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Nutritional patterns in the diet of 50-year-old and 60year-old Vilnius men: a 10-year comparative study

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²National Nutrition Centre, Ministry of Health of the Republic of Lithuania, Vilnius, Lithuania **Background.** Over the past decade, mortality caused by coronary heart disease (CHD) has been rising in Lithuania. There is a close relationship between nutrition and CHD. We failed to find any confirming data from any comparative studies showing the actual nutritional status of a population either in Lithuania or other Baltic States. Therefore, the purpose of our study was to compare the state of nutrition in a population of 50-year-old men with the same group of men after a period of 10 years.

Materials and methods. We investigated 82 randomly selected 60-year-old men who took part in the LiVicordia study in 1994. Food intake was studied by the 24-hour recall method.

Results. The diet of the men was too rich in animal fat, mono- and disaccharides, and it was poor in complex carbohydrates, vegetable fat, and some antioxidant vitamins. The total energy intake of the men investigated in 1994 was higher than it was in 2004 because of a significantly higher fat intake. The mineral composition of the diet did not significantly change, with the exception of calcium, the daily intake of which was significantly higher in 2004 compared to the one in 1994. Daily intake of vitamin E was significantly lower in 2004 than it was 10 years earlier.

Conclusions. The chemical composition of the diet of Vilnius men during the 10-year period was unbalanced and unhealthy (too rich in animal fat, mono- and disaccharides, and too poor in vegetable fat and vitamin E) and could therefore be considered a risk factor for CHD.

Key words: nutrition, fats, diet, antioxidants, risk factor, comparative study

INTRODUCTION

Coronary heart disease (CHD) is one of the main causes of death in adults in many European countries, including Lithuania (1, 2). Serum cholesterol is the most significant risk factor for CHD. The most important determinant of serum cholesterol levels is one's habitual diet, in which the quality of fat is more important than total fat intake. A high intake of saturated fat is strongly related to elevated serum levels of total and low-density lipoprotein (LDL) cholesterol, while n-6 polyunsaturated fatty acids (PUFAs) reduce serum cholesterol. Diets with a high proportion of saturated fat have accordingly been associated with CHD, and high intake of PUFA has been considered beneficial with regard to cardiovascular risk (3). The most important risk factor in which diet plays the major role, both in causation and treatment, is dyslipoproteinemia (4, 5).

In addition to that, there is evidence of a relationship between deficiency in antioxidant micronutrients such as vitamins E, C and β -carotene in the diet and an increased risk of cardiovascular disease (6–8). It is now recognized that the oxidation of LDL, the main carrier particles for cholesterol in the blood, is involved in the development of atherosclerosis. Several epidemiological studies, both prospective and retrospective, have indicated that diet high in saturated fat and cholesterol may also increase the risk of cancer (9–11).

Over the past decade, mortality caused by CHD has been declining in Western Europe and rising in the Baltic States, including Lithuania (1, 2, 12–14). We could not find any confirming data from any ten-year comparative studies showing the actual nutritional status of a population either in Lithuania or other Baltic States. Therefore, the purpose of our study was to compare the state of nutrition as one of the potential risk factors for atherosclerosis in a population of 50-year-old Vilnius men with the same group of men after a 10-year period.

MATERIALS AND METHODS

We investigated the 60-year-old men who had taken part in the LiVicordia (Linköping – Vilnius coronary disease risk assessment) study in 1994. The sample group consisted of 82 randomly selected men from Vilnius. Our investigation took place in 1994 and 2004. Food intake was studied by the 24-hour recall method. This is a retrospective investigation that is performed as a personal interview (15). A specially trained person conducted the interviews. Only one interview was conducted with each man investigated. The interviews were evenly distributed from Monday to Friday, thereby reflecting food consumption from Sunday to Thursday, and the interviews were performed during the same periods of the year. The men investigated were asked to

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say what they had consumed over the period of 24 hours from 00.00 until 24.00 the day and night preceding the interview. The interview form was open-ended, and the general questions were "What did you eat and drink?" and "Did you eat or drink any-thing else?" Further supplementary questions and probes such as "Did you have any snacks during the day?" were used to assist the man investigated in recalling what he had consumed. After that, a checklist was used to remind the man investigated in case he had forgotten anything, for example sweets, ketchup, fruit, ice cream etc.

Each reported food was assigned a food code. The quantity of each food was converted from cups, slices and plates to weight in grams of the edible portion of food. The energy and nutrient contribution of the quantity of each food was calculated partially using the original Lithuanian food composition tables (16) and, in addition, the Russian food composition tables (17–19). The nutritional data were counted according to an original computer program (20). Decrease in energy and nutrient amounts caused by cooking the meals was taken into consideration. Data are expressed as mean \pm standard deviation. The level of statistical significance was set at p < 0.05. All calculations were made with the SPSS computer program (v. 13.0).

