

**VITAMINS AND MINERALS IN DIETS OF FIRST YEAR FEMALE STUDENTS  
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The research was aimed at evaluating dietary energy value and the supply of vitamins and minerals in diets of 1 year female students of the Wrocław University of Environmental and Life Science depending on the place of residence (a family home, academic campus or a rented apartment). Analyses were carried out with the use of triple 24-h dietary recall.

No statistically significant differences were demonstrated between energy value and contents of vitamins and minerals in diets of all female students examined nor in the group of students living in Wrocław (n=127) nor in those of students from smaller towns living in academic dormitories or rented apartments (n=147). Statistically significantly higher intake of vitamin B<sub>1</sub> was only observed with diets of Wrocław citizens (1.1 mg). An average diet of all female students examined was characterised by a low intake of vitamins B<sub>1</sub>, B<sub>2</sub>, B<sub>6</sub> and niacin (approx. 50-75% of Polish recommended dietary allowances) as well as calcium and iron (51% and 63% of dietary allowances, respectively). In addition, analyses demonstrated a too high intake of sodium (250% of minimum intake – without additional salting) and phosphorus (118% of Polish RDA). Insufficient contents of vitamins and minerals were shown in approx. 1/3 of the examined diets of the female students under study.

**INTRODUCTION**

One of the extrinsic factors that significantly affects human development and maintenance of good health condition is rational nutrition. Based on ample research it was demonstrated that by providing an organism with appropriate amounts of all essential nutrients it is possible to considerably reduce or delay the development of nutritionally-determined metabolic diseases. Appropriate to organism's needs intake of *e.g.* antioxidative vitamins (A, E, C) has been documented to exert protective effects in etiology of cardiovascular diseases. They may neutralize free oxygen radicals, inhibit oxidative modification of low-density lipoproteins (LDL) as well as protect organism against inflammatory changes of vascular endothelium [WHO, 2003; Duda, 2000]. Excessive amount of sodium in a diet has been shown to contribute to its increased concentration in blood plasma, which leads to water migration from cells to extracellular compartments and to an increased risk of elevated arterial blood pressure. The excessive intake of salted food evokes atrophic lesions of gastric mucosa, which may facilitate the initiation of the carcinogenic process. Excessive supply of sodium in a diet increases excretion of calcium with urine and, thus, contributes to the loss of calcium from osseous tissue and decreases bone density. As a consequence, people not consuming appropriate amounts of milk and dairy products (sources of calcium) are characterised by increasing susceptibility to bone fracture and devel-

oping osteoporosis [Dawson-Hughes, 2003; Xu *et al.*, 2004]. A too low intake of food products that provide iron, folates and vitamin B<sub>12</sub> may be the major, nutritional cause of anemia and disturbances of hematopoiesis in a body [WHO, 2003; Grundy *et al.*, 2002].

Rational nutrition is of key significance in the adolescents due to their high mental and physical activity, the final phase of the anabolic period but also due to potential emergence of the first symptoms of many nutrition-related disorders and diseases. Wholesome behaviours and lifestyle of academic youth are, undoubtedly, affected by nutritional habits acquired in the childhood and in the period of early adolescence.

The presented study was aimed at evaluating the content of vitamins and minerals as well as energy value in diet of first year female students, and at comparing the intake of those nutrients in a group of women depending on the place of residence. Students living in their family homes continue the nutritional pattern established in their families that is characterised by a higher frequency of consuming traditional products and more rational eating habits [Wądołowska, 2000]. In turn, young people changing their place of residence into a dormitory or a rented flat are compelled to prepare meals by themselves. Their eating habits are characterised by complete freedom in the selection of courses resulting from individual likings and financial status [Klimis-Zacas *et al.*, 2007; Jaworowska & Bazylak, 2007; Morimoto *et al.*, 2006; Fisberg *et al.*, 2006; Pynaert *et al.*, 2007].

