consuming supper (p=0.001), being on diet (p=0.032), intake of supplements (p=0.041), meat (p<0.001), dried meat (p=0.027), coffee and tea consumption (p=0.016), physical activity (p=0.041; p=0.016), and smoking (p=0.029). This study showed non-healthy eating and lifestyle behavior among Medical School students. We observed association between the year of study, and some of the eating habits and lifestyle factors.*

**Key words:** university students, eating habits, lifestyle habits

## Introduction

Eating habits, tobacco smoking, alcohol consumption and physical inactivity are key aspects of lifestyle that increase risk for major diseases such as cancer and coronary heart disease<sup>1</sup>. Those factors could be moderated in frame of public health prevention<sup>2,3</sup>. Although lifestyles and health beliefs are generally established early in life, lifestyle habits established during the University years also can have an enormous impact on health and well-being, as well as the risk for developing obesity, diabetes, heart disease and cancer<sup>4</sup>. As most University students no longer live with their parents, their living arrangements have been reported to influence food choices, changes in physical activity and other life attitudes. Besides, adapting to the stress, emotional challenges, newfound freedom, as well as changes in eating patterns, certainly play large roles in determining their lifestyle<sup>5,6</sup>. Coming to University for many young people means

making important daily decisions on their own, which include what foods they consume and where they are going to eat. Adjusting to appropriate eating habits is hard when they are first living on their own. These include especially healthy eating habits, and a healthy diet does not mean only safe and balanced food, but also a correct dietary pattern. The dietary pattern includes the frequency and interval between meals, the size of daily meals and consumption of a varied moderate diet that includes food from each of the major food groups<sup>2</sup>.

Today, the world trend, especially among adolescents and young people, is irregular meal consumption, where breakfast is often replaced with coffee, and consumption of mostly non home-made food, especially in fast-food restaurants<sup>7</sup>. Consumption of fast food was connected with the increased risk for obesity among students in the

USA<sup>8</sup>. As fast food restaurants offer food rich in energy and poor in essential micronutrients, eating more food away from home could negatively influence overall nutritional quality<sup>7</sup>. Even though many factors influence students' eating habits, it is important that students eat properly during this period of their lives. Eating and other lifestyles habits of University students may change their university experience. Sometimes it is hard to find balance but regular planning of food consumption and physical activity, not smoking and avoiding alcohol consumption contributes to maintaining healthy lifestyle habits, higher motivation and productivity in everyday student's life<sup>4</sup>.

Therefore, it is important to monitor the trends in health behavior among young people to understand the factors that might affect the development of their health behavior. The aim of the current study was to evaluate and compare eating and other lifestyle habits of a group of students at the beginning and at the end of their University studies. This cross-sectional study took place during the academic year 2003/04.

## Subjects and Methods

### Subjects

The cross-sectional study is designed to evaluate and compare the eating habits and lifestyle risk factors among the undergraduate students of the Zagreb University Medical School. The sample comprised 496 students aged 19 to 26 years. The response rate was 88.9%, ensuing 441 (312 females and 129 males) returned questionnaires. Among them 169 were first year and 272 sixth year students. This study did not need ethical approval because no invasive procedures were obtained. All students volunteered for the study.

### Methods

To detect the eating habits (number of meals, place of consuming, type of meal, foodstuffs) and lifestyle factors (smoking, alcohol consumption, physical activity) between students first and sixth year a self-administered questionnaire »Eating habits of students from Zagreb University« was used<sup>9</sup>. The questionnaire had three sections.

The first part of the questionnaire consisted of questions regarding to gender, age, body weight and height of subjects. This section also consists of questions about general eating habits: place where students consumed their meals (at home with family, in students' restaurants or combination of those two places), number of meals/per day and skipped meals (breakfast, lunch, supper and snacks). Further, students were asked if they follow any alternative diets or are on a special diet (because of some disease), or are vegetarian, and intake of supplement vitamins and minerals was also evaluated.

The second part of the questionnaire included questions about physical activity, smoking and alcohol consumption. Exercise was assessed by asking participants

if they exercise or if they practice regular sport activity. Participants were defined as regular smokers if they reported smoking more than one cigarette *per day*. Light smokers were defined as those who reported smoking one to 10 cigarettes *per day*, while heavy smokers were those smoking more than 10 cigarettes *per day*<sup>10</sup>. Alcohol consumption was assessed as: non-drinkers, occasional (sometimes, no more than 2–3 times *per week*) or regular drinkers (every day alcohol consumption).

