POLISH JOURNAL OF FOOD AND NUTRITION SCIENCES
Pol. J. Food Nutr. Sci. 2006, Vol. 15/56, No 1, pp. 83–90

NUTRITIONAL PATTERNS OF 40-YEAR-OLD WOMEN FROM WROCŁAW IN THE ASPECT OF THE RISK OF CARDIOVASCULAR DISEASES. PART I. INTAKE OF SELECTED NUTRIENTS AND GROUPS OF FOOD PRODUCTS

Monika Bronkowska, Alicja Żechałko-Czajkowska

Chair of Human Nutrition, Department of Agricultural Technology and Storage, Agricultural University of Wrocław, Wrocław

Key words: women, food intake, cardiovascular diseases

The paper addressed the assessment of nutritional patterns of 40-year-old women (n=592), participants of the programme "Prevention of cardiovascular diseases in a selected population from Wrocław". Information on food intakes were collected using 24–h recall and history of nutrition (among others: usual daily number of meals, consumption frequency of different food products, nutritional preferences).

The qualitative analysis of nutritional patterns demonstrated that in 63% of the women examined food intake was highly irregular. A daily distribution of meals was characterized by shifting the time of their consumption to late afternoon or evening hours.

In the average food ration, energy derived from fat, protein and carbohydrates accounted for 32.9%, 13.9% and 53.2%, respectively. It was shown that the daily food rations of women were inadequately low in cereal products (80% of the recommended level), milk and dietary products (66%), potatoes (61%) as well as fruit and vegetables (86%).

INTRODUCTION

A proper, well-balanced diet is one of the factors determining the health condition of humans. Results of epidemiological studies carried out on cohort groups [Schulte *et al.*, 1999; WHO, 2003] and observations made on populations of multiple countries [among others: Elmstahl *et al.*, 1999; Pardo *et al.*, 2001; World Health Report, 2002] have confirmed the undisputed relationship between inappropriate, irrational nutrition and the development of civilization diseases, including cardiovascular diseases, obesity, arterial hypertension, insulin-dependent diabetes, tumors *etc*.

Health risks commonly occurring in the Polish population, *e.g.* improper lifestyle (smoking, a lack of physical activity), and an irrational diet have contributed to the development of a number of disease entities [Sygnowska *et al.*, 1996]. According to data by the Main Office of Statistics of the year 2003 [Statistical Yearbook, 2004], the number of deaths caused by cardiovascular diseases constituted *ca.* 56.7% of total deaths in Poland and was found to increase twofold over a time span of 44 years [Statistical Yearbook, 1961]. It should be emphasized, however, that from the beginning of the 1990-ies an opposite tendency has been observed in so far a steady increase in the number of deaths of cardiovascular diseases due to a reduced intake of animal fats [Narojek, 1997; Waśkiewicz & Sygnowska, 2002].

The study addressed the evaluation of the nutritional patterns of 40-year-old women from Wrocław differing in terms of educational and professional status. Correlations between food intake and other risk factors of cardiovascular diseases in those women (among others: blood lipid indices, overweight and obesity, hypertension) will be presented in the next part of the paper.

MATERIAL AND METHODS

A nutritional study covered female participants of the programme „Prevention of cardiovascular diseases in a selected population of the 40-year-olds from Wrocław" which was coordinated by the Health Department of the City Office of Wrocław in the years 1999–2001. The women were selected based on the Personal Identification Number (*ca.* 10 000 of 40-year old women a year) and invited by mail to prophylactic examinations. Of the responding women (*ca.* 30% of the total population) 592 have agreed to take part in the nutritional study.

The assessment of food intake was carried out on data collected using 24-h recall and history of nutrition covering 2-3 months prior the experiment. In the quantitative evaluation, use was made of the "Photo album of products and dishes" elaborated at the National Food and Nutrition Institute [Album fotografii produktów i potraw, 1996]. Food ratios analysed with "Dietetyk 2000" software for Windows

Author's address for correspondence: Monika Bronkowska, Department of Agricultural Technology and Storage, Faculty of Food Sciences, Agricultural University, ul. Norwida 25, 50-375 Wrocław, Poland; e-mail: monika@wnoz.ar.wroc.pl

95, containing a data basis created by the authors based on "Tables of nutritive values of food products" [Kunachowicz *et al.*, 1998] and "Dishes – composition and nutritive value" prepared at the National Food and Nutrition Institute [Nadolna *et al.*, 1994], were determined for energy value and contents of 19 dietary components. Basic losses occurring during culinary and technological treatment were considered by reducing the energy value and contents of proximate nutrients by 10%. In addition, calculations were made for the intakes of 8 groups of food products. The history of nutrition was taken using a questionnaire that contained questions referring to nutritional preferences, usual daily number of meals, usual consumption frequency of different food products and dishes, and personal evaluation of eating habits. In this part of the manuscript, consideration was also given to data on some elements of life style (smoking, physical activity).

