



BODY MASS INDEX AND FOOD FREQUENCY INTAKE OF FOREIGN MEDICAL STUDENTS

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ABSTRACT

Purpose: At present a number of research studies report on the changes of dietary habits of students in transition from home to university of the foreign country. In recent years obesity has become a global public health concern. The aim of this study was to evaluate body mass index and food frequency consumption in foreign medical students from Medical University-Plovdiv, Bulgaria, before and after their moving from home to Plovdiv. **Material and methods:** A cross-sectional survey of 51 foreign medical students (30/58,8%/ males and 21 /41,2%/ females, aged 21.6 (\pm 1.8) years, from Faculty of Medicine at Medical University of Plovdiv was carried out. Students filled out anonymously a self-administered questionnaire that included questions on their usually daily food frequency intake (FFQ) before and after their enrollment in Medical University of Plovdiv (at home and away from home) after training in Nutrition Hygiene. Body mass index (BMI) was used to assess students' weight status. **Results:** Based on measured BMI the prevalence of normal weight and overweight of males was 76,7% (n=23) and 16,7% (n=5), and of normal weight and underweight of females - 85,7% (n=18) and 9,5% (n=2) respectively. Food consumption frequencies of respondents before and after starting Medical University didn't differ statistically significant. Low and medium food frequency consumption predominated at both males and females living at, and away from home. Fresh fruits and vegetables intake was low at high frequencies (2 and >2 times a day) that didn't correspond to recommendations of health nutrition. **Conclusion:** Significant changes of dietary habits of investigated students in transition from home to the foreign country were not established. Students with normal BMI prevailed but overweight males and underweight females were at increase health risk. Further knowledge about health nutrition and its role in prevention of non-communicable diseases is necessary to improve dietary behavior of inquired students especially as future medical specialists counselling their patients about nutrition.

Key words: body mass index, food frequency intake, dietary habits, students

INTRODUCTION

Healthy nutrition is one of the main health-protecting lifestyle factors and elements of disease prevention. The student lifestyle changes significantly in a foreign country. In new setting the students undergo exposure to dietary and climate changes as well as changes in social

environment. The research has suggested that dietary patterns change dramatically following arrival of students in a foreign country and students are at risk for development of unhealthy eating habits during their first year of education (1, 2). When students start their education in a foreign country, the quality of their diets declines, and they often gain weight; the future risk of development of non-communicable diseases and other functional disabilities increases. The research has identified significant changes in dietary patterns of immigrant students: consumption of carbohydrates

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(particularly sugar) and fats often exceeds recommended levels; consumption of protein, meat, meat alternatives, dairy products, fruits and vegetables significantly decreases after arrival of students in a foreign country; students tend to consume saltier snack items (2).

Medical students are future medical specialists who will advise patients on how and what they should eat in order to avoid various chronic noninfectious diseases, will increase the knowledge level in the population, and will promote interest in the influence of lifestyle and nutrition on health status (1, 3, 4). Medical faculty students may develop irregular eating habits for reasons such as their social-economic situations, adaptation to faculty life, dormitory or their new environment. As a result, some students eventually ignore their basic food requirements (5). In particular, university students living away from home develop unfavorable eating habits, showing a rapid change of the traditional diet in an undesirable direction and lifestyle modification towards globalized behaviors (6).

Several influential factors such as stress, sedentary lifestyle, lack of availability of familiar food, peer pressure, and limited finances contribute to the adoption of poor dietary practices after moving away from one's native country and entering a university. Additional factors such as skipping breakfast due to irregular class schedules and class overload disrupt normal eating patterns and lead to development of unhealthy habits that may further have adverse effects on student health (2). Therefore, the assessment of dietary changes of foreign medical students is of great importance, since healthy practices adopted early in their life may not only improve their health, but also enhance their psychological readiness to participate in creation of environment of healthy behavior among their peers (2). The **aim** of the present study was to evaluate body mass index and food frequency consumption in foreign medical students from Medical University-Plovdiv, Bulgaria, before and after their moving from home to Plovdiv.

MATERIAL AND METHOD

A cross-sectional survey of 51 foreign medical students (30 /58,8%/ males and 21 /41,2%/ females, aged 21,6 (\pm 1,8) years, from Faculty of Medicine at Medical University of Plovdiv was

carried out. Students filled out anonymously a self-administered questionnaire that included questions on their usually daily food frequency intake (FFQ) before and after their enrollment in Medical University of Plovdiv (at home and away from home), also their weight, height, after training in Nutrition Hygiene during second semester of 2013/2014 academic year. Food frequency questionnaire was adapted to Dietary Questionnaire for Epidemiological Studies Version 2 (DQES v2), Cancer Epidemiology Centre, Melbourne, 2014 (7). The adapted FFQ had two main components: list of foods /23 items/ and set of frequency-of-use response categories. Food groups and serving sizes were presented according to Food Guide Pyramid (FGP) definitions for each food category / The Food Guide Pyramid, US Department of Agriculture, 1992/ (8). Analysis of food intakes for all questions in terms of frequency was performed by conversion of questionnaire responses to daily equivalent frequencies (DEF) according to DQES v2 User guide (7). Additional questions about frequency intake of non-alcoholic beverages and food supplements were included. Body mass index (BMI) was used to assess students' weight status according to the WHO classification. The collected data were analyzed by statistical program SPSS v.19. All subjects with missing information were excluded from data analyses.

