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RESIDENTAL FACTORS AFFECTING NUTRIENT INTAKE AND NUTRITIONAL STATUS OF FEMALE PHARMACY STUDENTS IN BYDGOSZCZ

MIEJSCE ZAMIESZKANIA A SPOSÓB ŻYWIENIA I STAN ODŻYWIENIA STUDENTEK FARMACJI W BYDGOSZCZY

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The aim of present study was to estimate nutrient intake as well as nutritional status of female pharmacy students from Bydgoszcz, and to investigate relationship of these factors with type of usual residence place during academic year. The 24-hour recall method was used to evaluate dietary intake of 47 subjects. Measured values of height, body mass and four skinfolds thickness were used for calculation of BMI, FFM, %FM indices. An analysis of nutritional status of studied population showed lower body mass and BMI in the sub-group of female students residing outside of their family home. In comparison to the female students living without parents percentage of energy provided by total fat (29,9 %) was significantly less and percentage of energy from carbohydrate was significantly higher (55,4 %) than students who reside with their parents. Elevated intake of phosphorus and retinol accompanied by inadequate intake of riboflavin, calcium, iron and copper was exhibited in both residence-type related sub-groups of investigated female pharmacy students.

Key words: type of residence place, nutritional status, dietary intake, female pharmacy students
Słowa kluczowe: miejsce zamieszkania, stan odżywienia, sposób żywienia, studentki farmacji

INTRODUCTION

Some inadequate dietary habits are an important risk factor in development of common chronic diseases such as cancer, obesity, hypertension, osteoarthritis [5, 10]. Inadequate, deficient or excess intake of range of some specific nutrients may cause acute symptoms or occur-

rence of chronic disease at greatest risk in susceptible individuals depending on age, race and various sociodemographic factors. Currently, increasing obesity and different metabolic disorders have been observed in many countries over the world. Thus, in recent years there has been enhancing interest in the identification of dietary patterns and food attitudes indicated by various populations [10]. Knowledge of specific eating practices and diet-associated risk factors is also important for relating diet and its composition to nutritional status and for the identification of special groups at risk of under- or over consumption of specific nutrients.

The food intake and food preferences are influenced by age, gender, cultural, social and emotional factors, mass media. Especially, students are exposed to many additional stress factors – time shortage, living on their own, dissatisfaction with one's appearance, eating junk food [13]. Entering to university is frequently connected with leaving out of the family home, thus beginning a highly stimulative stage in the life of a young man. Most of students are forced to change the behavioural, intentional, physiological and economic rules used until this time to choose the type and contents of meals. Adapting and implementing of healthy eating is closely related with their future academic performance and further professional carrier [15].

The results of previous studies of various populations of female students indicated that the energy intake was often below the nutritional norms and supported by reduced ingestion of nutrients [8, 14]. Some findings also stated that students prefer sedentary life style [3]. Thus, detailed knowledge of food intakes by young adults is important to enable successful intervention, supervision and prevention of improper dietary habits which can be associated with increased risk of some chronic disease.

The purpose of present study was to evaluate energy and nutrient intake and nutritional status of university female students from Bydgoszcz, and to investigate relationship of these factors with type of residence preference during academic year.

MATERIALS AND METHODS

The studied population included 73 female students from Faculty of Pharmacy of Collegium Medicum im. *Ludwika Rydygiera* in Bydgoszcz. Twenty six female students were excluded from father analyses because of missing data, so the final sample population included 47 students. The mean age of students was $22{,}8 \pm 2{,}35$ years.

The 24-hour recall method was used to evaluate dietary intake of subject [4]. Food quantities were assessed by use of "Atlas of photographs of food products and dishes" [12]. Energy and nutrient intake was calculated by software "Dietetyk" which calculate food consumption using food tables currently verified and validated [7]. The results were compared with the nutritional norm at the safe level (RDI) for adult in 19 – 26 years old and moderate physical activity [16]. Cholesterol and food fiber intake was compared with WHO recommendation (300 mg and 25 g respectively) [10]. Physical activity (low or moderate) was taken into account for calculation norm for energy, carbohydrate and fat intake by study subjects. Measurements of height, body mass and four skinfolds thickness values were used for calculation of body mass index (BMI, kg/m^2), free fat mass (FFM, kg) and percentage of fat mass (%FM, %) parameters [6]. Information on type of residence place in time of academic year was obtained through a dedicated lifestyle questionnaire. The *Mann Whitney* U-test was used for statistical analyses.