At the beginning, the group of women under scrutiny was divided in terms of the level of occupational physical activity, however no statistically significant differences (Student's t-test for independent variables) were observed in food intakes between particular groups of women. No significant differences were either observed in the intakes of nutrients between groups differing in educational status.

The assessment of the nutritional patterns of the women was carried out using our own health-promoting nutrition model elaborated based on international recommendations and a number of nutritional and cardiologic programs and reports, including those of the experts of World Health Organization [2002, 2003] and National Cholesterol Education Program Adults Treatment Panel III [Grundy *et al.*, 2001]. The design of the health-promoting model and results achieved for the proximate nutrients were presented in Table 1.

The model assumed the energy value recommended for 40-year-old women [Ziemlański, 2001] as a weighted mean, taking into account the appropriate proportion of women with small and moderate occupational activity. The per cent contributions of energy originated from protein (12%), fats (30%), and carbohydrates (58%) were used to determine the recommended dietary allowance of those components in the health-promoting model. Following recommendations of experts, 30 g of dietary fiber and 300 mg of cholesterol were accepted as desirable in the women's diet.

In the employed health-promoting model of fatty acid intake, elaborated based on WHO recommendations [WHO, 2003] as well as international and domestic reference data [among others: Lauritzen *et al.*, 2001; Paradowski & Kempiński, 2003; Ziemlański, 2001], the following contribution of fatty acids in the total energy value was accepted: energy derived from saturated fatty acids (SFA) – 10% (including 7% of energy originated from lauric acid 12:0, myrisitic acid 14:0 and palmitic acid 16:0); energy derived from monounsaturated fatty acids (MUFA) – 12% (including 11% from oleic acid 18:1); and energy derived from polyunsaturated fatty acids (PUFA) – 8% (including 5.5% from linolic acid 18:2 n-6, 1.5% from linolenic acid 18:3 n-3, and 1.5% from the sum of eicosapentaenoic 20:5 n-3 and decosahexaenoic 22:6 n-3 acids).

Data referring to the intake of individual fatty acids by the women examined and recommendations of the health-promoting model were compiled in Table 2.

In addition, the Keys' index of diet atherogenictity was calculated:

$[1.35\times(2\times\%\text{en. from SFA}-\%\text{en. from PUFA})+1.5\times\sqrt{\text{cholesterol/1000kcal}}]$, [Rywik & Broda, 2002a, b]; and the results were presented in Table 2.

The results obtained were divided according to the per cent of meeting the recommendations of the health-promoting model (Table 3), *i.e.* ranges of: 0–30%, 30%–50%, 50%–70%, 70%–90%, 90%–110%, 110%–130%, and over 130%; with the 90%–110% range acknowledged as the appropriate and consistent with recommendations.

The mean intakes of food products (converted into the main products) by the examined women from Wrocław were compared with recommendations according to Szponar *et al.* [2001]. In the employed health-promoting model, use was made of data for a basic diet of 26–60-year-old female, after interpolation of a food ration from 1910 kcal to 2014 kcal (the mean energy value in the presented study), and the results obtained were presented in Table 4.

RESULTS AND DISCUSSION

The examined group of women was characterised by differentiated occupational physical activity. *Ca*. 62% of the group (n=367) was constituted by women with a low occupational physical activity, among others: teachers, secretaries, accountants; 38% of the women (n=225) were classified to a group of moderate occupational physical activity , which included, among others, dressmakers, cleaning ladies, and nurses. Most of the women had higher education (59%) or academic education (25%). It should be emphasized that *ca.* 51% of the respondents were smokers; 27% of the women declared to smoke 10–20 cigarettes daily, 13% – up to 10 cigarettes daily, and 8% – more than 20 cigarettes daily.

In terms of the marital status, 79% of the women under scrutiny were married, 13% were divorced, 3% were widows, and 5% were singles.

In respect of the extra-occupational physical activity, 30% of the women described their lifestyle as active, 48% – as relatively active and 21% as little active. Participation in regular physical exercises (aerobic, callanetics, jogging, *ca.* 2.5 h a week on average) was declared by 22% of the women.

The frequency of meal consumption is of significant importance to the proper functioning of the body. Appropriate distribution of meals over the entire day has an impact on the reduced incidence of overweight and obesity as well as results in better and more complete utilization of nutrients. The regularity of consuming meals has been reported to positively affect stabilization and, most of all, reduction of body mass [Charzewska *et al.*, 2003]. In the reported study, the history of nutrition demonstrated that as little as 37% of the examined women were characterised by appropriate daily distribution of meals, *i.e.* more than 3 meals a day and 3.5–4.5 h breaks between them. The other 63% of the subjects demonstrated partly appropriate or inappropriate distribution of meals.