RESULTS AND DISCUSSION

General characteristics of students included: mean age (years \pm SD) - males - 21,80 (\pm 1,71), females - 21,33 (\pm 1,88); mean height (cm \pm SD) - males - 181,33 (\pm 8,31), females - 168,45 (\pm 8,22); mean weight (kg \pm SD) - males - 76,93 (\pm 11,81), females - 60,95 (\pm 10,22); mean BMI (kg/m² \pm SD) - males - 23,4 (\pm 2,95), females - 21,4 (\pm 2,62). By nationality Greek predominated (66%) following of Turkish (19%) and other (15%). No significant differences were found between BMI categories and gender and nationality of students ($P > 0,05$). Based on measured BMI the prevalence of normal weight and overweight of males was 76,7% (n=23) and 16,7% (n=5), and of normal weight and underweight of females - 85,7% (n=18) and 9,5% (n=2) respectively (**Table 1**). These results are in agreement with other studies investigated body mass index of medical students (3, 4, 9, 10).

Table 1. Frequency distribution of students by their BMI category

Gender	BMI category /n (%)/				Total
	Underweight (< 18,5)	Normal (18,5 – 24,9)	Overweight (25 – 29,9)	Obese (≥ 30)	
Males	1 (3,3%)	23 (76,7%)	5 (16,7%)	1 (3,3%)	30 (100%)
Females	2 (9,5%)	18 (85,7%)	1 (4,8%)	-	21 (100%)
Total	3 (5,8%)	41 (80,4%)	6 (11,8%)	1 (2,0%)	51 (100%)

Food consumption frequencies of respondents before and after starting Medical University didn't differ statistically significant. Low and medium food frequency consumption predominated at both males and females living at, and away from home. Fresh fruits and vegetables intake was low at high frequencies (2 and >2 times a day) that didn't correspond to recommendations of health nutrition. Only 19% of students had fresh fruit intake 2-3 times a day before enrolment v.s. 9,5% after enrolment at university; at very high intake 4/>4 times a day – 4,8% v.s. 9,5% respectively. Authors reported about insufficient and much less than recommendations of health nutrition intake of fruits and vegetables at surveys of students' nutrition (1, 5, 9, 11). 32,1% (n=9)/22,2% (n=6) of males and 52,4% (n=11)/40%

(n=8) of females consumed fish once a week before and after arrival in Plovdiv respectively. Studies of Papadaki et al. (2007) and Baldini et al. (2009) found that consumption of fresh fruits, cooked and raw vegetables, pulses, fish, seafood, olive oil of students who lived away from their family was decreased during their university education (6, 11).

Paired samples t test was performed to reveal the differences in food consumption patterns (including FGP servings of food groups) before and after enrolment at Medical University-Plovdiv (**Table 2**). From before to after test data analysis statistically significant differences in consumption of food groups were not established.

Table 2. Consumption of food groups and food items before and after enrolment at university

Food groups and food items	Before enrolment FGP Servings Mean ± SEM	After enrolment FGP Servings Mean ± SEM	Significance (2-tailed)
Milk, yogurt and cheese group	0,71±0,11	0,72±0,12	0,880
Vegetable group	0,34±0,04	0,32±0,04	0,611
Fruit group	0,8±0,12	0,76±0,11	0,650
Meat, poultry, fish, beans, eggs and nuts group	0,36±0,04	0,4±0,06	0,349
Chicken	0,58±0,13	0,64±0,14	0,317
Fish	0,14±0,02	0,3±0,1	0,141
Sandwiches, hotdogs, hamburgers	0,45±0,09	0,44±0,1	0,886
Beans	0,2±0,04	0,02±0,05	0,950
Bread, cereal, rice and pasta group	0,44±0,04	0,46±0,05	0,854
Fats, oils and sweets group	0,54±0,07	0,54±0,08	0,833
Butter	0,38±0,07	0,28±0,05	0,096
Oils	0,88±0,15	0,85±0,16	0,491
Chips, fried potatoes	0,28±0,06	0,38±0,09	0,198
Biscuits, chocolate, sweets	0,59±0,12	0,65±0,14	0,333

The consumption of meat, milk, vegetable, fruit and bread groups was decreased compared to FGP recommendations at both cases, before and after moving of foreign students from home to

Plovdiv. At before and after enrolment the mean reported intakes of meat (0,36/0,4 servings), vegetable (0,34/0,32 servings), fruit (0,8/0,76 servings) and bread (0,44/0,46 servings) groups

were significantly lower compared to FGP requirements. To meet the daily minimum servings according to FGP recommendations it is necessary to consume minimum 2 servings each of fruits, milk and meat; 3 servings of vegetables; and 6 servings of bread group (8). It is likely that the general failure to meet the recommended servings of all food groups is probably due to the large percentage of students, who skip meals, decrease serving sizes, and avoid certain nutritious foods. These patterns can be explained by irregular class schedules, class overload as well as by insufficient food preparing skills and lack of finance among foreign students who live far from their families (2). Authors reported about significantly lower mean intakes of meat, vegetable, fruit and bread groups compared to Food Guide Pyramid requirements of foreign medical students at the end of the first year of their education (2).

61,5%/68% of male and 42,1%/45% of female investigated students never or very rarely used dietary supplements before and after moving from home to Plovdiv respectively. Low and medium frequency non-alcoholic beverages intake prevailed at 78% of students. There were not significant differences by gender and before and after enrolment at university measure in both cases.

CONCLUSION

Significant changes of dietary habits of investigated students in transition from home to the foreign country were not established. Students with normal BMI prevailed but overweight males and underweight females were at increase health risk. Further knowledge about health nutrition and its role in prevention of non-communicable diseases is necessary to improve dietary behavior of inquired students especially as future medical specialists counselling their patients about nutrition.

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