The third part of the questionnaire included food frequency of typical food items in food groups based on their nutrient composition. Foods were categorized into the food groups such as milk and dairy products, meat (red or white), smoked dry meat products, poultry, eggs, fruits, vegetables (legumes also), nuts, and grains, cakes/sweets, coffee and tea and non-alcoholic beverages. Students were asked to indicate the frequency of consumption for each food item reporting daily, three or four times weekly, monthly and never during the last year.

The questionnaire was given to students in lectures with oral instructions and they completed it by themselves. It took about 20 to 30 minutes to complete the questionnaire. The feasibility and appropriateness of the questionnaire were verified in a pilot assessment performed by a group of 46 students. Analysis of the results from the pilot study produced some improvements in the questionnaire.

To define nutritive status, self-reported weight and height were used to calculate the body mass index (BMI). BMI was calculated as weight (kg)/height squared (m<sup>2</sup>). According to guidelines proposed by the National Institutes of Health, underweight in adults aged 18 years and older is defined as BMI <18.5 kg/m<sup>2</sup>, normal weight as BMI 18.5–24.9 kg/m<sup>2</sup>, overweight as BMI 25.0–29.9 kg/m<sup>2</sup> and obesity as BMI ≥30.0 kg/m<sup>2</sup><sup>11</sup>.

### Statistical analysis

The statistical software package SPSS 13.0 (SPSS Inc.; Chicago, Illinois USA) was used for the analysis of data.  $\chi^2$  analysis was performed to test the differences in proportions of qualitative variables between two groups. Mann Whitney U test was used for testing the difference between quantitative variables when distribution was not normal, and Student-t test when distribution was normal. Logistic regression analysis was performed to assess the relationship between the students' year of study (first and sixth) and their lifestyles, dietary habits and frequency of intake of food items. The level  $p < 0.05$  was considered as the cut-off value for significance.

## Results

The sample comprised 169 (38.3%) (average age: 19.2±1.7) first and 272 (61.7%) (average age: 24.7±1.5) sixth year students. Female were in significantly higher number ( $p < 0.001$ ) on both years. On first year were 135 (80.0%) females and 34 (20.0%) males and on sixth year were 177 (65.0%) females and 95 (35.0%) males.

According to the number of consumed meals *per day*, there was no statistical difference between first- and sixth-year students. First-year males consumed significantly more meals ( $p=0.043$ ) compared to sixth-year males. Only 22.5% of students of both academic years consumed breakfast regularly. More sixth-year students, compared to first-year, consumed supper ( $p=0.001$ ). Twenty-three percent of all students were on weight reduction diet. More first-year students (23.6%) reported to be on a diet, compared to sixth-year (19.9%) and this difference was statistically significant ( $p=0.032$ ). Overall, 41.9% of students used dietary supplements, with freshmen using them more frequently than sixth-year students (45.8% *vs.* 35.6%,  $p=0.041$ ) (Table 1).

According to BMI classifications 76.5% of first-year and 66.3% of sixth-year males had normal weight, while 23.5% of first-year and 33.7% of sixth-year males were overweight. Among females, 8.1% of first-year and 11.4% of sixth-year were underweight, while the corresponding values for normal weight were 87.4% and 81.3%, and for overweight were 4.4% and 7.4%. Male students of both years who skipped breakfast, had higher BMI ( $25.8\pm 1.8$  freshmen and  $24.4\pm 2.0$  older) than males with regular breakfast consumption ( $22.6\pm 2.6$  freshmen and  $24.1\pm 2.6$  older), but the difference in BMI among first-year male students was statistically significant ( $p=0.014$ ). First-year females who skipped breakfast had higher BMI ( $21.3\pm 2.8$ ) in relation to those who had breakfast regularly ( $20.7\pm 2.0$ ) but the difference was not statistically significant. Among sixth-year females, there was no difference in BMI regarding to breakfast consumption. Students of both years, who were on a reduction diet, had higher BMI ( $21.9\pm 2.3$  first year *vs.*  $22.5\pm 2.9$  sixth-year students) than other students ( $20.9\pm 2.4$  first year *vs.*  $21.8\pm 2.9$  sixth-year).

