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NUTRITIONAL STATUS AND NUTRITIONAL HABITS OF MEN WITH BENIGN PROSTATIC HYPERPLASIA OR PROSTATE CANCER – PRELIMINARY INVESTIGATION

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ABSTRACT

Introduction. The ageing in men, the most frequent pathologic lesions affecting the prostatic gland in this period are benign prostatic hyperplasia (BPH) and prostate cancer (PC), the course of which may be influenced by the improper nutritional status of patients and their nutritional habits. The aim of this study was, therefore, to evaluate the nutritional status and eating habits of men diagnosed and treated for one of the above diseases.
Material and metods. The nutritional status of 30 male patients with clinically confirmed and treated disease of the prostatic gland, including 15 men (aged 51-75 years) with BPH and 15 men (aged 51-73 years) with PC, was evaluated based on their BMI, WC, WHR, and WHtR parameters. In turn, the energy and nutritive value of 90 daily food rations (DFRs) was evaluated. Finally, calculations were made for the Key's index of diet atherogenicity, resultant Glycemic Index (GI) and Glycemic Load (GL).
Results. Higher values of the BMI, WC, WHR and WHtR parameters were noted in the men with PC, they were also characterized by a higher incidence of peripheral subcutaneous obesity and visceral obesity. The DFRs of the men were characterized by a low energy value and by a low intake of available carbohydrates, dietary fiber, K, Ca, Mg, vitamins D and C, and fluids at a simultaneously high intake of total and animal protein, cholesterol, Na, P, Fe, Cu as well as vitamins B_2 and PP. The contribution of energy derived from the basic nutrients diverged from the recommended values. In addition, the DFRs were characterized by high values of Key's index and 24-h GL. Differences in meeting the RDA for selected nutrients between the analysed groups of men were statistically significant.
Conclusions. The improper nutritional status of the men may result from their incorrect nutritional habits which fail to improve their health status, and even predispose them to the development of some diet-dependent diseases. In view of that, both correction of diets of the surveyed men, as well as their health-promoting nutritional education in the aspect of prostate diseases seem necessary.

Key words: benign prostatic hyperplasia, prostate cancer, nutritional status, nutrition manner, Glycemic Index, Glycemic Load, Keys indicator

LIST OF ABBREVIATIONS

BPH – benign prostatic hyperplasia
PC – prostate cancer
DFRs – daily food rations
GI – Glycemic Index
GL – Glycemic Load
RDA – Recommended Daily Allowances
BMI – Body Mass Index
WC – Waist Circumference

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WHR – Waist-to-Hip-Ratio
WHtR – Waist-to-Height-Ratio

INTRODUCTION

The most common pathological lesions of the prostatic gland include benign prostatic hyperplasia (BPH), usually appearing in men at the advanced age and in the period of body ageing, as well as malignant carcinomas – mainly adenocarcinoma that constitutes 95% of all types of prostate cancers. A significant advance has been noted in recent years in the understanding of the etiology, diagnostics and therapy of prostatic diseases [Buckley et al. 2001]. The main cause of miction disorders in men is BPH which requires surgical and/or pharmacological intervention [Edwards 2008]. The highest incidence of prostate cancer is observed in the North America, Western Europe and some regions of Africa. As indicated by data of the National Cancer Registry, in Poland in 2009 the malignant carcinomas of the prostatic gland were diagnosed in 13.3% of the registered men, being the second after lung carcinoma (24.1%) and followed by colorectal cancers (12.1%). In addition, an increase has been observed in a mortality rate due to PC, which in 2009 accounted for 7.7% [Didkowska et al. 2011].

In the case of both BPH and PC, the likelihood of their development increases with age. The highest incidence is noted in men at the age between 55 and 79 years. Considering the fact that the average lifespan has changed over the years (from 64 in 2000 to an estimate of 75 by 2050), an increased number of men affected by prostate diseases, as well as an increased mortality rate due to carcinomas of this organ are very likely, with the latter estimated to reach even 5000 cases in 2015 [Edwards 2008, Didkowska et al. 2011]. Both the prevention and therapy of prostate diseases are significantly determined by the nutritional status and nutritional habits.

