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Nutritional and lifestyle habits of European pharmacy undergraduate students

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Summary. *Aim:* Balanced nutrition and healthy lifestyle habits are very important, especially in young population. By this way it is possible to prevent many non-communicable diseases. As a health care professionals, pharmacists have very important role in this mission. The aim of this study was to evaluate basic nutritional knowledge and lifestyle habits of pharmacy undergraduate students in the context of their future health profession. *Methods:* The study group consisted of 591 European undergraduate pharmacy students. The data related to anthropometry, eating and lifestyle habits were obtained based on self-administered cross-sectional survey. Analysis of gender differences was performed using the chi-square test. Statistically significance was set at p value < 0.05. *Results:* Anthropometric characteristics of students showed that 10.5 % female students were underweight, while 62.6% of the males were overweight and 0.7% were obese. Regular breakfast had 80.9% of the students. Breakfast skipping was statistically higher in male participants ($p<0.05$). Only 35% of students reported daily intake of vegetables. Also, low fruit consumption was observed in all students with statistically lower fruit intake in males ($p<0.05$). Consumption of alcohol, fried food and tobacco was not common among students. Basic principle of balanced nutrition was recognized by 58.4% of study population. *Conclusion:* Results of our study indicate that European pharmacy students have some unsatisfactory eating habits and nutritional knowledge which is already related to their inadequate nutritional status. Our finding suggests that increased level of nutritional education should be incorporated into European pharmacy curriculum.

Key words: Nutritional status, lifestyle habits, diet, European pharmacy students, nutritional education

Introduction

In European modern society, nutrition evolves from under-nutrition to over-nutrition (1). Data suggest that obesity has become a global epidemic disease, and it is the fastest growing form of malnutrition in developed and developing countries (2). Improper nutritional habits and physical inactivity contribute to overweight which can later cause obesity, which has proved to be an independent risk factor for many diseases such as certain cancers, type II diabetes mellitus and coronary heart disease (3, 4).

The student population is the important target for the promotion of healthy lifestyles, including healthy nutrition. Several studies indicated that University students make various mistakes in their nutrition. The most common reported nutritional faults observed among students include: consumption of snacks between meals, avoiding main meal, fast food consumption, night snacking, unhealthy weight loss diets (5). Beside unhealthy dietary behavior, there was evidence of low physical activity in student population (6). There have been various studies on the nutritional status, and eating habits among the non-European university students (7-9), and European students (10-14), however data on dietary patterns focused on pharmacy students are limited.

Nutritional knowledge of pharmacy students as future health professionals is particularly important. Pharmacists, especially those working in community

pharmacy, could provide various public health services. Pharmacist in some cases is the first and only health-care professional which can give advice regarding self-care to the patient. Activities of pharmacists evaluated by Pharmaceutical Group of European Union (PGEU) showed that European (EU) community pharmacists play important role in self-care support of patients, including counseling about selecting appropriate over-the-counter medication; healthy lifestyle; nutritional counseling regarding the type and quality of food eaten and selection of dietary supplements (15). Also, pharmacists can benefit by participating in educational programs aimed at public health promotion (16).

Nutritional knowledge of pharmacy students as future health professionals is important. Unfortunately, nutrition-related courses are incorporated in undergraduate programs of pharmacy studies among European countries in various degree so it could be expected that understanding of basic dietary recommendations in health and disease also varies. Some good examples of nutritional courses incorporated in pharmacy curriculum can be observed in Eastern Europe (17, 18), South European countries (19) as well as in Western Europe (20).

Since dietary habits of pharmacy students in Europe have rarely been determined, the primary purpose of this study was to evaluate eating and selected lifestyle habits among European undergraduate pharmacy students, including the usage of dietary supplements. One of the goals of this study was also to test the hypothesis if pharmacy students adopt healthy nutritional and lifestyle habits since it is expected that this population is better informed about their importance.