The study was approved by the Bioethical Committee of Lithuania (Approval No. 26 of 26 March 2004).

RESULTS

The results of the dietary energy and macronutrient intake of the men in 1994 and 2004 are presented in Table 1.

According to the data shown in Table 1, the total energy intake in the diet of the men in 2004 was lower than it was 10 years earlier but nevertheless met dietary recommendations for 50–64-year-old men (21). This could not be considered to be a risk factor for coronary heart disease.

The estimated data of the chemical composition of the diet in percentages of energy are presented in Fig. 1.

Fat intake of men investigated in 1994 and 2004 was significantly too high, compared to the recommended 15–30% (22).

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Chemical composition	2004		1994	
	Mean	St. deviation	Mean	St. deviation
Energy (kcal)	2356	678.79	2534	929.85
Protein (g)	82.02	31.78	76.14	28.32
Animal protein (g)	58.48	30.85	46.67	22.49
Fat (g)	101.50*	45.05	119.13*	58.36
Vegetable fat (g)	28.20	16.82	33.47	36.75
Carbohydrates (g)	256.65	80.49	257.96	91.43
Mono- and disaccharides (g)	103.38	42.35	102.91	51.01

* p < 0.05

Table 2. Mineral composition of the diet (n = 82)

Chemical composition	2004		1994	
	Mean	St. deviation	Mean	St. deviation
Sodium (mg)	4991.39	2617.79	4830.79	3553.16
Potassium (mg)	3394.49	1352.96	3306.90	2470.51
Calcium (mg)	817.07*	437.51	609.50*	373.96
Magnesium (mg)	309.00	91.31	271.49	151.19
Phosphorus (mg)	1415.32	469.22	1243.00	576.04
Iron (mg)	18.88	6.81	18.19	13.22
lodine (µg)	86.11	70.18	75.48	53.44

* p < 0.05

Table 3. Vitamins in the diet (n = 82)

Chemical composition	2004		1994	
	Mean	St. deviation	Mean	St. deviation
Vitamin A (mg)	0.78	2.46	0.49	0.9
Retinol equivalent	1.17	2.58	0.82	1.00
beta carotene (mg)	2.29	3.36	2.03	2.19
Vitamin B ₁ (mg)	1.48	0.75	1.69	1.61
Vitamin B ₂ (mg)	1.93	1.16	3.74	12.30
Vitamin PP (mg)	16.44	7.14	16.40	10.91
Vitamin C (mg)	76.15	61.12	72.34	67.92
Vitamin E (mg)	11.84*	6.58	17.80*	17.25



Fig. 1. Chemical composition of the diet in terms of energy (percentages)

The diet of Vilnius men was also too rich in mono- and disaccharides. According to recommendations, simple carbohydrates such as mono- and disaccharides should not supply more than 10% of energy (22).

The daily protein intake was found to be within normal physiological limits and comprised about 14% of total energy intake of the men in 2004 and about 13% in the same group of men 10 years earlier.

As could be seen in Table 2, the mineral composition of the diet of the men in 1994 and 2004 did not significantly change over the 10-year period. We discovered significantly smaller concentrations of calcium in the diet of the men in 1994 than we found in 2004. It seems that in 2004 the respondents consumed more dairy products.

The relationship between vitamins in the diet of the men in 1994 and 2004 is presented in Table 3.

Amounts of most vitamins in the diet of the men were within normal physiological limits and did not significantly differ in 1994 and 2004, with the exception of vitamin E, the daily intake of which was significantly higher in 1994 than it was in 2004. The consumption of vitamin A in 1994 was much lower than the recommended daily doses and much lower than it was in 2004, though these data were not significant.

DISCUSSION

In our study we compared the mean level of energy produced from the main ingredients of the diet of men in 1994 and 2004 with the level of energy from those ingredients recommended by WHO/FAO (22). The relationship between the intake of proteins, fats and carbohydrates in both groups of Vilnius men was unhealthy because it contained too much fat. According to the LiVicordia study data, in 1994, Vilnius men mostly used lard and butter for cooking, baking and spread, while Linköping men investigated by the same method in 2004 used mainly margarine and low fat spreads (23). The reduction of fat energy intake in Vilnius men investigated in 2004 compared to men investigated 1994 could be explained by the fact that Vilnius men consumed less lard and butter in 2004. According to the recommendations, 6–10% of total energy intake should come from polyunsaturated fatty acids and less than that should come from saturated fatty acids (22). A high total amount of dietary fat (especially of animal origin) is important in the formation of chylomicrons in the intestinal mucosa, and circulation of chylomicrons in blood is proportional to the amount of fat consumed (24, 25). It is well known that the amount of dietary cholesterol has influence on the level of endogenically synthesized cholesterol and atherosclerosis. A high intake of saturated fat is strongly related to the elevated serum levels of total cholesterol and LDL-cholesterol.