In view of the above, the aim of this study was to evaluate the nutritional status and nutritional habits of men with diagnosed and treated BPH or PC.

MATERIAL AND METHODS

The survey preliminary (conducted in November-December 2010) covered male patients (volunteers) of the Urology Ward of one of the hospitals in Szczecin with clinically diagnosed and treated disease of the prostatic gland including: 15 men (aged 51-75 years) with BPH and 15 men (aged 51-73 years) with PC. In the surveyed men, BPH was diagnosed from 7 months to 15 years, whereas PC from 2 weeks to 5 years before the study period.

In order to determine the nutritional status of patients, anthropometric measurements were performed that included measurements with a Gulick's metric tape of: waist circumference (*Waist Circumference*) measured at the mid-height between the inferior margin of coastal arch and the upper crest of the iliac bone at a short apnea, and hip circumference at the height of the greater trochanters. Data on body mass and body height were received from the patients based on measurements performed shoeless and in light outerwear, using a medical scale with a height meter, in a consultation room on admission to the hospital. From the obtained measurements BMI (*Body Mass Index*) was calculated according to the formula: body mass (kg)/ /height (m^2) [Ham 1992]. WHR (*Waist-to-Hip-Ratio*) was calculated to the formula: waist circumference (cm)/hip ratio (cm) [WHO 2002] and WHtR (*Waist-to-Height-Ratio*) was calculated according to the formula: waist circumference (cm)/height (cm) [Mansour and Al-Jazairi 2007].

Precise information on nutritional habits was received from the patients who after hospitalization, upon earlier instructions, were recording, with the method of current noting, the time of having meals, as well as the type and quantity of consumed foods in three days of the week (selected at random) including one weekend day. The energy and nutritive values of 90 daily food rations (DFR) (45 from men with BPH and 45 from men with PC) were assessed using a computer software "Dietician 2009" by determining the intake of dietary components in each day and then an average intake of three days, considering losses of the nutritive value of food products, and finally comparing the received values with Recommended Dietary Allowances (RDA) respective for age and gender [Jarosz and Bułhak-Jachymczyk 2008]. After considering the off-meals in groups of consumed food products, the values obtained were compared with recommended model food rations [Turlejska et al. 2006]. In addition, the analysed DFRs were determined for

the Key's index of diet atherogenicity using the formula 1.35 × (2 × % of energy from saturated fatty acids – % of energy from polyunsaturated fatty acids) + 1.5x√(cholesterol/1000 kcal) [Keys and Parlin 1966]. Values of resultant Glycemic Index (GI) and Glycemic Load (GL) (GI of food product × content of its carbohydrates (g)/100) were computed for particular meals of each menu using tables [Atkinson et al. 2008]. The following GI values of food products were adopted: GI ≤55 – low, GI 56-69 – medium, and GI ≥70 – high. The GL value was adopted for standard food ration of food products as: GL ≤10 – low, GL 11-19 – medium, and GL ≥20 – high [Wolever et al. 2006]. The GL of a whole day diet <80 was adopted as low, 80-119 as medium, and ≥120 as high [Monro and Shaw 2008]. Compliance with the RDAs for basic nutrients was estimated with the U'Mann-Whitney--Wilcoxon test at significance levels of $p \leq 0.05$ and $p \leq 0.01$ using Statistica 9.0® software.

RESULTS

The analysis of anthropometric data achieved demonstrated the highest values of BMI, WC, WHR and WHtR in the patients with PC (Table 1). The in-depth analysis of BMI values showed that only one man with PC and every fifth man with BPH were characterised by normal nutritional status. In addition, a higher percentage of overweight was noted in the men with BPH, obesity in the men with PC.