Methods

Design and Participants

The cross-sectional study was carried out between April and November 2012. during the Annual Congress of European Pharmaceutical Student Association (EPSA) in Istanbul, Turkey, International Pharmaceutical Federation (FIP) World Centennial Congress of Pharmacy and Pharmaceutical Sciences in Amsterdam, The Netherlands, and EPSA Autumn Assembly in Sofia, Bulgaria. Students from non-European countries were excluded and a total number of 591 undergraduate pharmacy students took part in this investigation. All participants were asked to sign informed consent according to the Declaration of Helsinki. This study received approval from the Ethic Committee for Human Research of Faculty of Pharmacy, University of Belgrade.

Data Collection

A self-reported height and weight data were used to calculate body mass index (BMI) as the ratio of body mass in kg and the square of height in meter (kg/m^2). Students were classified as overweight if their BMI was 25-29.99 kg/m^2 and obese with BMI ≥ 30 kg/m^2, as well as underweight with BMI <18.5 kg/m^2 (21). Eating habits of students were evaluated with a self-administered questionnaire which was adopted from previous studies (22, 23). The questionnaire was firstly used and standardized on University students from Japan and South Korean population by Sakamaki et al. (22). This questionnaire was also used in the study conducted by Yahia et al. (23) without standardization for Lebanon students since it contains general questions which are not country specific. The questionnaire consisted of 11 closed questions, divided into three sections. Four questions examined meal frequency; two questions examined fruit and vegetable intake. Next four questions explored lifestyle habits including fried food and alcohol consumption, smoking history, and social interaction during meals. One question was used to estimate the basic knowledge of students regarding balanced nutrition. To the original questionnaire, additional question was added to dietary supplements usage among pharmacy students. Anyone who reported currently taking, at least one dietary supplement, as well as using it one month previously, was defined as a dietary supplement user.

Statistical Analysis

The statistical analysis was performed using SPSS 18.0 for Windows (Chicago, IL, USA) software. Data are presented as the means and standard deviations for quantitative data and as frequencies for category data. Non-parametric variables were analyzed using the chi-square test. All reported p values were made on the

basis of two-tailed tests. Differences were considered statistically significant at p value < 0.05.

Results

Demographic and anthropometric characteristics of the study participants are presented in Table 1. This study included 591 European pharmacy students, 305 women and 286 men, the mean age 24.09 ± 2.26. Average weight and height of female study population were 58.68 ± 4.67 kg and 168.8 ± 4.8 cm, while the male population had average 84.91 ± 7.95 kg and 182.5 ± 6.3 cm. The average BMI of female students was 20.63 ± 1.84 kg/m^2 while for male students it was 25.52 ± 2.28 kg/m^2. Based on the classification of nutritional status by BMI, most the students were normal weight (63.1%). Among female students 10.5 % were underweight, 88.2 % were normal weight, while overweight and obese counted only 1.3%. Results for the nutritional status among male students were different, none of them were underweight, about two-thirds (62.6%) of the male students were overweight, and only 1% was obese. In general, obesity was observed in only 0.7% of the study population, an overweight problem was noticed in 30.8%, and undernutrition in 5.4% of the total study population.

The results of lifestyle and eating habits investigation among the study population are shown in Table 2. Obtained results were analyzed and compared by gender. Only half of students (55%) reported having regular meals during the day. Obtained results also revealed that majority of pharmacy students had three meals during the day (60.7%) and two meals (28.3%), without statistically significant difference between the genders. The regular breakfast habit was reported by 80.9% of the students, where statistically significant difference among genders was noticed (p=0.04). The habit of skipping the breakfast was more pronounced in male pharmacy students. Beside main meals, the snack consumption was also reported by the students. The frequency of daily snacking among students was 19.3%, while 40.9% consumed snacks between meals once or twice per week, with no gender differences.

The results of this study suggested an inadequate daily intake of colored vegetables among European pharmacy students. This is supported by the result that only 35% of the students ate colored vegetables daily while 23.4% students ate colored vegetable only once or twice per week. Low daily fruit consumption was also observed in study population because only 34% of students consumed fruit daily. While there was no gender difference in reported vegetable consumption, daily intake of fruits was statistically higher in female students (p< 0.05). Concerning fried food consumption, the results showed that more than 80% of pharmacy students rarely or 1-2 times per week use this type of food but the result that 6% of students reported eating fried food every day is of concern.