The qualitative analysis of 24-h recalls and history of nutrition indicated that meals consumed by the women were generally little diversified. Usually, the first and second breakfast consisted of sandwiches made of white bread spread with either butter or margarine, and cheese or different cured meat products used as additives. Dinner usually meant the second course that consisted most often of potatoes and a meat additive (burger, pork chop, chicken chop, stew). Vegetable additives to dinners usually included dill pickles, tomatoes, Chinese cabbage, lettuce and fresh cucumbers. The most frequently consumed soups were tomato soup, vegetable soup, barley soup and chicken soup with noodles. Supper usually consisted of sandwiches with cured meat products and/or cheese as well as "hot courses" (hot sausage, scrambled eggs) or heated dinner dishes, sometimes with a vegetable additive. Yoghurts, chocolate bars and fruit were declared the most frequently as an afternoon dessert or the so-called "snacks".

The main courses, constituting even up to 70% of the energy value of a daily food ration, were often consumed in the evening, after insufficient food intake over the entire day (according to 24-h recall). It appeared surprising that as much as 81% of the women examined acknowledged their nutrition patterns as good or very good. The proper distribution and regularity of meals exert a significant effect on lipid metabolism. A number of nutritional investigations carried out on different groups of the Polish population have demonstrated a high irregularity of nutrition [among others: Charzewska *et al.*, 2003; Sygnowska *et al.*, 1996].

Most of the women analysed rather did not pay attention to nutritional patterns. Interviews have demonstrated, however, that the subjects with academic and higher education were aware of the nutritional errors made. They have not modified their dietary habits due to a lack of time or reluctance of changes. Overweight and obese women were conscious of the incorrectness of their nutritional patterns. Thus it may be supposed that they accepted their overweight and obesity to a great extent and neglected potential health consequences.

The energy value of an average food ration of the women examined reached 7.6 MJ (1823.5 kcal) (Table 1) and was similar to the results obtained in other Polish investigations [Pietruszka *et al.*, 1998; Przysławski & Grygiel, 2003]. Nevertheless, the energy value of *ca.* 27% of the food rations analysed was very low and ranged from 50% to 70% of the recommended allowances, whereas that of 29% of food rations constituted 70–90% of the recommended allowances of the health-promoting programme (Table 3).

Intensive urban development and consequent common mechanization and automation of life in economically-developed countries have contributed to a reduced energy value of food rations consumed [Fraire *et al.*, 2003; Hermann-Kunz & Thamm, 1999]. Investigations carried out in 2001 in the city of Warsaw and the former Tarnobrzeskie Province under the Pol-MONICA BIS programme [Rywik & Broda, 2002a, b] have indicated that the energy value of food rations of women aged 35–44 years was lower than in the reported study and accounted for 7.1 MJ and 7.4 MJ (1702.0 kcal and 1765.4 kcal).

In the investigated group of women, the mean intake of total protein reached 63 g (Table 1). The proper intake of that component, meeting 90–110% of the recommended allowances, was reported in as little as 23% of the food rations examined. In *ca.* 23% of the food rations, the total protein intake was over 130% of the recommended level according to the health-promoting model (Table 3). The contribution of protein-derived energy in an average food ration reached 13.9%, compared to the recommended level of 12%. In other Polish research, the per cent of energy originated from protein ranged from 10.6 to 14% [Górnicka & Gronowska-Senger, 2003; Pardo *et al.*, 2001; Pietruszka *et al.*, 1998; Przysławski & Grygiel, 2003; Sygnowska *et al.*, 1996; Szponar *et al.*, 2003]. The Pol-MONICA BIS assay has demonstrated that the mean intake of total protein in women aged 35–44 years reached 57.8 g both for the subjects originating from Warsaw and those from the former Tarnobrzskie Province, whereas the contribution of protein-derived energy accounted for 14.1% [Rywik & Broda, 2002a, b]. A high protein intake has also been observed in a number of economically-developed countries, *e.g.* in Finland – 16.1% of the total energy [Valsta, 1999], Greece – 13.2% [Moschandres & Kafatos, 1999], Portugal – 17.1% [Graça, 1999], Canada – 16.5% [Pomerleau *et al.*, 1999], and Brasil – 14.2% [Fraire *et al.*, 2003].

In the case of women, it has been assumed that the supply of animal protein should reach *ca.* 33% and that of plant protein - 67% of the total protein supply. The investigated group of women was characterised by a high intake of animal protein which accounted for 39.3 g and exceeded the recommended level by as much as 97.5% (Table 1). The average food ration appeared to meet only 58.5% of the

TABLE 1 . Energy value and content of nutrients in food rations of the women examined (n=592).