RESULTS AND DISCUSSION

The higher percentage of students reside at dormitory or rented flat (53,2 %) during academic year than with parents (46,8 %). According to WHO BMI classification 81,8 % of

Table I. Type of residence place and current BMI status of female pharmacy students in Bydgoszcz

BMI class	Type of residence			
	Family home		Dormitory/ rented flat	
	N	%	N	%
< 18,5	1	4,5	4	16,0
18,5 – 24,9	18	81,8	21	84,0
> 25	3	13,7	0	0,0

students were classified into the normal weight category, 4,5 % students were underweight and 13,7 % were overweight in group which permanently live with their parents (table I). Whereas 84 % students were normal weight and 16 % were underweight among students who live without their parents. An analysis of nutritional status of studied population showed that mean body mass, free fat body mass (FFM), and BMI was lower about, respectively, 3,9 kg, 2,5 kg and 0,9 kg/m^2 in students who reside outside their parents home. However there were no significance differences between both considered groups. Percentage of body fat mass (%FM) was very similar in both groups (table II).

Table II. Anthropometric parameters of female pharmacy students in Bydgoszcz

Parameter	Type of residence	
	Family house	Dormitory/ rented flat
	N=22(46,8%)	N=25(53,2%)
Height, cm	167,2 ± 8,4	165,4 ± 5,7
Body mass, kg	60,1 ± 10,3	56,2 ± 5,9
FFM, kg	43,4 ± 5,7	40,9 ± 3,9
% FM	26,5 ± 3,9	26,3 ± 2,8
BMI, kg/m^2	21,4 ± 2,9	20,5 ± 1,8

It was observed that intake of many nutrient was insufficient in reference to norm at the safe level (RDI) in both sub-groups (table III). The estimated mean daily energy intake was 1709 kcal (78,2% RDI) for students who live in family house and 1639 kcal (74,7% RDI) for second group. Daily intake of fiber and cholesterol was similar for students living with and without parents, which was 189 and 193 mg of cholesterol and 17,9 and 18,7 g of fiber, respectively. The very low calcium intake was observed in both group and was significantly lower (47,5% RDI) in group which reside with family than in group which live alone (66,7% RDI). The estimated mean daily iron and copper intake was also very low among students residing both with and without parents (66,6 vs. 64,8% RDI and 49,4 vs. 44,3% RDI, respectively). Beside an analysis showed low intake of vitamin PP for female students who reside without parents (56,9 % RDI). Intake of vitamin B_1 and C in daily food rations filled the norm, but intake of vitamin B_2 was insufficient in both group. Daily food rations contained excessive quantities of phosphorus and retinol in case of female students residing with and without parents (132,4 vs. 138,7 % RDI and 129,0 vs. 143,1 % RDI, respectively). Percentage of realization of norm for magnesium was slightly lowered in the group of female students residing with parents (86,9 % RDI) compare to the group which reside without parents (89,2 % RDI).