## MATERIAL AND METHODS

In the years 2004-2005, a study was carried out that was aimed at evaluating eating habits of 274 female students aged 19-21 years, participating in yearly examinations of posture defects conducted amongst all first year students of the Wrocław University of Environmental and Life Sciences [Wyka & Żechalko-Czajkowska, 2007]. The examined group of young women constituted *ca.* 13% of all female students of the first year. Triple individual 24-h dietary recalls were carried out in working days when the students attended classes of physical education. To determine the amount of consumed food products and dishes use was made of the "Album of photographs of food products and dishes" elaborated at the National Institute of Food and Nutrition in Warsaw [Szponar *et al.*, 2000]. In total, 822 dietary recalls of female students were collected in the study.

The collected dietary interviews enabled evaluating mean energy value of an average food ration, contents of vitamins and minerals in food rations of all female students examined as well as these depending on the place of residence (Wrocław  $n=127$  and other, smaller town  $n=147$ ). Female students living in the country were excluded from analyses due to their low number ( $n=6$ ). Calculations were performed by means of "Dietetyk" software and "Food composition tables" data base [Kunachowicz *et al.*, 2005]. The energy value of an average diet was compared with the recommended dietary allowance (RDA) for women with moderate physical activity aged 19-25 years (2200 kcal), and with body mass of 55 kg. In calculations related to vitamins consideration was given to their culinary and technological losses, thus the content of vitamin C was reduced by 55%, that of folates by 50%, that of vitamin A by 25%, that of vitamin B<sub>1</sub> by 20% and that of vitamin B<sub>2</sub> by 15%. Results obtained were compared with Polish RDA, whereas the minimum dietary intake was adopted for sodium and potassium [Ziemiański, 2001]. In addition, all food rations were divided into percentage fractions of meeting DRA, *i.e.*: 0-30%, 30-50%, 50-70%, 70-90%, 90-110%, 110-130%, and over 130%. A statistical analysis of the results obtained was carried out using Statistica ver. 7 software. Mean values were compared with the Student's t-test after having checked normal distributions of contents of the nutrients examined.

## RESULTS AND DISCUSSION

The quantitative analysis of nutritional assessment demonstrated that the mean energy value of daily diets of all female students diverged considerably from the recommended value (2200 kcal) and reached 1614 kcal, which constituted 73% of DRA (Table 1). In addition, the analysis showed that the place of residence had no statistically significant effect on energy value of the diets of the young women. In diets of female students living in Wrocław it accounted for 1606 kcal, whereas in those of students living in rented flats or dormitories – for 1619 kcal. The appropriate energy supply (90-110% of RDA) was observed in merely 15% of food rations of the examined female students. A too low supply of energy at a level of 0-30% and 30-50% of the recommended value was demonstrated in 11% and 24% of the food rations

analysed (Table 3). The energy value exceeding the recommended dietary allowances (>130%) was observed in 2% of the food rations. Insufficient energy supply in diet of the first year female students resulted from a too low consumption of almost all groups of food products. It was demonstrated that the average food ration of the young women met 50% of the recommended intake for milk and dairy products, 63% of that for cereal products and 68% of that for fruits and vegetables. It should be emphasized, though, that despite the low mean energy value of meals most of the young women examined demonstrated proper body mass. This might be due to the fact that the adopted RDA (2200 kcal for women with moderate physical activity) are too high in respect of days with low physical activity (*e.g.* days of classes). In weekends, spent by most of the youth at their family homes, the intake of food-stuffs is usually remarkably higher and facilitates keeping the correct body mass. Similarly low results referring to energy supply with an average food ration were demonstrated in a groups of Greek women students of medicine [Mammas *et al.*, 2004] as well as amongst Polish female students from Olsztyn [Wądołowska *et al.*, 2004] and Cracow [Gacek, 2003].