Two lifestyle habits, alcohol and tobacco consumption, were recorded. According to the obtained

Table 1. General Demographic and Anthropometric Characteristics of the Study Group (n=591)

	All	Female	Male	P
Number, n (%)	591	305 (51.6)	286 (48.4)	-
Age, years	24.09 ± 2.26	23.74± 2.17	24.46 ± 2.31	-
Weight, kg	71.37 ± 14.62	58.68 ± 4.67	84.91 ± 7.95	-
Height, cm	175.4 ± 8.8	168.8 ± 4.8	182.5 ± 6.3	-
BMI, kg/m^2	22.99 ± 3.19	20.63 ± 1.84	25.52 ± 2.28	-
Underweight, n (%)	32 (5.4)	32 (10.5)	-	P < 0.001*
Normal, n (%)	373 (63.1)	269 (88.2)	104 (36.4)	P < 0.001*
Overweight, n (%)	182 (30.8)	3 (0.98)	179 (62.6)	P < 0.001*
Obese, n (%)	4 (0.7)	1 (0.33)	3 (1.0)	P < 0.001*

*Significant differences between gender were determined by Chi-square analyses (*P< 0.05)*

Table 2. Lifestyle and Eating Habits Among the Study Participants (n=591)

Questions	Levels	Total		Female		Male		P
		n	%	n	%	n	%	
Do you take your meals regularly?	always regular	325	(55)	171	(56.0)	154	(53.8)	0.62
	irregular	266	(45)	134	(43,9)	132	(46.1)	
Do you always take breakfast?	daily	478	(80.9)	260	(85.2)	218	(76.2)	0.04*
	three or four times per week	75	(12.7)	29	(9.5)	46	(16.1)	
	once or twice per week	21	(3.6)	9	(3)	12	(4.2)	
	rarely	17	(2.9)	7	(2.3)	10	(3.5)	
How many times do you eat meals except snacks during the day?	one time	29	(4.9)	14	(4.6)	15	(5.2)	0.92
	two times	167	(28.3)	87	(28.5)	80	(28)	
	three times	359	(60.7)	187	(61.3)	172	(60.1)	
	four times	36	(6.1)	17	(5.6)	19	(6.6)	
How often do you take snacks apart from regular meals?	daily	114	(19.3)	56	(18.4)	58	(20.3)	0.94
	three or four times per week	49	(8.3)	26	(8.5)	23	(8.0)	
	once or twice per week	242	(40.9)	126	(41.3)	116	(40.6)	
	rarely	186	(31.5)	97	(31.8)	89	(31.1)	
How often do you eat green, red or yellow colored vegetables?	daily	207	(35)	110	(36.1)	97	(33.9)	0.55
	three or four times per week	173	(29.3)	90	(29.5)	83	(29.0)	
	once or twice per week	138	(23.4)	73	(23.9)	65	(22.7)	
	rarely	73	(12.3)	32	(10.5)	41	(14.3)	
How often do you eat fruits?	daily	203	(34.3)	115	(37.7)	88	(30.8)	0.02*
	three or four times per week	195	(32.9)	90	(29.5)	105	(36.7)	
	once or twice per week	142	(24.0)	67	(22)	75	(26.2)	
	rarely	51	(6.9)	33	(10.8)	18	(6.3)	
How often do you eat fried food?	daily	38	(6.4)	19	(6.6)	19	(6.3)	0.70
	three or four times per week	70	(11.8)	31	(10.5)	39	(13.3)	
	once or twice per week	172	(29.1)	90	(30.5)	82	(27.6)	
	rarely	311	(52.6)	165	(52.5)	146	(52.8)	
How often do you take alcohol?	never	159	(26.9)	90	(29.5)	69	(25.1)	0.01*
	two or three times per week	135	(22.8)	55	(18.0)	80	(27.9)	
	rarely	297	(50.3)	160	(52.5)	137	(47.9)	
How often do you eat with friends and family?	daily	334	(56.5)	177	(56.1)	157	(57)	0.70
	three or four times per week	199	(33.7)	101	(32.8)	98	(34.6)	
	once or twice per week	47	(8.0)	20	(9.2)	27	(6.6)	
	always alone	11	(1.9)	7	(2.0)	4	(1.7)	
Please state your smoking history	current smoker	41	(6.9)	25	(8.2)	16	(5.6)	0.25
	non-smoker	550	(93.1)	280	(91.8)	270	(94.4)	
What type of food do you think you should eat to have a balanced nutrition?	mainly meat	96	(16.2)	40	(13.1)	56	(19.6)	0.06
	mainly vegetable	110	(18.6)	63	(20.7)	47	(16.4)	
	meat, vegetable and other variety of food	345	(58.4)	185	(60.7)	160	(55.9)	
	others	40	(6.8)	17	(5.6)	23	(8.0)	