Table III. Nutrient intake of female pharmacy students in Bydgoszcz

Parameter	Type of residence			
	Family home		Dormitory/rented flat	
	N=22 (46,8%)		N=25 (53,2%)	
	Intake (x ± SD)	%RDI	Intake (x ± SD)	%RDI
Energy, (kcal)	1709 ± 601	78,2 ± 27,6	1639 ± 449	74,7 ± 20,8
Protein, (g)	61,7 ± 25,6	77,2 ± 32,1	56,4 ± 15,73	70,6 ± 19,7
Carbohydrate, (g)	230 ± 74	80,2 ± 25,9	206 ± 68	71,7 ± 23,7
Food fiber, (g)	17,9 ± 7,6	71,8 ± 30,6	18,7 ± 7,7	75,0 ± 30,7
Fat, (g)	59,9 ± 36,5	85,6 ± 52,2	65 ± 25	93,5 ± 36,1
Cholesterol ,(mg)	189 ± 101	63,3 ± 33,8	193 ± 94	64,5 ± 31,4
Calcium, (mg) [a]	504 ± 184	47,5 ± 18,0	707 ± 319	66,7 ± 31,4
Phosphorus, (mg)	1032 ± 392	132,4 ± 52,4	1090 ± 323	138,7 ± 42,5
Magnesium, (mg)	243 ± 80	86,9 ± 28,9	250 ± 92	89,2 ± 32,9
Iron, (mg)	9,3 ± 2,9	66,6 ± 20,6	9,1 ± 2,8	64,8 ± 19,8
Zinc, (mg)	7,6 ± 2,5	76,2 ± 25,4	8,1 ± 2,2	81,0 ± 21,9
Copper, (mg)	1,1 ± 0,4	49,4 ± 20,0	1,00 ± 0,36	44,3 ± 15,9
Vitamin A, (μg RE)	773 ± 668	129,0 ± 111,5	858 ± 780	143,1 ± 130,1
Vitamin B_1, (mg)	0,92 ± 0,43	105,3 ± 49,1	0,81 ± 0,24	92,1 ± 27,1
Vitamin B_2, (mg)	1,29 ± 0,57	80,3 ± 35,8	1,31 ± 0,42	81,6 ± 26,1
Vitamin PP, (mg)	16,7 ± 12,4	87,8 ± 65,4	10,8 ± 5,0	56,9 ± 26,3
Vitamin C, (mg)	57,8 ± 43,6	97,4 ± 74,3	61,8 ± 42,5	103,1 ± 70,9
% energy from protein	-	14,7 ± 4,5	-	13,9 ± 2,2
% energy from fat [a]	-	29,9 ± 9,8	-	35,8 ± 8,9
% energy from carbohydrate [a]	-	55,4 ± 9,3	-	50,3 ± 9,3

x – mean, SD – standard deviation, %RDI – percentage of realization of norm at the safe level, [a] - statistically significant difference (*Mann-Whitney* U test)

In comparison to students living without parents who daily food rations content reached 35,8 % from fat and 50,3 % from carbohydrate percentage of energy provided by total fat (29,9 %) was statistically significant lower and percentage of energy from carbohydrate was significantly higher (55,4 %) for students who reside with their parents. Percentage of energy from protein was slightly higher for female students residing in family home than for the sub-group living without parents (14,7 % vs. 13,9 %), but statistical significant differences was not observed.

Students like other segments of the adult population, may not consume diet adequate to their requirements [3]. Entering to university may be an exciting and stressful moment for many young adult. Students have greater freedom and control their lifestyle than ever before, so this period is a suitable time to establish diverse healthy preferences. However researches have shown than many students engage in various unhealthy behaviours such as alcohol and tobacco use, physical inactivity and non-rational dietary practice [15].

The main finding of our study is that pharmacy female students regular diet contained insufficient quantities of various nutrient in both investigated group. Especially, very low intake of calcium, iron and copper was showed. Insufficient intake of this nutrient has been reported also in other female students population [14, 1]. Our study showed that intake of calcium, accompanied by increased intake of phosphorus, was statistically significant lower in group which reside with family. Similarly, *Olędzka* et al., [9], observed that calcium intake

was reduced for female students living in family home in comparison to group residing in dormitory (49,9 % RDI vs. 62,9 % RDI). This relationship was not observed by *Shimbo* et al. [11]. Their study showed that calcium intake was similar for students who reside both in and away from home (454 mg vs. 437 mg), but they observed that iron intake was lower for students residing outside family home. The elevated average intake of retinol (table III) was found in both sub-groups of investigated female students, which is significantly related with fat intake ($r = 0.57$). In view of serious side effects and health risk situations linked with permanent excessive intake of retinol and non-adequacy of dietary recall methods for assessment of micronutrient intake this findings should be verified in future chromatographic analysis of retinol concentration in collected serum samples of subjects.

