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Women with large bowel adenomas have lower intake of vitamin A in relation to controls

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Introduction. Literature data on diet effect on the development of large bowel adenomas and carcinomas are controversial.
Study goal. Comparative analysis of diets of patients with large bowel adenomas (study group) and patients without adenomas (control group).
Material and method. Study group and control group patients were recruited from the patients undergoing colonoscopy during routine work of Endoscopy Unit. The study group comprised patients with large bowel adenomas. Patients in the control group had no adenomas found during colonoscopy. The entire material included 111 patients (57 with, and 54 without, large bowel adenomas). The patients were interviewed as to food intake during 30 days preceding the examination and on the basis of this interview the intake of nutrients was calculated.
Results. In the analysis of vitamin intake lower values of all vitamins were found in the studied women. Significant differences were found in the intake of vitamin A (p=0.007) and beta-carotene (p=0.012). In women in the study group the mean vitamin A and beta-carotene level was 1225.3 μg (95% CI= 1021.3-1429.4/) and 4126.9 μg (95% CI=3251.6-5002.1), while in the control group 1865.2 μg (95% CI=1438.9-2291.5) and 6509.5 μg (95% CI= 4794.0-8224.96), respectively. Among studied men the intake of most studied vitamins was also lower, but the differences were not statistically significant.
Conclusion. Lower intake of vitamin A and beta-carotene in women could be one of the factors favouring the development of large bowel adenomas.

Kobiety z gruczolakami jelita grubego mają niższe spożycie witaminy A w porównaniu do grupy kontrolnej

Wstęp. Określenie wpływu żywienia na częstość występowania gruczolaków jelita grubego miałoby istotne znaczenie w prewencji rozwoju raka jelita grubego. W piśmiennictwie są sprzeczne dane o wpływie diety na powstawanie gruczolaków i raka jelita grubego.
Cel pracy. Analiza porównawcza diety pacjentów z gruczolakami jelita grubego (grupa badana) i osób bez gruczolaków (grupa kontrolna).
Materiał i metoda. Grupa badana i kontrolna wyselekcjonowane zostały spośród osób z wykonaną pełną kolonoskopią w ramach rutynowej działalności Pracowni Endoskopowej. Grupa badana składała się z pacjentów ze stwierdzonymi gruczolakami jelita grubego. Grupa kontrolna składała się z chorych, u których w badaniu kolonoskopowym nie zostały stwierdzone gruczolaki. Zbadano w sumie 111 osób (57 z polipami jelita grubego i 54 z grupy kontrolnej). Obliczono spożycie poszczególnych składników pokarmowych, przy użyciu metody oceniającej zwyczajową częstotliwość i ilość spożywania potraw i napojów w czasie 30 dni poprzedzających badanie.
Wyniki. Analizując spożycie witamin, stwierdzano u badanych kobiet mniejsze spożycie wszystkich badanych witamin. Znamienne różnice wystąpiły w stosunku do witaminy A (p=0,007) i beta-karotenu (p=0,012). W grupie badanych kobiet średnie spożycie witaminy A wyniosło 1225,3 μg (95% CI=1021,3-1429,4), podczas gdy w grupie kontrolnej 1865,2 μg (95% CI=1438,9-2291,5). Średnie spożycie beta-karotenu wyniosło w grupie badanej 4126,9 μg (95% CI=3251,6-5002,1), a w grupie kontrolnej 6509,5 μg (95% CI=4794,0-8224,96).
Grupa badanych mężczyzn charakteryzowała się również mniejszym spożyciem większości badanych witamin, ale różnice te nie osiągnęły znamienności statystycznej.

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Wniosek. Obniżone spożycie witaminy A i beta-karotenu u kobiet może być jednym z czynników sprzyjających występowaniu gruczolaków jelita grubego.

Key words: colorectal adenoma, vitamin A, nutrition
Słowa kluczowe: gruczolaki jelita grubego, witamina A, żywienie

Introduction

Large bowel carcinoma is a serious health problem in Poland, and its incidence has been rising in recent years. In the studies carried out in Western European countries and the USA a high incidence of large bowel carcinomas was revealed amounting to some 27% to 47% according to the method used in the populations aged 45 to 50 years [1, 2]. Finding of nutritional factors exerting a protective effect would allow for nutritional preventive measures reducing the incidence and recurrence of large bowel carcinomas.

Unfortunately, the results of hitherto conducted studies are contradictory. Lately, the opinion on the function of fibre [3] and fat [4] has been revised. Data concerning the protective function of antioxidant vitamins in the etiology of colorectal carcinoma is also conflicting.

Theoretical assumptions and study results suggest that intake of antioxidant vitamins could reduce the recurrence rate of polyps. This effect is suggested by the study of Cahill [5] who found a decreased proliferation of cells in the intestinal crypts in patients receiving supplements of vitamins A, E, C and beta-carotene. In these studies vitamin C exerted the most pronounced effect, followed by beta-carotene, while vitamin E had no effect on this proliferation. The protective effect of beta- carotene was observed also in other studies [6].