*Significant differences between gender were determined by Chi-square analyses (*P< 0.05).*

results, daily consumption of alcohol was not common among students. A half of studied population (50.2%) reported rare alcohol drinking, while 26.9% of students never drink. As expected, the alcohol consumption was statistically significantly higher in the male compared to the female students ($p< 0.05$). Also, consumption of tobacco was not common among European pharmacy students. The most of the students reported being non-smokers (93.1%). More than half of participating students (56.5%) eat daily with friends and family without a difference in gender. Interestingly, the simple question regarding balanced nutrition was answered correctly only by 58.4% students.

In Table 3. Results regarding dietary supplements were presented. It was found that 19.3% of the students reported their use, with vitamins and minerals supplements as the most commonly used.

Discussion

Investigation of dietary habits and nutritional knowledge of student population has recently attracted the attention of various research groups. Health profession university students are of special interest because of their future involvement in health promotion practices. The aim of this study was to assess nutritional status among European pharmacy students, and also to investigate the eating and lifestyle habits among them. According to our knowledge, this kind of studies was rarely conducted among European pharmacy students (12, 13). In our study, participating students were from 26 European countries covering an entire geographical area of Europe.

We have found that depending on gender there are two different problems concerning nutritional status among European pharmacy student population. Within female population, overweight and obesity were of no importance, but each tenth female student was undernourished. Among male population undernutrition and obesity were not problems, but almost two-thirds of participating students were overweight. Other investigations have also found that overweight status was a predominant problem among male university students in European (24, 25) as well as in non-European countries (23, 26, 27). Better nutritional status among female students may be explained with their generally healthier dietary and lifestyle habits compared to the male students. Von Bothmer and Fridlundt (28) have found that female Swedish university students had healthier habits related to alcohol consumption and nutrition. Also, the possible contributing factor to the normal, but also to the undernourished status can be mass media influence on the picture of the ideal female body shape (29). The similar results were obtained for female participants in the previ-

Table 3. The Usage of Dietary Supplements Among Student Populations (n=591)

Questions	Levels	Total		Female		Male		P
		n	%	n	%	n	%	
Do you use dietary supplements?	No	477	(80.7)	239	(78.4)	238	(83.2)	0.135
	Yes	114	(19.3)	66	(21.6)	48	(16.8)	
	one supplement	87	(76.3)	48	(72.7)	39	(81.3)	0.386
	≥ 2 supplements	27	(23.7)	18	(27.3)	9	(18.8)	0.124
What kind of dietary supplements do you use?	Multivitamins	52	(45.6)	25	(37.9)	27	(56.3)	0.664
	Mineral	23	(20.2)	18	(27.3)	5	(10.4)	0.010*
	Vitamin	22	(19.3)	15	(22.7)	7	(14.6)	0.124
	Fish oil	14	(12.3)	10	(15.2)	4	(8.3)	0.178
	Herbal	10	(8.8)	7	(10.6)	3	(6.3)	0.342
	Probiotics	9	(7.9)	6	(9.1)	3	(6.3)	0.507
	Proteins	8	(7.0)	-	-	8	(16.7)	0.003*
	Multivitamin-minerals	7	(6.1)	5	(7.6)	2	(4.2)	0.073
	Royal jelly	7	(6.1)	5	(7.6)	2	(4.2)	0.768
	Yeast	5	(4.4)	4	(6.1)	1	(2.1)	0.374

*Significant differences between gender were determined by Chi-square analyses (*P< 0.05)*

ous study conducted among students from Faculty of Pharmacy, University of Belgrade (30).