The analysis of WC values demonstrated that almost all men were characterised by visceral deposition of fatty tissue. In turn, based on WHtR values, the risk of type 2 diabetes development was stated in over 2/3 of the surveyed patients, whereas the risk of arterial hypertension development in nearly half the men with BPH and 2/3 of the men with PC. The qualitative analysis of daily food rations (DFRs) of the male patients demonstrated that only 2/3 of them (usually those with PC) were consuming the recommended number of 4-5 meals a day. They were usually skipping II breakfasts and afternoon snacks (Table 2).

In turn, the quantitative analysis of DFRs (Table 3) of the surveyed men showed their insufficient energy value. The DFRs of men with BPH were characterised by a low intake of dietary fiber, fat, minerals (K, Ca, Mg, Zn), vitamins (A, D_3, E, B_1, C) and fluids at simultaneously high intakes of total and animal protein, cholesterol, minerals (Na, P, Fe, Cu), and vitamins B_2 and PP. In contrast, DFRs of men with PC were insufficient in providing recommended levels of intake for dietary fiber, minerals (K, Ca, Mg), vitamins (D_3, C) and fluids and, simultaneously, exceeding recommended levels for total and animal protein, fat, cholesterol, minerals (Na, P, Fe, Zn, Cu), vitamins A and E, and B-group vitamins.

The contribution of energy (Table 3) derived from basic nutrients diverged from the recommended values

Table 1. Anthropometric attributes values and of the BMI, WHR, WHtR indicators in men with BPH or PC, x ±SD, n = 30

Parameters and indices	Men with	
	BPH (n = 15)	PC (n = 15)
Age, year	66.1 ±9.2	63.1 ±5.2
Body weight, kg	81.8 ±14.1	88.0 ±15.4
Body height, cm	1.74 ±0.1	1.74 ±0.08
Waist circumference, cm	98.5 ±13.1	103.8 ±12.6
Hip circumference, cm	101.1 ±9.9	105.1 ±8.2
BMI, $kg \cdot m^{-2}$	26.8 ±4.1	29.0 ±4.1
Norm 18.5-24.9, %	20.0	6.7
Overweight 25.0-29.99, %	66.7	53.3
Obesity I° 30.0-34.99, %	6.7	33.3
Obesity II° 35.0-39.99, %	6.7	6.7
Obesity III° ≥ 40, %	0	0
WHR, cm/cm	0.97 ±0.09	0.99 ±0.08
<0.90, %	6.7	6.7
≥0.90, %	93.3	93.3
WHtR, cm/cm	0.56 ±0.08	0.60 ±0.07
≥0.52 risk of type 2 diabetes, %	73.3	86.7
≥0.56 risk of hypertension, %	46.7	73.7

Table 2. Number and type of males consumed by daily by the men with BPH or PC under research in the term of interview, n = 30

Number and type of males	Men with	
	BPH (n = 15)	PC (n = 15)
	Number of meals	
1-2	–	–
3	26.7	26.7
4	46.7	46.7
5	20.0	26.7
6 and more	6.6	–
	Meal	
Breakfast	93.3	100
Lunch	60.0	53.3
Dinner	93.3	100
Afternoon snack	40.0	40.0
Supper	100	93.3

in both men with BPH and those with PC, and was too high for proteins, fats and saturated fatty acids, and too low for carbohydrates. The above abnormalities resulted from the insufficient intake (Table 4) of wheat and rye bread, flours and pastas, cereal products, potatoes, vegetables, legume grains and nuts, fruits, milk and fermented milk drinks, and fish, as well as from excessive consumption of rennet cheeses, meat, cured meats, eggs, fats, sugar and sweets.

Significantly higher percentage ($p \leq 0.05$, $p \leq 0.01$) realization of RDA (Table 3) for fat, saturated fatty acids, Fe, Zn, and vitamins E, B_1, B_6, PP was noted in diets of the men with PC, compared to the patients with BPH. The contribution of energy derived from polyunsaturated fatty acids was also significantly higher in the men with PC.