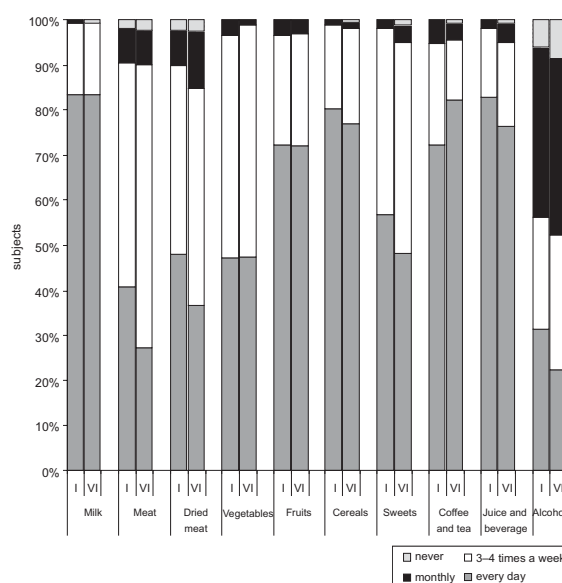


Fig. 1. Frequency of different foodstuffs intake according to academic year.

Almost half of all students (47.2%) reported engaging in physical activity. Among them, 50 (24.0%) regularly exercised in sports clubs. First-year students were significantly more physically active than sixth-year students ( $p=0.041$ ), and they regularly exercised in sports clubs more often ( $p=0.016$ ). Among all students, 153 (34.7%) were smokers. Between them, first-year students used tobacco significantly more often than sixth-year students did ( $p=0.029$ ). Seventy-seven (50.3%) of all students were heavy smokers, but there were no statistically significant differences between academic years. The prevalence of alcohol consumption was high among students of

TABLE 1  
STUDENTS EATING HABITS AND AVERAGE BMI ACCORDING TO THE ACADEMIC YEAR

Parameters	N (%) of students			p
	All students 441 (100)	1 <sup>st</sup> years 169 (38.3)	6 <sup>th</sup> years 272 (61.7)	
Meals <i>per days</i> ( $\bar{X}\pm SD$ ):	1.9±0.1	1.9±0.1	1.9±0.1	0.400
• Male		2.3±0.2	1.9±0.1	0.043
• Female		1.8±0.1	1.9±0.2	0.786
Regular daily meals:				
• Breakfast	99 (22.5)	40 (23.6)	59 (21.7)	0.627
• Lunch	275 (62.4)	104 (61.5)	171 (62.9)	0.781
• Supper	150 (34.0)	54 (32.0)	96 (35.3)	0.001
Diet				
• Diet	103 (23.4)	49 (23.6)	54 (19.9)	0.032
• Intake supplements	185 (41.9)	77 (45.8)	96 (35.6)	0.041
BMI ( $\bar{X}\pm SD$ )				
• Male	23.9±2.5	23.2±2.6	24.1±2.5	>0.05
• Female	20.8±2.3	20.8±2.2	20.8±2.5	>0.05

BMI – body mass index

**TABLE 2**  
DIFFERENCES IN LIFESTYLE HABITS BETWEEN STUDENTS ACCORDING TO ACADEMIC YEAR

Parameters	N (%) of students			p
	All students (n=441)	1 <sup>st</sup> year (n=169)	6 <sup>th</sup> year (n=272)	
Physical activity:				
• Physical exercise	208 (47.2)	117 (54.3)	91 (43.7)	0.041
• Physical activity in sport club	50 (24.0)	35 (29.9)	14 (15.4)	0.016
Cigarette smoking:				
• Regular smokers	153 (34.7)	70 (41.4)	83 (30.5)	0.029
• Heavy smokers	77 (50.3)	31 (44.3)	46 (55.4)	0.226
Alcohol consumption:				
• Occasional	408 (92.5)	159 (94.1)	249 (91.5)	0.424
• Regular	104 (25.5)	53 (31.4)	61 (22.4)	0.115

both years. Among them, 104 (25.5%) were regular alcohol consumers, but there were no statistically significant differences between the academic years (Table 2).

The frequency of food intake, according to the year of study, is summarized in Figure 1 and Table 3. A large proportion of students of both years reported consuming milk and dairy products, fruits, cereals, coffee and beverages on a daily basis (Figure 1). Meat ( $p < 0.001$ ), and dried meat ( $p = 0.027$ ) were consumed significantly more often among first-year students. Coffee and tea ( $p = 0.016$ ) were consumed more often by sixth-year students (Table 3).