Contents of antioxidative vitamins in an average diet of all first year female students of the Wrocław University of Environmental and Life Sciences were presented in Table 1. Mean intake of vitamin A (retinol equivalent) in food rations of female students from Wrocław (803 mcg) and those from outside Wrocław (856 mcg) exceeded the RDA by 34% and 44%, respectively. As little as 15% of the entire group of women examined ( $n=274$ ) met the recommendation (90-110%) for that vitamin. *Ca.* 35% of the diets of the female students were classified to interval meeting 30-70% of RDA. In 15% of the diets, the intake of vitamin A reached over 110% of the recommended values. The supply of vitamin E in an average diet of young women from Wrocław met the RDA in 93%, whereas that of women from outside Wrocław in 97%. *Ca.* 20% of diets of the examined female students demonstrated deficient contents of vitamin E – up to 50% of RDA, whereas *ca.* 10% of the diets were shown to meet >110% of RDA for that vitamin. The content of vitamin C in an average diet of women from Wrocław reached 88% of RDA, in turn in the female students not living in Wrocław it accounted for 100% (60 mg). In *ca.* 40% of food rations of the female students, the supply of that vitamin was shown to reach up to 70% of RDA. No statistically significant differences were demonstrated between contents of antioxidative vitamins in diets of female students living in Wrocław with their families and those not originating from Wrocław and thus living in dormitories or rented apartments. Similar results were described by Jaworowska & Bazylak [2007], who also investigated the effect of place of residence on contents of vitamins in diets. No statistically significant difference was observed in contents of vitamins between diets of female students living with their families or in the campus dormitories. Female students of pharmacy at the Medical Academy in Bydgoszcz living at their family homes were shown to consume 773 mcg of vitamin A (126% of RDA) and 57.8 mg of vitamin C (97% of RDA), whereas the intake of those vitamins in the female students living in dormitories or in rented apartments accounted for 858 mcg (143% of RDA) and 61.8 mg (103% of RDA), respectively.

TABLE 1. Energy value and contents of vitamins in diets of first year female students of the Wrocław University of Environmental and Life Sciences.

Students		Energy value (kcal)	Vitamin A (mcg retinol equivalent)	Vitamin E (mg)	Vitamin D (mcg)	Vitamin C (mg)
Total (n=274)	$\bar{x} \pm SD$ (min- max)	1614 $\pm$ 535 (313-5266)	835 $\pm$ 864 (119-8562)	7.7 $\pm$ (3.9) (1.3-31.2)	1.6 $\pm$ 2.5 (0-11.1)	56.7 $\pm$ 39.7 (3.4-201.3)
	% RDA	73	139	96	32	94
	mcg or mg /1000 kcal		517	4.7	0.9	35.1
Students living in their family home (n=127)	$\bar{x} \pm SD$ (min- max)	1606 $\pm$ 466 (654-3303)	803 $\pm$ 694 (134-7138)	7.5 $\pm$ 3.2 (2.6-20.0)	1.6 $\pm$ 2.6 (0.1-11.1)	52.8 $\pm$ 34.0 (5.2-200.3)
	% RDA	73	133	93	32	88
	mcg or mg / 1000 kcal		500	4.6	0.9	32.8
Students living in dormitory (n=147)	$\bar{x} \pm SD$ (min- max)	1619 $\pm$ 589 (313-5266)	862 $\pm$ 990 (119-8562)	7.8 $\pm$ 4.5 (1.3-31.2)	1.7 $\pm$ 2.4 (0-10.4)	60.1 $\pm$ 43.8 (3.4-201.3)
	% RDA	73	143	97	34	100
	mcg or mg / 1000 kcal		532	4.8	1.0	37.1
		Vitamin B <sub>1</sub> (mg)*	Vitamin B <sub>2</sub> (mg)	Vitamin B <sub>6</sub> (mg)	Niacin (mg)	Folate (mcg)
Total (n=274)	$\bar{x} \pm SD$ (min- max)	0.9 $\pm$ 0.4 (0.2-2.8)	1.2 $\pm$ 0.4 (0.2-3.2)	1.2 $\pm$ 0.5 (0.3-4.1)	9.2 $\pm$ 4.1 (1.6-28.5)	253 $\pm$ 194 (53-822)
	% RDA	52	75	66	48	115
	mcg or mg /1000 kcal	0.5	0.7	0.7	5.7	156
Students living at their family home (n=127)	$\bar{x} \pm SD$ (min- max)	1.1 $\pm$ 0.5 (0.2-2.8)	1.2 $\pm$ 0.4 (0.2-3.1)	1.2 $\pm$ 0.4 (0.5-2.5)	9.0 $\pm$ 3.6 (3.0-21.1)	250 $\pm$ 184 (53-741)
	% RDA	64	75	66	47	113
	mcg or mg / 1000 kcal	0.6	0.7	0.7	5.6	155
Students living in dormitory (n=147)	$\bar{x} \pm SD$ (min- max)	0.8 $\pm$ 0.3 (0.2-2.4)	1.2 $\pm$ 0.6 (0.3-3.2)	1.2 $\pm$ 0.5 (0.3-4.1)	9.4 $\pm$ 4.4 (1.6-28.5)	257 $\pm$ 203 (76-822)
	% RDA	47	75	66	49	116
	mcg or mg / 1000 kcal	0.5	0.7	0.7	5.8	158