In both groups of men, the computed values of Key's index (Table 3) of diet atherogenicity exceeded by over 30% the permissible value of 35, however were not significantly different. The calculated resultant GI (Table 5) of meals was low, but significantly higher in the men with BPH. In turn, the 24-h GL values of diets of both groups of men were high but did not differ significantly.

Table 3. Energy value and basic nutrients levels in daily ford rations in men with BPH or PC in the term of interview, n = 30

Components	Men with (n = 30)				Statistical significant
	(x ±SD)		% of daily allowance		
	BPH (n = 15)	PC (n = 15)	BPH (n = 15)	PC (n = 15)	
1	2	3	4	5	6
Energy, kcal	1 945.5 ±462.1	2 306.4 ±508.2	73.5 ±15.5	83.2 ±17.6	
Total protein, g	86.7 ±27.7	94.7 ±18.5	119.3 ±34.6	123.8 ±34.2	
Animal protein, g	59.4 ±24.2	62.5 ±15.0	244.7 ±86.7	242.3 ±67.9	
Assimilable carbohydrates, g	243.0 ±51.2	281.8 ±86.3	186.9 ±39.4	216.7 ±66.4	
Dietary fibre, g	17.1 ±6.0	22.1 ±9.2	69.6 ±24.2	88.4 ±36.8	
Total fat, g	75.9 ±29.5	97.4 ±21.3	85.6 ±30.4	106.5 ±19.6	**
Saturated fatty acids, g	28.2 ±11.3	33.8 ±10.3	96.2 ±33.9	111.1 ±29.4	*
Polyunsaturated fatty acids, g	11.5 ±3.7	16.0 ±3.0			
P/S	2.8 ±0.7	2.3 ±0.7			

Table 3 – cont.

1	2	3	4	5	6
Keys indicator	46.6 ±7.9	45.5 ±9.1	133.3 ±22.6	130.1 ±26.1	
Cholesterol, mg	336.0 ±169.1	361.4 ±141.6	112.0 ±54.7	120.4 ±47.2	
Sodium, mg	2 071.9 ±802.3	2 455.6 ±740.8	154.6 ±56.7	177.9 ±57.9	
Potassium, mg	3 229.1 ±854.6	3 858.6 ±1136.1	68.7 ±18.2	82.1 ±24.2	
Calcium, mg	587.3 ±300.4	617.7 ±276.1	45.2 ±15.4	47.5 ±21.2	
Phosphorus, mg	1 310.6 ±408.1	1 505.7 ±321.5	187.2 ±58.3	215.1 ±45.9	
Ca/P	0.46 ±0.1	0.39 ±0.1			
Magnesium, mg	300.3 ±94.8	378.1 ±119.8	71.5 ±22.6	90.0 ±28.5	
Ferrum, mg	11.0 ±3.8	14.6 ±3.6	110.2 ±37.5	145.8 ±35.9	**
Zinc, mg	10.6 ±4.0	13.5 ±3.0	96.2 ±36.6	122.3 ±27.4	**
Copper, mg	1.18 ±0.4	1.45 ±0.5	131.0 ±45.9	160.9 ±50.7	
Retinol equivalent, µg	847.7 ±668.9	1 250.4 ±1665.7	94.2 ±74.3	138.9 ±185.1	
Vitamin D_3, µg	2.78 ±1.0	3.30 ±1.3	22.1 ±0.9	22.9 ±13.6	
Vitamin E, mg	9.2 ±3.3	12.4 ±3.8	91.8 ±33.0	124.1 ±37.9	*
Vitamin B_1, mg	1.1 ±0.4	1.5 ±0.4	86.7 ±27.9	116.8 ±33.0	*
Vitamin B_2, mg	1.6 ±0.6	1.7 ±0.6	121.8 ±48.2	133.3 ±45.2	
Vitamin B_6, mg	1.7 ±0.5	2.1 ±0.4	100.3 ±33.1	126.1 ±24.1	**
Niacin, mg	18.0 ±5.8	22.2 ±6.1	112.3 ±36.5	138.5 ±37.8	*
Vitamin C, mg	43.4 ±29.0	56.5 ±43.3	57.9 ±38.6	75.3 ±57.8	
Water, g	1 611.0 ±287.0	1 807.4 ±579.9	43.5 ±7.8	48.8 ±15.7	
Protein, % energy	17.7 ±2.4	16.8 ±2.5	126.2 ±17.2	120.1 ±18.2	
Fat, % energy	34.4 ±6.1	38.2 ±5.3	114.7 ±20.2	127.4 ±17.8	
Saturated fatty acids, % energy	12.8 ±2.1	13.1 ±2.2	128.1 ±21.6	131.4 ±22.9	
Polyunsaturated fatty acids, % energy	5.3 ±1.1	6.4 ±1.2	88.9 ±18.0	106.6 ±20.8	*
Carbohydrates, % energy	47.9 ±7.3	45.0 ±6.6	85.6 ±13.0	80.3 ±11.8	
Sucrose, % energy	9.1 ±4.3	8.3 ±5.1	91.1 ±42.5	83.1 ±51.4	