We assume that total energy intake in 1994 was higher than it was in 2004 because of significantly higher fat intake. In 2004, the men consumed 101.50 ± 45.05 grams of fat each 24 hours, and 10 years earlier the same group of men consumed 119.13 \pm 58.36 grams of fat every 24 hours. The energy produced from fat in the diet of the men was significantly higher in 1994 than it was in 2004: 43.13 ± 11.06 and 39.27 ± 10.11 , respectively. Our results for Vilnius men are also supported by earlier research: a nutrition study of Kaunas city inhabitants in 1992–1993 using a seven-day dietary recall method found a similar intake of fat in inhabitants of Kaunas as we found in Vilnius men (26).

Some recent studies show that redox active forms of transition metals such as iron are essential for the promotion of lipid peroxidation by cells, and high dietary iron intake is associated with an increased risk of myocardial infarction (27). We estimated that the men in Vilnius consumed approximately twice as much iron as the recommended (21) 10 mg per day. The concentration of iron in the diet of the men did not differ in 1994 and 2004.

Dietary antioxidants, such as vitamins C, E, A, and beta carotene are important to help prevent coronary heart disease and atherosclerosis by blocking the oxidative modification of low density lipoproteins, which may be selectively incorporated by monocytes in the arterial wall (28–30). Our results are in line with the results of other studies, mainly the LiVicordia study (31), results of which show that, compared to Linköping men, Vilnius men had lower serum levels of the lipid-soluble antioxidant vitamins, especially vitamin E.

CONCLUSIONS

1. In 1994 and 2004, the dietary composition of the population investigated was too rich in fat, especially that of animal origin, and mono- and disaccharides, but too poor in complex carbohydrates and vegetable oils.

2. The total dietary energy intake of the men in 1994 was higher than it was in 2004 because of significantly higher fat intake.

3. The dietary calcium intake in 2004 was significantly higher than it was 10 years earlier.

4. The dietary vitamin E intake in 2004 was significantly lower than it was in 1994.

5. The chemical composition of the diet of Vilnius men in 1994 and 2004 was unbalanced and unhealthy and could therefore be considered to be a risk factor for some cardiovascular diseases.

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PENKIASDEŠIMTMEČIŲ IR ŠEŠIASDEŠIMTMEČIŲ VILNIAUS MIESTO VYRŲ MITYBOS RACIONO YPATUMAI: LYGINAMASIS DEŠIMTIES METŲ TYRIMAS

Santrauka

Daugelyje Europos šalių, įskaitant ir Lietuvą, koronarinė širdies liga yra viena dažniausių suaugusiųjų mirties priežasčių. Paskutinįjį dešimtmetį mirtingumas nuo koronarinės širdies ligos Lietuvoje vis didėjo.

Kadangi yra žinomas glaudus ryšys tarp žmonių mitybos ir aterosklerozės, mūsų **tyrimo tikslas** buvo įvertinti šešiasdešimtmečių Vilniaus miesto vyrų mitybą, kaip vieną iš galimų koronarinės širdies ligos rizikos veiksnių, ir palyginti su tų pačių vyrų mityba prieš 10 metų.

Medžiaga ir metodai. Buvo tirti 60-mečiai vyrai, kurie 1994 m. dalyvavo LiVicordia (Linköping – Vilniaus koronarinės ligos rizikos įvertinimo) tyrime. Atsitiktinės atrankos būdu tyrimui buvo atrinkti 82 Vilniaus vyrai. Tiriamųjų paros maisto racionas buvo apskaičiuotas remiantis apklausa.

Rezultatai. Vyrai su maistu vartojo per daug gyvulinės kilmės riebalų ir mono- bei disacharidų ir per mažai – sudėtingųjų angliavandenių, augalinių riebalų ir kai kurių antioksidacinių vitaminų. Dėl statistiškai patikimai didesnio riebalų suvartojimo bendras energijos sunaudojimas 1994 m. buvo didesnis nei 2004 metais. Mineralinių medžiagų kiekis 1994 ir 2004 metais tirtų vyrų maiste buvo panašus, išskyrus kalcį,– jo 2004 m. vyrai suvartojo statistiškai patikimai daugiau nei 1994 metais. Vitamino E 2004 m. tiriamieji suvartojo patikimai mažiau nei 1994 metais.

Išvados. Vilniaus miesto vyrų mitybos racionas dešimties metų laikotarpiu (1994–2004) nebuvo subalansuotas: tiriamieji per daug vartojo gyvulinių riebalų, mono- ir disacharidų ir per mažai – augalinių riebalų ir vitamino E. Visa tai gali būti laikoma koronarinės širdies ligos rizikos veiksniu.

Raktažodžiai: mityba, riebalai, antioksidaciniai vitaminai, rizikos veiksniai, lyginamasis tyrimas