\* statistically significant differences between intakes in the group of female students living at their family homes and those from a dormitory.

An earlier survey on eating habits of female students of Musical Academy (n=60) and Higher School of Management and Finances (HSMF) carried out by the Provincial Sanitary and Epidemiological Station in Białystok demonstrated insufficient supply of vitamin C (72% and 67% of RDA, respectively) and vitamin A (female students of HSMF –55% of RDA) in diets of the young women under study [Stożnicka *et al.*, 1999].

In our study, diets of the first year female students of the Wrocław University of Environmental and Life Sciences were shown to supply too low levels of vitamins B<sub>1</sub>, B<sub>2</sub> and B<sub>6</sub> (meeting the RDA in *ca.* 50-75%), which was due, most of all, to insufficient consumption of cereal products (63% of recommended intake on average) as well as fruits and vegetables (68% of recommended intake on average) [Wyka & Żechałko-Czajkowska, 2006]. The average food ration of young women living in Wrocław was found to contain a higher concentration of vitamin B<sub>1</sub> (1.1 mg – 64% of RDA) as compared to that of female students living in dormitories (0.8 mg – 47%), and the difference appeared to be statistically significant (t-test,

$p < 0.001$ ). *Ca.* 30% of food rations of the women examined met the recommended dietary allowances for that vitamin in up to 30%. The supply of vitamins B<sub>2</sub> and B<sub>6</sub> was at a similar level irrespective of the place of residence and accounted for 1.2 mg (*i.e.* 75% and 66% of the Polish RDAs, respectively). In turn, in 25% of the diets the content of vitamin B<sub>2</sub> oscillated around 30-50% of RDA. Such a low intake of that vitamin by the women examined was due to a low consumption of milk and dairy products (*ca.* 50% of the recommended intake) demonstrated in the analysis of consumption of particular food products [Wyka & Żechałko-Czajkowska, 2006]. In *ca.* 55% of the food rations the supply of vitamin B<sub>6</sub> did not exceed even half the Polish RDA. The diets of the students were also characterised by a very low content of niacin. It reached as little as 9 mg and did not meet even half the RDA. Almost all the assayed diets were classified to an interval below 70% of RDA for niacin demand.

A quantitative assessment of nutrition of students of the Pharmacy Division in Warsaw demonstrated a significant difference between nutritional patterns of the first years students

and those of the IV<sup>th</sup> and V<sup>th</sup> year that consisted in a higher percentage of persons categorized, based on classification by Szczygłowa, to a group having proper eating habits. Results obtained point also to more positive eating habits of students living in their family homes. In an average diet of the first year female students of pharmacy, the content of vitamin B<sub>1</sub> accounted for 66.8% of RDA, whereas in that of the V<sup>th</sup> year students – for 90%. The respective values referring to vitamin B<sub>2</sub> accounted for 92% and 119% of RDA, and those concerning niacin – for 58% and 109% of RDA [Oleđzka *et al.*, 2003].