Logistic regression analysis was performed to exclude predictors of poor eating habits and to assess the relationship between the students' year of study (1<sup>st</sup> and 6<sup>th</sup> year) and their lifestyle, eating habits and frequency foodstuffs intake. Significant predictors of poor eating habits were gender [OR (CI 95%) 0.32 (0.16–0.64)], place of meal consumption [OR (CI 95%) 2.30 (1.15–4.61)], coffee and tea consumption [OR (CI 95%) 0.49 (0.27–0.89)], being on diet [OR (CI 95%) 0.54 (0.30–0.99)], physical activity [OR (CI 95%) 2.01 (1.20–3.37)], cigarette smoking [OR (CI 95%) 1.65 (0.02–2.65)] and regular breakfast consumption [OR (CI 95%) 0.37 (0.19–0.72)].

## Discussion

This study showed non-healthy eating and lifestyle behaviours among first- and sixth-year students of the School of Medicine in Zagreb. We observed association between the year of study and some eating habits and lifestyle factors that are significant predictors of poor eating habits in gender and place of meal consumption, similar to other Croatian studies<sup>12–14</sup>.

The recommended number of daily meals is three to five<sup>1</sup>. The studies among other Croatian University students showed that students consume an average of 2.4 meals and 1.3 snacks *per day*<sup>15</sup>, a higher number of meals compared to this survey. The studies conducted in other countries also reported that young people have developed irregular dietary patterns, skipping meals, snacking between meals, and frequently eating away from home<sup>16,17</sup>. In our study results showed that only first-year males consumed higher number of meals (2.3±0.2). That could be the residual eating habit developed during adolescence. The rest of students consumed less than 2 meals *per day*. The reason may be their busy schedules, lectures and dislocated places of lectures and students' restau-

**TABLE 3**  
DAILY FREQUENCY OF FOODSTUFFS INTAKE ACCORDING TO ACADEMIC YEAR

Foodstuffs	N (%) of students		p
	1 <sup>st</sup> year (n=169)	6 <sup>th</sup> year (n=272)	
Milk and dairy products	141 (83.4)	227 (83.5)	0.900
Meat	69 (40.8)	74 (27.3)	<0.001
Dried meat	81 (47.9)	100 (36.8)	0.027
Vegetables	80 (47.3)	129 (47.4)	0.936
Fruits	122 (72.2)	196 (72.1)	0.937
Cereals	136 (80.4)	210 (77.1)	0.488
Sweets	140 (82.8)	208 (76.5)	0.140
Coffee and tea	122 (72.2)	224 (82.4)	0.016
Juice and beverage	96 (56.8)	131 (48.2)	0.095



rants. However, they have no experience and time to organize economic, fast and healthy meals.

Breakfast is the most frequently skipped meal among students in this study as in other Croatian student's<sup>15</sup>. Only twenty-five percent of students regularly consumed breakfast and this habit does not change according to the year of study. Our results are similar with research by Amosa et al.<sup>18</sup>. The survey by Pao et al. showed that breakfast is a frequently skipped meal in all age groups, especially in younger people<sup>19</sup>. Nevertheless, Nicklas et al. reported that 37% of young people skipped breakfast, which is much lower than in our survey<sup>20</sup>. Also, a study among French students showed a low frequency of snacking and a high regularity in having breakfast, especially in those with lower BMI<sup>21</sup>. In the current study, first year male students who had irregular breakfast, were overweight. Fujiwara showed that skipping breakfast is associated with dysmenorrhoea in young women in Japan<sup>22</sup>. The literature showed that students who increased breakfast participation are significantly more attentive, had higher grades on exams and had significantly fewer behavioural and emotional problems than those who did not eat breakfast. In contrast, skipping breakfast has been associated with lower nutritional status, risk of cardiovascular disease and development of obesity<sup>23</sup>. Probably skipping breakfast could be explained as a habit made early in life and coming to the University hardly will change it. Lunch, traditionally the most important meal in our area, was the least skipped meal among our students. More than sixty percent of students consumed this meal regularly probably not only because of tradition, but also largely due to skipped breakfast.

In this survey, a significantly higher consumption of meat and smoked dry meat products were reported among younger students. The same results were obtained among students from Spain<sup>24</sup>. Coffee and tea were consumed more among sixth-year students. Milk and dairy products were often used foodstuffs in students of both years. A low consumption of vegetables in students of both years was shown in this study. However, daily fruit consumption was higher than in other European countries. A marked deterioration in frequency of fruit consumption between European University students was observed during the last decade<sup>25</sup>. US national surveys showed that young people aged 18 to 24 years did not consume enough vegetables and fruits. The students in this study, like those in USA, consumed cereals (including grain products, bread, pasta, rice) more frequently than vegetables and fruits<sup>7</sup>.