Energy and nutrients	Mean $\bar{X}$±SD	Min.	Median	Max.	Recommendations of the health--promoting model	% of recommendations of the health--promoting model
Energy (MJ)	7.6±2.3	4.2	7.2	16.6	8.4	90.5
Energy (kcal)	1823.5±557.7	1005.9	1731.6	3951.9	2014	90.5
Total protein (g)	63±22.8	14.6	59.9	183.9	60.4	104.3
Plant protein (g)	23.7±9.4	7.4	21.9	70.5	40.5	58.5
Animal protein (g)	39.3±19.3	0.4	37.7	172.4	19.9	197.5
Total fats (g)	67.2±27.9	18.1	61.4	188.1	67.1	100.1
Cholesterol (mg)	294.4±225.9	0	223.7	1409.4	300	98.1
Total carbohydrates (g)	251.5±86.7	92.9	234.0	661	292.0	86.1
Dietary fibre (g)	18.5±7.2	4.1	17.9	57.9	30.0	61.7

TABLE 2. Fatty acid contents in food rations of the women examined (n=592).

Energy and nutrients	Mean $\bar{X}$±SD	Min.	Max.	Recommendations of the health--promoting model	% of recommendations of the health--promoting model
12:0 (lauric) (g)	0.9±0.8	0	6.7	15.6	105.1
14:0 (myrisitic) (g)	4.4±2.6	0.1	16.3		
16:0 (palmitic) (g)	11.1±5.2	2.1	38.4		
18:0 (stearic) (g)	3.8±2.8	0	1.0	-	-
20:0 (arachidic) (g)	0.1±0.1	0	0.7	-	-
Total SFA* (g)	22.8±11.0	4.2	69.5	22.4	101.8
% energy from SFA	10.2±4.8	1.9	31.1	10.0	102.0
16:1 (palmitoleic) (g)	4.6±3.7	0.0	21.9	-	-
18:1 (oleic) (g)	20.4±10.4	2.1	80.0	24.6	82.7
Total MUFA ** (g)	27.2±13.2	4.9	91.2	26.8	101.3
% energy from MUFA	12.2±5.9	2.2	40.8	12.0	101.7
18:2 (linolic) (g)	8.5±4.8	1.2	33.5	12.3	69.1
18:3 (linolenic) (g)	2.5±2.1	0.2	17.4	3.4	73.5
20:4 (arachidonic) (g)	0.1±0.1	0	1.0	-	-
20:5 (eicosapentaenoic) (g)	0.1±0.2	0	1.8	2.2	9.1
22:6 (docosahexaenoic) (g)	0.1±0.33	0	3.0		
Toal PUFA*** (g)	11.7±6.4	1.7	43.8	17.9	65.3
% energy from PUFA	5.2±2.8	0.8	19.6	8.0	65.0
Keys index****	38.6±15.0	1.0	92.3	34	113.5

*SFA – saturated fatty acids; **MUFA – monounsaturated fatty acids; PUFA – polyunsaturated fatty acids;

**** Keys index – $1.35\times(2 \times$ % en. from SFA – % en. from PUFA) + $1.5 \times \sqrt{\text{cholesterol/1000 kcal}}$

TABLE 3. Per cent realization of recommendations of the health-promoting model in menus of the women examined (n=592).

Energy and nutrients	Per cent realization of recommendations of the health-promoting model						
	0–30%	30–50%	50–70%	70–90%	90–110%	110–130%	>130%
	% of food rations						
Energy	0	0.2	26.5	29.2	24.0	10.1	10.0
Total protein	0.3	4.0	14.7	19.4	23.1	15.9	22.6
Animal protein	0.5	1.7	3.7	5.7	6.1	7.9	74.4
Plant protein	6.1	34.1	35.8	15.0	3.9	4.0	1.0
Total fats	0	2.7	10.3	18.2	19.1	14.2	35.5
Cholesterol	8.8	18.9	19.3	12.3	10.1	6.6	24.0
Saturated fatty acids	0.3	3.2	7.1	12.7	13.7	14.4	48.6
Monounsaturated fatty acids	2.4	12.3	16.0	19.3	14.5	10.3	25.2
Polyunsaturated fatty acids	10.5	18.1	19.2	18.9	12.7	8.1	12.5
Carbohydrates	0.3	9.1	33.6	28.4	15.9	7.6	5.1
Dietary fibre	6.6	26.3	35.3	22.0	6.4	1.9	1.5

recommended allowance for plant protein. In *ca.* 51% of the food rations, the supply of that component was within the 50–90% range of recommendations assumed in the health-promoting model.