The supply of folates in an average diet of the examined female students of the Wrocław University of Environmental and Life Science appeared to be correct (from 113 to 116% of RDA, depending on the place of residence, Table 1). Caution should be exercised, however, that the assayed women were in the procreation age and, according to recommendations of the Programme for Primary Prophylaxis of Neural Tube Defects, their daily intake of folic acid should reach *ca.* 400 mcg [WHO, 2002; ACOG, 2003]. In addition, it was demonstrated that in *ca.* 30% of the analysed diets the content of that vitamin did not exceed half the RDA. Deficiency of folates in the adults facilitates, among other things, development of atherosclerotic processes, increasing susceptibility of cells to neoplastic lesions as well as accompanies mental disorders depressive in

character and the occurrence of macrocytic anaemia [Oleđzka & Stawarska, 2001; Rogalska–Niedźwiedź *et al.*, 2000]. Investigations of Brazilian female students (n=119) demonstrated a low intake of folates (at a level of 154 mcg) and that almost all food rations (99%) failed to meet the adopted nutritional standards [Morimoto *et al.*, 2006].

Table 2 collates results on the mean intake of minerals in the entire group of women examined as well as depending on the place of residence. No statistically significant differences were observed in the mean intake of those nutrients as affected by the place of residence. Food rations of the women analysed were characterised by excessive concentrations of sodium that met 240-262% of the minimum intake. It should be emphasized that the amount of sodium contained in diets originated from highly-processed food and did not involved customary salting of meals on a plate. In almost all diets of the female students examined the content of sodium exceeded 130% of the minimum intake (Table 3). The assessment of sodium intake with diets of adult women aged 20-30 years from Warsaw (n=21) demonstrated that the main source of its intake (3144 mg on average) was salt added to courses during culinary treatment (49%) and during technological processing (39%). Sodium naturally-occurring in food products constituted as little as 11% of the total content of sodium [Czerwińska &

TABLE 2. Contents of minerals in diets of first year female students of the Wrocław University of Environmental and Life Sciences.

Students		Na (mg)*	K (mg)*	Ca (mg)	P (mg)	Mg (mg)
Total (n=274)	$\bar{x} \pm SD$ (min- max)	1440 ± 740 (190-8468)	2264 ± 799 (633-6122)	570 ± 243 (66-1511)	951 ± 305 (300-2556)	211 ± 76 (50-567)
	% RDA	250	64	51	118	75
	mcg or mg /1000 kcal	892	1402	353	589	130
Students living at their family home (n=127)	$\bar{x} \pm SD$ (min- max)	1507 ± 870 (314-8468)	2259 ± 696 (753-4351)	569 ± 242 (134-1235)	946 ± 286 (386-1888)	211 ± 72 (89-496)
	% RDA	262	64	51	118	75
	mcg or mg / 1000 kcal	938	1406	354	589	131
Students living in dor- mitory (n=147)	$\bar{x} \pm SD$ (min- max)	1383 ± 600 (90-4219)	2268 ± 881 (633-6122)	571 ± 244 (66-1511)	956 ± 322 (300-2556)	211 ± 80 (50-567)
	% RDA	240	64	51	119	75
	mcg or mg / 1000 kcal	853	1400	352	590	130
Total (n=274)		Fe (mg)	Zn (mg)	Cu (mg)		
	$\bar{x} \pm SD$ (min- max)	8.9 ± 3.8 (2.0-25.3)	7.2 ± 2.3 (1.7-20.7)	0.86 ± 0.3 (0.1-2.84)		
	% RDA	63	72	43		
Students living at their family home (n=127)	$\bar{x} \pm SD$ (min- max)	9.0 ± 3.7 (3.8-22.6)	7.1 ± 2.1 (2.8-15.1)	0.8 ± 0.2 (0.3-1.6)		
	% RDA	64	71	40		
	mcg or mg / 1000 kcal	5.6	4.4	0.5		
Students living in dor- mitory (n=147)	$\bar{x} \pm SD$ (min- max)	8.7 ± 3.9 (2.2-25.3)	7.2 ± 2.5 (1.7-20.7)	0.8 ± 0.1 (0.1-2.8)		
	% RDA	62	72	40		
	mcg or mg / 1000 kcal	5.3	4.4	0.5		

\* referred to the minimal dietary allowance (without additional salting).