In their studies on animals Zheng found that retinoids can inhibit cell proliferation and prevent aberrant crypt foci [7]. The inhibition of growth of human colon carcinoma cells through induction of apoptosis in proliferating cells has also been observed in *in vitro* studies [8].

One of the reasons of the lack of consistency in the results of studies on the discussed matter may be the different significance of particular nutrients in different countries. This, and all the other previously cited problems, stand behind the idea of conducting this study.

Study goal

Analysis of differences in vitamin intake between patients with large bowel adenomas (study group) compared with control group.

Material and method

Patients

The study group and the control group were selected from patients undergoing colonoscopy during routine work of the Endoscopy Unit. The study group comprised patients with diagnosis of large bowel adenomas. The entire studied material included 111 patients (57 with large bowel polyps and 54 without polyps, among them 67 women (mean age in the study group 56.39±11.61, and in the control group – 56.39±11.62 yrs.) and 44 men (mean age 62.0±10.88 in the study group and 58.2±11.72 yrs.

Exclusion criteria were: the diagnosis of carcinoma, severe dysplasia, malabsorption syndrome and other diseases leading to nutritional deficits or intestinal absorption disorders (alcoholism, drugs).

The study was carried out after obtaining the approval the local Ethical Board. The patients formally agreed to take part in the project.

Calculation of nutrients intake

In both groups dietary history was obtained with an inquiry form including data on usual consumption of dishes and drinks, and their amounts and consumption frequency assessing the intake of vitamins during 30 days preceding the study.

The intake of nutrients in everyday diet was established by interviewing the patients using an album of food products [9].

The information was used to estimate the calorie and nutrients value of habitual daily diet. The calculations were obtained using the Diet 2 software, which provides information on composition and nutritional value of given elements of the diet. This computer program had been created and accepted by the National Institute of Food and Nutrition [10].

The statistical analysis was based on Student's t-test, accepting $p=0.05$ as statistically significant. In the analysis of statistically significant differences between the groups the 95% confidence interval for the mean value was given (95%CI).

Results

In the study group of women, in relation to controls, no significant differences were found in the consumption level as expressed by calorie value (1755.8 kcal vs. 1925 kcal), the intake of protein (69.1 g vs. 76.1 g) carbohydrates (237.2 g vs. 258.0 kcal). In the studied men the consumption of total protein was lower (84.6g), similarly as the consumption of carbohydrates (275.7 g) and energy (2126.9 kcal) in relation to controls, for whom the respective values were: 98.4 g, 336.1 g, 2612.8 kcal, but the differences were not significant statistically. The results are presented in Table I.

In women from the study group the mean vitamin A intake was 1225.3 μg (95% CI=1021.3-1429.4), while in the control group it was 1865.2 μg (95% CI=1438.9--2291.5), $p=0.007$. The mean intake of beta-carotene was 4126.9 μg (95% CI=3251.6-5002.1) in the study group and 6509,5 μg (95% CI=4794,0-8224.96), $p=0.012$.

In women in the study group, in relation to those in the control group, no differences were found in the intake of retinol (483.7 μg vs. 691.9 μg), vitamin E (8.9 mg vs. 10.4 mg), thiamin (1.0 mg vs. 1.1 mg), riboflavin (1,5 mg vs. 1.7 mg), niacin (12.6 vs. 13.8 mg), vitamin B6 (1.6 vs. 1.8 mg) and vitamin C (96.3 vs. 121.3 mg).

Table I. The content of studied nutritional components in the usual diet in the study group (SG) and control group (CG)

		Energy (kcal)	Total protein (g)	Carbohydrates (g)	Total fat (g)	ENP (%)	ENF (%)	ENC (%)
				Women				
SG	M	1755.8	69.1	237.2	67.2	15.3	33.7	50.7
	SD	450.3	20.2	64.5	22.8	2.4	6.2	6.5
CG	M	1925.0	76.1	258.0	73.4	15.4	33.0	51.0
	SD	586.0	27.4	72.9	29.0	2.6	5.1	6.9
p=		NS	NS	NS	NS	NS	NS	NS
				Men				
SG	M	2126.9	84.6	275.7	83.6	15.4	33.8	49.5
	SD	759.3	31.6	83.6	40.0	2.2	5.9	7.0
CG	M	2612.8	98.4	336.1	102.3	15.0	34.2	48.4
	SD	868.5	24.9	118.2	44.2	2.0	4.7	6.4
p=		NS	NS	NS	NS	NS	NS	NS

[M-mean, SD – standard deviation, EN – % of energy derived from protein (P), fat (F), carbohydrates (C), NS - non-significant]

Vitamin intake by men in the study group was not significantly different from that in controls: vitamin A (1702.2 vs. 1797.4 ug), beta-carotene (5659.3 vs. 5554.8 ug), retinol (669.9 vs 789.0/ug), vitamin E (10.7 vs. 11.8 mg), thiamin (1,2 vs. 1.5 mg), riboflavin (1,8 vs. 2,1 mg), niacin (15,8 vs. 18,7 mg), vitamin B6 (2,0 vs. 2.3 mg) and vitamin C (109,7 vs. 131.4 mg). The results of this part of the study are shown in Table II.