The total carbohydrate intake with the average food ration of the women examined reached 251.5 g and was lower by 13.9% from the recommended level (Table 1). In *ca.* 16% of the food rations, the intake of that component constituted 90–110%, whereas in *ca.* 43% of the food rations – as little as 30–70% of the recommended level according to the health-promoting model (Table 3).

The contribution of carbohydrate-derived energy in the average food rations of the women under scrutiny was low and reached 53.2%. The Pol–MONICA BIS assay has demonstrated that in Warsaw women aged 35–44 years the per cent of energy derived from carbohydrates accounted for 50.1%, whereas in those originated from the former Tarnobrzeskie Province – for 52.9% [Rywik & Broda, 2002a, b].

The mean intake of dietary fibre in the food rations of the women reached 18.5 g. In 33% of the food rations, its supply was very low (0–50% of the recommended level), whereas as little as *ca.* 6% of the food rations appeared to meet the appropriate recommended range of 90–110%. Comparably low supply of dietary fibre has been reported in the Pol–MONICA BIS assay [Rywik & Broda, 2002a, b] as well as in experiments carried out in Germany [Hermann-Kunz & Thamm, 1999], Greece [Moschandres & Kafatos, 1999], and Brasil [Fraire *et al.*, 2003]. Dietary fibre intake

meeting the recommended dietary allowances is likely to contribute to a reduced concentration of LDL-cholesterol fraction of blood. Dietary fibre has also been reported to enhance the "utilization" of cholesterol produced in the liver, which limits the possibility of its incorporation into lipoproteins generated in the liver [Grundy *et al.*, 2001].

In the food rations of the women analysed, the mean per cent of energy derived from fat reached 32.9%. In *ca.* 19% of the food rations, fat intake was found to be at the appropriate level (90–110%), whereas in as many as 35.5% of the food rations its supply exceeded 130% of the health-promoting model recommendations. The supply of fats with food rations of the examined group of women was comparable with other Polish data [Pardo *et al.*, 2001; Pietruszka *et al.*, 1998; Sygnowska *et al.*, 1996; Waśkiewicz & Sygnowska, 2002]. According to the Pol–MONICA BIS study, the contribution of energy derived from fats reached 35.8% in women from Warsaw and 33.5% in those from the former Tarnobrzeskie Province [Rywik & Broda, 2002a, b].

It should be emphasized, however, that the above-mentioned results are lower than findings reported by authors from Greece [Moschandres & Kafatos, 1999], Finland [Valsta, 1999], France [Volatier & Verger, 1999], Belgium [De Henauw & De Backer, 1999], and Spain [Schröder *et al.*, 2003].

Cholesterol intake with the mean food ration was 294.4 mg. It was found that in *ca.* 10% of diets cholesterol supply oscillated around the 90–110% range of the model, whereas in 24% of the food rations – it was over 130% of the recommended level. The concentrations of cholesterol demonstrated in the food rations analysed were lower compared to the German [Hermann-Kunz & Thamm, 1999] and Belgian results [de Henauw *et al.*, 1999], yet higher than those reported in the Pol–MONICA BIS programme (265.3 mg) [Rywik & Broda, 2002a, b]. A high content of cholesterol in women's diet (397 mg) has also been observed by Pietruszka *et al.* [1998] who analysed nutritional patterns of inhabitants of three selected villages of the former Warsaw, Radomskie and Bielskopodlaskie Provinces.

The supply of saturated fatty acids (SFA) with the mean food ration of the women reached 22.8 g, which constituted 10.2% of the total energy and was consistent with the recommendations of the employed health-promoting model (Table 2). Still, it is worth emphasizing that in *ca.* 50% of the food rations SFA concentration exceeded 130% of the recommended level. A higher intake of saturated fatty acids has also been observed in the populations of Greeks [Moschandres & Kafatos, 1999], the French [Löwik *et al.*, 1999], the Spanish [Schröder *et al.*, 2003], and Finns [Valsta, 1999], and accounted for *ca.* 12%, 16%, 12.2% and 14.2% of energy, respectively. A high per cent of SFA-derived energy has been demonstrated in Polish assays as well, and reached 14.7% as reported by Sygnowska *et al.* [1996] and 10.8–12.1% according to the Pol–MONICA BIS assay [Rywik & Broda, 2002a, b].

The total intake of monounsaturated fatty acids (MUFA) with the mean food rations of the women reached 27.2 g. Their concentrations met 90–110% of the recommended level in 14.5% of the food rations, whereas in 50% of the subjects the intake of MUFA was below 90% of the recommended level (Table 3). In the recommended health-promoting model, the contribution of energy derived from oleic acid was defined at a level of 11% of total energy. The average food ration appeared to meet 82.7% of the recommended allowance for energy. Results of studies by Valsta [1999] into, among others, the intake of monounsaturated fatty acids, are similar to those reported in this research and oscillate around 11.2% of energy.