Czerniawska, 2007]. A survey of Japanese female students (n=353, aged 18-22 years) demonstrated that the highest amounts of sodium (3442 mg on average) in a diet were delivered with traditionally-prepared soups (58%), cereal products (9.6%) as well as fish and sea fruits (4.9%) [Murakami *et al.*, 2007]. A reduction in supply of sodium contained in food products and salt added during culinary treatment is a major recommendation in the prophylaxis of arterial hypertension. A study by Pao-Hwa *et al.* [2003] showed stabilization of arterial blood pressure and improvement of health status of bones by reduced loss of osseous matter and increased bone density in a group of adult Americans (n=186) keeping for 30 days a DASH diet providing various concentration of sodium, *i.e.* 1150, 2300, 3450 mg.

Average diet of the examined female students was characterised by calcium deficiency (*ca.* 570 mg – 51% of RDA). In *ca.* 40% of the diets its content ranged from 30% to 50% of the Polish RDA. It should be emphasized that such a low content of calcium in a diet resulted from insufficient intake of dairy products (50% of recommended level) [Wyka & Żechałko-Czajkowska, 2006]. Ueno *et al.* [2005] demonstrated a high health risk resulting from calcium deficiency in a group of 106 Japanese female students aged 19-23 years. The supply of that nutrient in that group reached 380 mg. In turn, a study by Vatanparast *et al.* [2006] reported on a diminishing supply of calcium in food rations of Canadian female students, *i.e.* from 997 mg to 772 mg over a 10-year period. Those authors emphasized that the reversal of that negative tendency requires increasing the intake of calcium-fortified foodstuffs. Gao *et al.* [2006] showed that the intake of appropriate amounts of

calcium in a group of American teenagers is not possible due to a too low contribution or a lack of dairy products in their diets. Proper modification of diet and introduction of 1.5 portions of fruit juices enriched with calcium increased the supply of that nutrient in diet of girls to a considerable extent (from 498 mg to as much as 1302 mg/day).

In the reported study, the content of iron in an average food ration of all female students examined accounted for 8.9 mg, whereas in that of students living in dormitories and those living in Wrocław it accounted for 8.7 mg and 9.0 mg, respectively, which met RDA in *ca.* 62-64%. In *ca.* 40% of the diets, its content did not exceed 50% of RDA. The appropriate level of iron, *i.e.* 90-110% of RDA, was demonstrated in barely 7% of the diets assayed. In the case of female students of pharmacy from Bydgoszcz living in their family homes, their food rations were shown to provide 9.3 mg of that micronutrient as compared to 9.1 mg noted for students living in dormitories [Jaworowska & Bazylik, 2007]. Diets of young women from Greece contained 10.8 mg [Klimi-Zacas *et al.*, 2007], whereas these of Belgian women – 10.5 mg of iron [Pynaert *et al.*, 2007]. In 80% of food rations of female teenagers from Italy, the intake of iron was below 12 mg/day [Leclercq *et al.*, 2004]. Too low uptake of iron with food may be the major cause of anemia (<12 g/dL of hemoglobin in blood) in the group of the young women under scrutiny. In the study by Eckhardt *et al.* [2007], anemia was demonstrated in 32% of adult women from Egypt, in 31% of women from Peru and in 21% of Mexican women. According to WHO data [2002], a risk factor of iron deficiency in a diet was the cause of death of 0.8 mln of people worldwide.