Discussion

The analysis of the influence of nutritional factors on the development of these tumours has failed to give a clear--cut answer. In interventional studies the basis problem is ensuring of sufficiently long follow-up time, since it is known that oncogenesis duration is often very long, extending over years. Doubts exist about the meticulous observation of the recommended dietary habits. In the analysis of the dietary interviews it is not possible to rule out the influence of the diagnosis made previously on the dietary habits of the studied subjects, many of them can also have difficulties in recalling their diet from several or more days.

In the present study the dietary habits of patients with large bowel adenomas were analysed in relation to the diets of patients in the control group – who had mostly large bowel function disturbances. It was not possible to recruit a control group of healthy persons because of: 1) the relatively low motivation of healthy persons to undergo colonoscopy, and 2) the difficulty in finding individuals without complaints in age groups corresponding to the studied group.

The importance of factors related to social environment, especially dietary factors, in the development of

Table II. The content of the studied vitamins in the usual diet in the study group (SG) and control group (CG)

		Vitamin A (ug)	Retinol (ug)	Beta-karotene (ug)	Vitamin E (mg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)	Vitamin B6 (mg)	Vitamin C (mg)
					Women					
SG	M	1225.3	483.7	4126.9	8.9	1.0	1.5	12.6	1.6	96.3
	SD	576.2	325.6	2471.3	3.9	0.3	0.5	3.3	0.5	43.6
CG	M	1865.2	691.9	6509.5	10.4	1.1	1.7	13.8	1.8	121.3
	SD	1183.8	652.5	4764.1	4.4	0.3	0.7	4.2	0.6	80.0
p=		0.007	NS	0.012	NS	NS	NS	NS	NS	NS
					Men					
SG	M	1702.2	669.9	5659.3	10.7	1.2	1.8	15.8	2.0	109.7
	SD	761.8	468.7	3097.5	4.5	0.5	0.6	5.7	0.6	50.7
CG	M	1797.4	789.0	5554.8	11.8	1.5	2.1	18.7	2.3	131.4
	SD	649.0	525.0	2481.3	3.8	0.6	0.6	6.3	0.7	83.1
p=		NS	NS	NS	NS	NS	NS	NS	NS	NS

(M-mean, SD- standard deviation)

large bowel adenomas and carcinomas has not yet been elucidated.

In the reported study no differences were found between the study group and the control group, with the exception of vitamin A intake. A comparison of the present results with literature data showed a high diversity of results due, in part, to methodological difficulties.

Reduced incidence of large bowel adenomas in individuals receiving calcium and antioxidant vitamins was observed by Hofstad in a three year interventional study, placebo controlled, in Norway. In that study no growth inhibition of already present polyps was observed during this supplementation [11].

In the Australian Polyp Prevention Study reduced incidence was noted for polyps over 10 mm in diameter (in individuals on low-fat, rich-in-fibre diet, but this effect was not found in the analysis of beta-carotene effect [12].

In many case-control and cohort studies the relationship was analysed between calcium intake and large bowel carcinoma [13, 14]. In most of them an inverse relationship was found between calcium intake and the risk of large bowel carcinoma development.

In other studies the protective effect of vitamins C and E [15] was observed, but it was not found for beta--carotene [16].

In case-control studies Freudenheim demonstrated a lower risk of large bowel carcinoma in persons consuming foliates in high amounts [17]. This effect w as not confirmed in other studies [18].

On the other hand, Whelan, in his case-control study, demonstrated a protective role of supplementation of multivitamin preparations, including vitamin E and calcium [19]. These results were different from those of an earlier work of Neugut (case-control study), who failed to find any relationship between supplementation of vitamins A, C, D, calcium and multivitamin preparations [20].

In many earlier studies a protective effect of beta-carotene on the development of large bowel carcinoma [21, 22] was shown, however, in other studies this was not observed [23, 24].

Recently published studies (Cancer Prevention Study II cohort) have found a correlation between multivitamin use and colon cancer mortality, especially among participants consuming two or more alcoholic drinks per day [25]. A prospective cohort study within a randomised placebo-controlled trial did not show that supplementation with alpha- tocopherol and beta-carotene reduced the risk of colorectal cancer. However, it cannot be excluded that an 8- year-long observation of the patients was simply too short to show the benefits of taking antioxidant vitamins [26].

Our results are consistent with the results of the studies revealing that vitamin A may be a factor reducing the risk of adenomatous polyps.

Conclusion

Lower intake of vitamin A and beta-carotene in women could be one of the factors increasing the probability of large bowel adenoma development.

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