Between students who were on a reduction diet and students who had minimum of daily food intake, younger students more often took dietary supplements. These data show that they are conscious about the importance of vitamins and minerals in their daily diet. But, vitamin and mineral supplements are not a substitute for a healthy diet. So, better conscious about low calorie foods, as a way for maintaining or achieving proper weight is needed.

The majority of students were classified into the normal BMI group. Obesity was found in small number of males, and underweight in few females from the sixth year. Female students had similar BMI (20.8 kg/m<sup>2</sup>) compared with results from 22 countries, while male students had a higher BMI<sup>26</sup>. The prevalence of obesity in this study was lower than in American studies, where 35% of students were overweight or obese<sup>27</sup>.

In this study, a high prevalence of alcohol consumption was found, but it is interesting that first-year students consumed more alcohol than sixth-year students, which could be explained by the knowledge they acquire until their last year of medical studies. Also, there is a possibility that they might relate alcohol to independence since they are for the first time independent. The high prevalence of alcohol consumption among our students replicates findings from other survey among Croatian students<sup>15</sup>. Similar results were observed among students from Western and Eastern Europe<sup>28</sup>, while prevalence among Swedish University students was lower<sup>29</sup>. We think the limitation of this survey could be data deficit about quantity and kind of consumed alcohol.

The prevalence of smoking was higher compared with other University students in Croatia and Europe<sup>15,25</sup>. More first-year students were light smokers compared to older students, but older students, although their knowledge about the effects of smoking on health had purportedly increased due to their studies, were more often in the category of heavy smokers. Copeland gives us data about tobacco as means to decrease appetite and control body mass<sup>30</sup>. Surveys from Houston, USA, show student's smoking as an important public health problem because the majority of them continue smoking after graduation. Wetter et al. say that 87% of regular and 50% of irregular smokers continue smoking, while even 11.5% of non-smokers become irregular smokers<sup>31</sup>.

In this study, lower levels of physical activity were reported compared to students in 23 other countries<sup>32</sup>. Among first-year students, physical activity was significantly higher compared to sixth year's students, and among them higher number exercised regularly in sports clubs. A more sedentary lifestyle, as a result of years of studying, probably made older students less interested for physical activity. Social supportive environment is crucial for being physical active<sup>33</sup>, as well as cultural norms<sup>28</sup>.

Our findings suggest the need for strategies designed to improve competence in the area of nutrition, especially with respect to information relating to sources of nutrition and healthy weight management. From the educator's perspective, the University represents the final opportunity for nutritional education of large number of students. Better education regarding benefits of appropriate eating habits, regular physical activity and education regarding health risks of tobacco smoking should be encouraged on University students.

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## RAZLIKE U PREHRAMBENIM I ŽIVOTNIM NAVIKAMA STUDENATA PRVE I ŠESTE GODINE MEDICINSKOG FAKULTETA U ZAGREBU

### SAŽETAK

U ovom radu uspoređivane su prehrabene i životne navike studenata prve (n=169) i šeste (n=272) godine Medicinskog fakulteta u Zagrebu, prosječne starosti od 19 do 26 godina, obzirom na godinu studija. Za prikupljanje podataka u ovom istraživanju kreiran je Upitnik o prehrabnim navikama studenata. Studenti obiju godina slični su po: dnevnom broju obroka, neredovitom uzimanju obroka, preskakanju doručka, učestalosti konzumacije povrća, voća, žitarica, slatkiša, mlijeka i mliječnih proizvoda, kao i indeksom tjelesne mase te konzumaciji alkohola. Značajne razlike između ispitivanih skupina uočene su u konzumaciji večere (p=0,001), učestalosti provođenja redukcijskih dijeta (p=0,032), uzimanju dodataka prehrani (p=0,041), konzumaciji mesa (p<0,001), suhomesnatih proizvoda (p=0,027), kave i čaja (p=0,016), tjelesnoj aktivnosti (p=0,041; p=0,016), i pušenju (p=0,029). Istraživanje je ukazalo na postojanje nezdravih prehrabnih i životnih navika, među studentima Medicinskog fakulteta u Zagrebu, te je uočena povezanost između godine studija i nekih prehrabnih i životnih navika.