It was also shown in the present study that percentage of energy from fat was statistically significant lower and percentage of energy from carbohydrate was statistically significant higher for students which residing with their parents. Similar results have been shown in study conducted by *Brevard* and *Ricketts* [3] in group of USA students. They observed lower percentage of energy provided by carbohydrate and higher by fat in case of female students residing on the university campus. It was also showed by *Fisberg* et al. [5] and *Mammas* et al. [8] for students from Brazil and Greece, respectively. They observed high percentage energy from fat and low from carbohydrate in daily food ration of students. Our study showed that energy and protein intake was slightly lower for female students living without their parents. It was observed for female students from Japan [11]. Contrary, *Olędzka* et al. [9], and *Brevard* and *Ricketts* [3], observed that energy intake was higher for students residing in a dormitory or on the campus. These findings indicate that student residence during academic year may reasonable affect their real food choices. *Beerman* et al. [2] identified differences in food choices and dietary practices depending on a student residence. In addition *Brevared* and *Ricketts* [3] suggested that students who reside away from home may eat more fried and fast food, because they do not have time or skills to prepare meal in a dormitory. In contrast, students living with parents may have less money to spend for food and they consume more meals prepared by family members in home.

An analysis of nutritional status of studied here female population showed diminished body mass and BMI in the group residing outside their parents. However, in studies of *Shimbo* et al., 2004, similar body mass and BMI in group residing both in and away from parents (or family) home was observed. Our findings indicate that type of female student residence during academic year significantly affects their dietary intake. Enhanced promotion of a healthy lifestyle is essential to encourage students to improve their dietary habits, what may help prevent of some diseases susceptibility in further years of life.

CONCLUSIONS

1. The female students who reside in family home had lower body mass and BMI in comparison to the sub-group which live outside home.
2. Those who live outside home intake the higher percentage energy from fat and lower from carbohydrate than female students residing in a family home.
3. In both sub-groups of investigated female pharmacy students elevated intake of phosphorus and retinol as well as inadequate intake of riboflavin, calcium, iron and copper was found.

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Summary

The aim of present study was to estimate nutrient intake as well as nutritional status of undergraduate female pharmacy students from Bydgoszcz, and to investigate relationship of these factors with type of usual residence place during academic year. The 24-hour recall method was used to evaluate dietary intake of 47 subjects. Measured values of height, body mass and four skinfolds thickness were used for calculation of BMI, FFM, %FM indices. An analysis of nutritional status of studied population showed lower body mass and BMI in the sub-group of female students residing outside of their parent family. Generally, the average energy and macronutrient intake as a percentage of that suggested as appropriate were diminished in both considered sub-groups of accommodation setting. In comparison to the female students living without parents percentage of energy provided by total fat (29,9 %) was significantly less and percentage of energy from carbohydrate was significantly higher (55,4 %) than students who reside with their parents. Elevated intake of phosphorus and retinol accompanied by inadequate intake of riboflavin, calcium, iron and copper was exhibited in both residence-type related sub-groups of investigated female pharmacy students.

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Streszczenie

Badania podjęto w celu określenia współzależności pomiędzy miejscem zamieszkania podczas roku akademickiego a sposobem żywienia i stanem odżywienia studentek farmacji w Bydgoszczy. Do oceny wartości odżywczej racji pokarmowych zastosowano metodę wywiadu 24-godzinnego. Ponadto wyznaczono wskaźnik masy ciała (BMI), beztłuszczową masę ciała (FFM) oraz odsetek tłuszczu w ciele (%FM). U studentek mieszkających w czasie roku akademickiego poza domem rodzinnym odnotowano niższą masę ciała oraz niższe BMI. Stwierdzono istotnie niższy procentowy udział energii pochodzącej z tłuszczów (29,9 %) oraz istotnie wyższy z węglowodanów (55,4 %) u studentek mieszkających w domu rodzinnym. Odnotowano wysokie spożycie witaminy A i fosforu oraz niewystarczające witaminy B_2, wapnia, żelaza i miedzi w obu badanych grupach.

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