*Statistically significant difference $p \leq 0.05$.
**Statistically significant difference $p \leq 0.01$.

Table 4. Consumption of the selected groups of products in daily ford rations in men with BPH or PC in the term of interview, n = 30

Components, g	Men with (n = 30)		% of daily allowance	
	BPH (n = 15)	PC (n = 15)	BPH (n = 15)	PC (n = 15)
Wheat and rye bread	181.8	168.2	54.6	50.5
Flour, pasta	22.6	30.7	30.8	41.5
Groats, rice, breakfast cerals	16.4	28.3	48.2	81.5
Potatoes	217.9	251.1	55.4	67.8
Vegetables	162.2	190.0	30.8	36.3
Pulses seeds and nuts	2.3	7.3	11.4	36.7
Fruits	67.9	91.2	21.7	27.0
Milk and milk fermented beverages	130.9	185.8	29.1	41.3
Fresh cheeses	61.8	89.6	88.3	24.3
Ripening cheeses	17.7	14.8	135.2	102.8
Meat, poultry	142.8	165.5	172.0	200.7
Sausages	60.6	99.5	183.5	299.8
Fish	25.7	13.0	36.7	16.2
Eggs	48.4	32.0	289.7	191.2
Animal fats	24.0	25.5	123.4	122.4
Vegetable fats	23.5	28.1	104.2	128.9
Mixed fats	5.1	3.8	101.3	74.4
Sugar and sweets	68.6	98.0	143.3	209.6

Table 5. Glicemic Index (GI) and Glycemic Load (GL) in daily diet rations of BPH or PC person, x ±SD, n = 30

Components	Men with		Statistical significant
	BPH (n = 15)	PC (n = 15)	
Average daily Glicemic Index	32.0 ±3.5	27.3 ±4.6	*
Average daily Glicemic Load	143.5 ±39.5	154.8 ±50.9	–

*Statistically significant difference $p \leq 0.01$.
GI ≤ 55 low, GI 56-69 medium, GI ≥ 70 high.
GL ≤ 10 low, GL 11-19 medium, GL ≥ 20 high.
GL of an everyday diet ≤ 80 low, GL 80-119 medium, GL ≥ 120 high.

DISCUSSION

The process of natural ageing and its dynamics are influenced not only by genetic factors, but also by environmental factors linked with lifestyle, including nutrition [Joseph et al. 2009]. Also the nutritional status changing with age [Beaufrère and Morio 2000] is determined by nutritional habits, including both the intake and digestion of nutrients, as well as their absorption and utilization. Both, benign prostatic hyperplasia (BPH), referred to as adenoma and not being a malignant carcinoma, as well as prostate cancer (PC) – adenocarcinoma, are diet-dependent diseases [Buckley et al. 2001].