Przysławski *et al.* [1999], in their study on the nutritive value of reconstituted food rations from the Wilekopolska region, have demonstrated that MUFA intake constituted 13–14% of energy. According to the Pol–MONICA BIS assay, the per cent of MUFA-derived energy supplied with an average food ration of women aged 35–44 years accounted for 14.4% and 13.6% in subjects from Warsaw and those from the former Tarnobrzeskie Province, respectively [Rywik & Broda, 2002a, b].

The supply of polyunsaturated fatty acids (PUFA) with the average food rations of the women examined reached 11.7 g and was lower by 34.7% than the recommended level. In 37% of the food rations, MUFA intake met the recommended values in as little as 30–70% (Table 2). According to the applied health-promoting model, the contribution of energy from fatty acids 18:2 and 18:3 was to reach 5.5% and 1.5%, respectively. In the average food ration of the women examined, the recommended levels of linolic acid intake were met in 84.0%. In the case of EPA (20:5) and DHA (22:6) acid, the per cent of energy supplied by those acids was very low and constituted only 9% of the recommended daily intake of that group of acids with antiatherosclerotic activity.

In a study aimed at evaluating nutritional patterns of people employed in public and private sectors and originated from the Wielkopolska region, Przysławski [1999] has demonstrated the per cent of polyunsaturated fatty acids (PUFA) to account for 4.1% and 5.2% of the total energy, respectively. In the Pol-MONICA BIS assay, the intake of PUFA constituted *ca.* 6% of energy [Rywik & Broda, 2002a, b].

A diet's atherogenicity is often evaluated by calculating Keys index that includes the intakes of saturated and polyunsaturated fatty acids and dietary cholesterol [Rywik & Broda, 2002a, b]. For the average food ration of the examined group of women, the Keys index was 38.6. It appeared to be too high (113.5%) compared to that proposed in the health-promoting model, *i.e.* 34 (Table 2). In the Pol–MONICA BIS assay [Rywik & Broda, 2002 a, b], the atherogenicity index was higher and accounted for 41.

The results for the intake of selected groups of food products were presented in Table 4. They indicate a low intake of milk and dairy products (66.5% of the recommended level), potatoes as well as vegetables and fruit (61.1% and 85.9% of the recommended level, respectively). In contrast, high intakes were observed in the case of eggs and fats (118.5% and 130.9% of the recommended level, respectively). Insufficient supplies of cereal products, potatoes and fruit with the average food ration affected the scant intake of complex carbohydrates, dietary fibre and other valuable nutrients.

The unbalanced diet and improper lifestyle (smoking, stress, low physical activity) of the examined group of women are likely to contribute to an increased risk of car-

TABLE 4. Groups of products in food rations of the women examined (n=592).

Energy and nutrients	Mean $\bar{X}$±SD	Min.	Max.	Recommendations of the health--promoting model	% of recommendations of the health--promoting model
Cereal products*	193±103.6	3.3	711.6	242.5	79.8
Milk and dairy products**	424±422.3	0	2197.8	637.9	66.5
Eggs	21±34.1	0	208.0	17.6	118.5
Fats	48±24.6	0	186.0	36.9	130.9
Meat and meat products***	164±125.7	0	907.2	158.2	103.8
Potatoes	161±155.4	0	1026.9	263.4	61.1
Vegetables and fruit	630±446.4	0	3282.1	738.1	85.9
Sugar and sweets	40±41.3	0	235.1	42.2	96.0

Conversion into the main products:

* cereal products 100 g → 135 g bread and rolls; 135 g confectionery bread products

** milk and dairy products 100 g → 15 g cottage cheeses; 30 g homogenised cottage cheeses; 10 g rennet and processed cheeses

*** meat and meat products 100 g → 120 g poultry; 80 g fish; 70 g different sausages

diovascular diseases in the future. It should be emphasized that at the moment of the assay, 37% of the women were shown to display three (and more) risk factors of cardiovascular diseases (elevated lipid indices, overweight, hypertension, among others). Those results will be elaborated in consecutive manuscripts.

In the light of current results of epidemiological and clinical studies, the introduction of changes in eating habits and lifestyles of the 40-year-old women through an efficient educational process would enable delaying the development dynamics of cardiovascular diseases and long-term improvement of health condition and life quality of the women under study.

CONCLUSIONS

1. A low number of the 40-year-old women going for free-of-charge prophylactic tests points to their poor knowledge and disregard for the possibilities of maintaining and improving their health condition.