TABLE 3. Percentage distribution of meeting Recommended Dietary Allowances for energy, selected vitamins and mineral by diets of first year female students of the Wrocław University of Environmental and Life Sciences.

Energy value and nutrients	Percentage of RDA						
	0 – 30	30 – 50	50 – 70	70 – 90	90 – 110	110 – 130	> 130
	% of examined diets						
Energy	11	24	20	18	15	10	2
Vitamin A	5	15	20	30	15	5	10
Vitamin E	4	16	10	25	35	7	3
Vitamin D	20	45	14	10	2	4	5
Vitamin C	10	18	12	15	25	10	10
Vitamin B <sub>1</sub>	30	10	41	3	7	5	4
Vitamin B <sub>2</sub>	10	25	8	37	8	4	8
Vitamin B <sub>6</sub>	15	40	21	10	3	6	5
Vitamin PP	23	32	40	-	-	-	5
Folate	7	23	5	6	32	10	17
Sodium	4	2	-	-	-	-	96
Potassium	5	10	25	33	10	6	11
Calcium	7	40	21	6	3	16	7
Phosphorus	15	9	10	10	19	27	10
Magnesium	5	16	20	25	7	9	18
Iron	13	27	30	5	11	5	9
Zinc	11	16	17	25	15	10	6
Copper	9	37	27	7	12	6	2

## CONCLUSIONS

No statistically significant differences were observed in energy value nor contents of vitamins and minerals in daily food rations between female students from Wrocław eating at their family homes and those originating from smaller towns and living either in dormitories or in rented apartments. The exception was the content of vitamin B<sub>1</sub> which appeared to be significantly higher in a group of students originating from Wrocław. The study demonstrated that the place of residence was not a factor differentiating the energy value and contents of vitamins and minerals in diets of the young women.

The entire examined group was characterised by insufficient intake of energy, vitamins (especially of B<sub>1</sub>, B<sub>2</sub>, and B<sub>6</sub>) and almost all minerals (except for sodium and phosphorus). It should be emphasized that *ca.* 30-40% of the assessed diets did not meet even half the Polish RDAs for those nutrients. Irrational eating habits of the young women under study may in the future be the main cause of nutrition-related disorders and diseases.

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## WITAMINY I SKŁADNIKI MINERALNE W RACJACH POKARMOWYCH STUDENTEK PIERWSZEGO ROKU UNIwersYTETU PRZYRODNICZEGO WE WROCŁAWIU

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Celem badań była ocena wartości energetycznej diet oraz podaży witamin i składników mineralnych w racjach pokarmowych studentek I roku Uniwersytetu Przyrodniczego we Wrocławiu, w zależności od miejsca zamieszkania (żywnie w domu rodzinnym oraz w akademiku lub na stacji). W pracy wykorzystano 3-krotny wywiad o spożyciu z 24 godzin poprzedzających badanie.

Nie wykazano istotnych statystycznie różnic pomiędzy wartością energetyczną oraz zawartością witamin i składników mineralnych w racjach pokarmowych wszystkich studentek, a także w grupie mieszkających we Wrocławiu (n=127) oraz z innych mniejszych miast, które zamieszkały w akademikach lub na stacji (n=147). Stwierdzono jedynie istotnie wyższe spożycie witaminy B<sub>1</sub> w dietach Wrocławianek (1,1 mg). W średniej racji pokarmowej wszystkich badanych studentek wykazano zbyt niskie spożycie witamin B<sub>1</sub>, B<sub>2</sub>, B<sub>6</sub> i niacyny (ok. 50-75% normy żywienia na poziomie bezpiecznym) oraz wapnia i żelaza (odpowiednio 51% i 63% normy). Stwierdzono zbyt wysokie spożycie sodu (250% minimalnej normy spożycia – bez dosalania) oraz fosforu (118% normy na poziomie bezpiecznym). Niedostateczną zawartość witamin i składników mineralnych wykazano w około 1/3 badanych racji pokarmowych studentek.