Regarding the meal regularity, we found that even 45% of students had irregular meal pattern, especially in terms of daily breakfasting in male students. This result is in line with previous studies among medical students in northern Greece (10) and France (31). Breakfast is the most important meal of the day because irregular breakfasting is a precondition for low nutritional status (32). In fact, there is evidence that regular daily breakfast decrease dietary fat intake and frequent snacking (33). The additional calories from fat and snacks can contribute to the positive energy balance and to risk in developing overweight and obesity (34). In contrast with earlier studies conducted in Chinese, Lebanese, and Saudi Arabian students, we have found less snack consumption among European pharmacy students (9, 23, 26). Additionally, we did not find statistically significant difference in snack consumption among genders.

Fruits and vegetables are high water and fiber sources, and their consumption in the balanced diet can reduce energy intake and prevent overweight and obesity development (35). In the present study, it was noticed the unhealthy eating habits concerning fruit and vegetable consumption. Only 1/3 of participating students reported consuming fruits and colored vegetables daily. This was in line with low intake of fruits and vegetables among students reported in several previous studies (10, 11, 26, 36). Additionally, our results confirmed that female students had healthier habits in term of the fruit consumption than male study participants (11, 31, 37). Also, in line with the previous study of Sakamaki et al. (9) conducted on Asian students, we have found that consumption of fried food among European pharmacy students was low. Similar results were obtained for drinking and smoking habits. However, opposite to the previous investigations, we noticed more inappropriate knowledge about balanced diet (9, 23). Merely 58% pharmacy students answered correctly to a basic question what balanced nutrition should consist of, while Sakamaki et al. (9) and Yahia et al. (23) found 70.7% and 74%.

One of the aims of this study was to evaluate students' habits of dietary supplements use. Although some studies reported that students frequently consume dietary supplements (38,39), in our study only 19,3% of the students reported using its. Within the supplement users' group, 27% used two and more supplements. Multivitamin was the category of dietary supplements most frequently consumed (8.8% of students), both by female and male students. This result is in line with the most popular supplements reported in a recent survey among pharmacy and nursing students (40). A statistically significant difference between genders was observed in the use of other supplements such as minerals and proteins. The data showed that women consumed more mineral and men consumed more protein supplements.

Investigation of nutritional knowledge and dietary and lifestyle habits of pharmacy students is interesting in the context of their future profession. Beside physicians, pharmacists have an important role in the prevention of some chronic non-communicable diseases. Pharmacists can give advice regarding the proper nutrition to the patients with diabetes mellitus and cardiovascular disease (41), obese patients (42), and those with eating behavior diseases (43). The examples from some countries show how it looks like in practice when the pharmacist is involved in nutritional counseling. In Denmark community pharmacists organized two programs for weight control during the 90-es with individual weight reduction, counseling and weight reduction programs became an important part of pharmacy practice in Denmark (44). In some South European countries, such as Spain, pharmacists also participate in health prevention activities by giving advice regarding the proper nutrition (45). In UK community pharmacists have the important role in weight management control programs through a promotion of healthy eating and lifestyle habits (46).

Conclusions

The maintaining an optimal weight and adoption of healthy eating habits are very important at university age for overall health and can help prevent and control malnutrition. The prevention of chronic non-communicable diseases can be essential for improving quality of life as well as reducing the need and costs of potential therapy in the future. The obtained results of this study indicate that there are a few topics related

nutrition in pharmacy students should mainly focus on. The first one is activities for the promotion of diet and healthy behaviors, with special attention to male students. Thus, observed high level overweight in male students requires interventions that should improve eating habits, such as regularly breakfasting. Also, despite satisfactory results related to smoking, alcohol and fried food consumption, it is necessary to stimulate higher daily intake of fruit and vegetables among student populations. Nutritional education of pharmacy students deserves special attention too, especially in respect to their future community role in the health promotion. Examples from some European countries are encouraging because they indicate how the knowledge of pharmacists in this field actually utilized in the pharmaceutical practice. The fact that about one-third students answered false on the question about balanced diet, gave an indication of the risk of unsatisfactory nutrition knowledge level among pharmacy students. Although in some European countries nutritional education in pharmacy curriculum is present for a long time, in other countries it found place recently. Nutritional education related to weight management and maintain of adequate nutrient supply is recommended so nutrition related courses should be obligatory included to the European pharmacy curriculum.

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