2. No statistically significant differences were demonstrated in the nutritional patterns of women depending on their educational and occupational status. Nevertheless, a highly individually-diversified intake of nutrients and irregularity of meal consumption were reported.

3. A high (over 130% of RDA) intake of animal protein, total fats, saturated fatty acids and cholesterol were observed in 74%, 35%, 49% and 24% of the women examined, respectively.

4. The majority of women (70–90%) was demonstrated to be characterised by the insufficient intake of plant protein, dietary fiber and polyunsaturated fatty acids.

5. Insufficient intakes were also reported for cereals products, milk and dairy products, potatoes as well as vegetables and fruit.

6. Nutritional patterns of the majority of 40-year-old women from Wrocław were improper, atherogenic, and approximating eating habits of other populations of economically-developed countries.

REFERENCES

1. Album fotografii produktów i potraw. Prace IŻŻ, Warszawa, 1996.
2. Charzewska J., Wajszczyk B., Chabros E., Rogalska-Niedźwiedź M., Chwojnowska Z., Wholesome aspects of meals consumption frequency – New look at the traditional nutrition. Żyw. Człow. Metab., 2003, 30, 68–75 (in Polish; English abstract).
3. De Henauw S., De Backer G., Nutrient and food intakes in selected subgrups of Belgian adults. Brit. J. Nutr., 1999, 81, S37–S42.
4. Elmstahl S., Holmqvist O., Gullberg B., Johansson U., Berglund G., Dietary patterns in high and low consumers of meat in a Swedish Cohort Study. Appetite, 1999, 32, 191–206.
5. Fraire R.D., Carloso M.A., Shinzato A.R., Ferreira S.R.G., Nutritional status of Japanese-Brazilian subjects: comparison across gender and generation. Brit. J. Nutr., 2003, 89, 705–712.
6. Górnicka M., Gronowska-Senger A., Estimation of the changes in selected nutritive elements consumption in 1990–2000 in Poland. Żyw. Człow. Metab., 2003, 30, 328–334 (in Polish; English abstract).
7. Graça P., Dietary guidelines and food nutrient intakes in Portugal. Brit. J. Nutr., 1999, 81, supl. 2, S99–S103.
8. Grundy S.M., Becker D., Clark L.T. *et al.*, National Cholesterol Education Program (NCEP). Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults (Adults Treatment Panel III). NIH Publication, 2001.
9. Hermann-Kunz E., Thamm M., Dietary recommendations and prevailing food and nutrient intakes in Germany. Brit. J. Nutr., 1999, 81, supl.2, S61–S69.
10. Kunachowicz H., Nadolna I., Przygoda B., Iwanow K., Tabele wartości odżywczej produktów spożywczych. Prace IŻŻ, 1998 nr 85, Warszawa (in Polish).
11. Lauritzen J., Hansen H.S., Jorgensen M.H., The essentiality of long chain n–3 fatty acids in relation to development and function of the brain and retina. Prog. Lip. Res., 2001, 40, 1–94.
12. Löwik M.R.H., Hulshof K.F.A.M., Brussaard J.H., Patterns of food and nutrient intakes of Dutch adults according to intakes of total fat, saturated acids, dietary fiber, and of fruit and vegetables. Brit. J. Nutr., 1999, 81, supl. 2, S91–S98.

13. Moschandreas J., Kafatos A., Food and nutrient intakes of Greek (Cretan) adults. Recent data for food-based dietary guidelines in Greece. Brit. J. Nutr., 1999, 81, suppl. 2, S71–S76.
14. Nadolna I., Kunachowicz H., Iwanow K., Potrawy – skład i wartość odżywcza. Prace IŻŻ, 1994 Warszawa (in Polish).
15. Narojek L., Charakterystyka zmian w spożyciu tłuszczów w Polsce. Żywn. Żywienie a Zdrowie, 1996, 4, 77–82 (in Polish).
16. Paradowski L., Kempiński R., Nutrition and chronic diseases of developed communities. Adv. Clin. Exp. Med., 2003, 12, suppl. 1, 109–116.
17. Pardo B., Szcześniewska D., Waśkiewicz A., Sygnowska E., Overweight and obesity and their environmental determinants in the population of citizens of right-bank Warsaw. Czyn. Ryz., 2001, 1/2, 58–67 (in Polish).
18. Pietruszka B., Brzozowska A., Puzio-Dębska A., Dietary assessment of adults in three villages in Warsaw, Radom and Biała Podlaska districts. Żyw. Człow. Metab., 1998, 49, 219–229 (in Polish; English abstract).
19. Pomerleau J., Østbye T., Bright-See E., Potential underreporting of energy intake in the Ontario Health Survey and its relationship with nutrient and food intakes. Eur. J. Epidemiol., 1999, 15, 553–557.
20. Przysławski J., Gertig H., Bolesławska I., Duda G., Maruszewska M., Nowak J., Nutritional value of diets reconstituted in laboratory of workers employed in public or private sector in the Wielkopolska region. Żyw. Człow. Metab., 1999, 26, 99–110.
21. Przysławski J., Grygiel B., Estimation of nutrition manner of obese women perimenopausal and postmenopausal period. Żyw. Człow. Metab., 2003, 30, 127–132 (in Polish; English abstract).
22. Rywik S., Broda G., Health status of the population of the former Tarnobrzeskie Province in 2001. Inst. Kardiol., Warszawa, 2002 a (in Polish).
23. Rywik S., Broda G., Health status of the Warsaw population in 2001. Inst. Kardiol., Warszawa, 2002 b (in Polish).
24. Schröder H., Marrugat J., Elosua R., Covas M.I., Relationship between body mass index, serum cholesterol, leisure – time physical activity, and diet in a Mediterranean Southern – Europe population. Brit. J. Nutr., 2003, 90, 431–439
25. Schulte H., Cullen P., Assmann G., Obesity, mortality and cardiovascular disease in the Münster Heart Study (PROCAM). Atherosclerosis, 1999, 144, 199–209.
26. Statistical Yearbook, 1961, Main Office of Statistics.
27. Statistical Yearbook, 2004, Main Office of Statistics.
28. Sygnowska E., Jasiński B., Waśkiewicz A., Pardo B., Broda G., Sources of energy and nutrients in the diet of the urban population studied in the Pol–MONICA programme. Żyw. Człow. Metab., 1996, 23, 110–127 (in Polish; English abstract).
29. Szponar L., Turlejska H., Pelzner U. *et al.*, Normy wyżywienia i zbiory receptur w „Podstawy naukowe żywienia w szpitalach". Prace IŻŻ, 2001, Warszawa (in Polish).
30. Szponar L., Ołtarzewski M., Rychlik E., Energy and proteins in daily food of different population groups in Poland. Żyw. Człow. Metab., 2003, 30, 113–119 (in Polish; English abstract).
31. Valsta L. M., Food – based dietary guidelines for Finland – a staged approach. Brit. J. Nutr., 1999, 81, supl.2, S49–S55.
32. Volatier J.L., Verger P., Recent national French food and nutrient intake data. Brit. J. Nutr., 1999, 81, supl. 2, S57–S59.
33. Waśkiewicz A., Sygnowska E., The achievement of recommended guidelines for fat intake in the diet of Warsaw people in the years 1984–2001. Now. Lek., 2002, 71, 265–268 (in Polish; English abstract).
34. World Health Organization., Diet, nutrition and the prevention of chronic disease. Report of joint WHO/FAO Expert Consultation. Technical Report Series, No 916, Geneva, 2003.
35. World Health Report 2002, Reducing Risks, Promoting Healthy Life. World Health Organization, Geneva, 2002.
36. Ziemlanski Ś., Normy żywienia człowieka. Fizjologiczne podstawy. 2001, PZWL Warszawa.

Received March 2005. Revision received August and accepted December 2005.

SPOSÓB ŻYWIENIA 40-LETNICH KOBIET Z WROCŁAWIA W ASPEKCIE ZAGROŻENIA CHOROBAMI UKŁADU KRĄŻENIA. CZ. I. SPOŻYCIE WYBRANYCH SKŁADNIKÓW POKARMOWYCH I GRUP PRODUKTÓW

Monika Bronkowska, Alicja Żechałko-Czajkowska

Zakład Żywienia Człowieka, Katedra Technologii Rolnej i Przechowalnictwa, Akademia Rolnicza, Wrocław

Oceniono sposób żywienia 40-letnich kobiet (n=592) uczestniczek programu „Profilaktyka chorób sercowo-naczyniowych dla wybranej populacji 40-letnich mieszkańców Wrocławia". Zastosowano metodę wywiadu o spożyciu z ostatnich 24 godzin oraz historię żywienia (m.in. zwyczajowa dzienna liczba posiłków, częstotliwość spożywania produktów, upodobania żywieniowe).

Na podstawie analizy jakościowej sposobu żywienia wykazano wśród 63% badanych kobiet dużą nieregularność w przyjmowaniu posiłków. Rozkład posiłków w ciągu dnia charakteryzował się przesunięciem czasu ich spożywania na godziny późno popołudniowe i wieczorne.

W średniej racji pokarmowej udział energii pochodzącej z tłuszczu, białka i węglowodanów wynosił kolejno 32,9%, 13,9%, 53,2%. Wykazano niskie spożycie produktów zbożowych (80% zaleceń), mleka i jego przetworów (66%), ziemniaków (61%) oraz warzyw i owoców (86%).