Excessive body mass has been shown to facilitate the development of prostatic gland diseases, to increase the risk of prostate cancer incidence and to shorten survival time [Fesinmeyer et al. 2009, Mehdad et al. 2010]. One of the pathogenetic factors in the process of prostate cancer development in obese individuals is improper, suppressed secretion of adipokines [Tilg and Moschen 2006] that exhibit anti-proliferating properties, as well as inhibit angiogenesis and intracellular transmission of signals linked with carcinogenesis [Bub et al. 2006]. Obese men, contrary to lean ones, are also characterised by a higher incidence of BPH [Buckley et al. 2001], while visceral obesity – noted in majority of the surveyed men – facilitates

the incidence of intraperitoneal and intranephric hypertension [Gryglewska et al. 1998], increases the risk of development of the metabolic syndrome, including insulin-resistance, hyperinsulinemia, impaired glucose tolerance and hyperlipidemia [Hsing et al. 2007]. The visceral fatty tissue has a large metabolic potential and constitutes a source of released carcinogens in obese individuals. It additionally, reduces the concentration of sex hormone-binding globulin (SHBG), thereby increasing concentrations of free estradiol and testosterone [Davies et al. 2011].

The improper nutritional status of the surveyed men stated in the study, i.e. peripheral subcutaneous and visceral obesity, may result from both hormonal changes appearing with age, low physical activity as well as ill-balanced nutrition. The excessive, compared to RDA, percentage content of fat in the energy value of their diets (mainly of saturated fatty acids derived from ripening and melted cheeses, meat and cured meats, and eggs) could also contribute to fatty tissue deposition. The main site of fatty acids synthesis is liver, while precursors of their synthesis include both dietary fats and carbohydrates. A diet rich in saturated fats inhibits the activity of acetyl-CoA carboxylase [Sul et al. 2000] and synthesis of fatty acids [Knoche et al. 1973], whereas the polyunsaturated fatty acids are implied to control the quantity of lipogenic hepatic enzymes. The likely mechanism of the adverse effect of diet rich in saturated fatty acids is an increase in androgens concentration in blood plasma as a result of fats conversion to androgens, displacement of androgens by fatty acids from their protein links and/or inhibition of sex hormones excretion with feces [Brawley and Barnes 2001]. Although the role of unsaturated fatty acids in the genesis and therapy of prostate cancer is less explicit than that of saturated fatty acids, investigations conducted so far indicate that EPA (Eicosapentaenoic acid) and DHA (Docosahexaenoic acid) acids inhibit the growth of pathological cells of the prostatic gland [Leitzmann et al. 2004]. The higher content of polyenoic fatty acids in diet of the men with PC, that is implicated in the increased risk of their peroxidation in the body, is not alarming as the simultaneously high content of dietary thiamine [Sushko and Lukienko 1981] and pyridoxine [Taysi 2005] may prevent this process.

The exceeded above RDA values content of cholesterol in diets of both groups of men (derived from eggs, meat, cured meats, and rennet cheeses) is unbeneficial as it enhances estrogen synthesis from androstendiol and testosterone, as a result of the activity of aromatase enzyme in fatty tissue and muscles. It disturbs the balance between concentrations of estrogen and androgens which decrease with age and might be one of the factors inducing prostatic stromal hyperplasia, and enhanced production of growth factors (mainly of FGF-2) [Giri and Ittmann 2001]. In addition, based on the computed value of Key's index, it may be concluded that the diet of the surveyed men was highly atherogenic because the index exceeded by 30% the permissible value of 35.

In the case of the analysed patients, the synthesis of fatty tissue could also be enhanced by a high percentage of carbohydrates in the energy value of their diets, and thus by a low intake of complex carbohydrates (dark bread, groats, rice, pasta) rich in, i.a., dietary fiber which is implicated to improve glucose tolerance and physiological mechanisms of its blood level control [Weickert and Pfeiffer 2008]. A recent case-control study found a significant inverse association between dietary fiber and prostate cancer risk [Lewis at al. 2009]. Carbohydrates are the key source of energy in diet responsible not only for the maintenance of a stable physiological level of glucose in blood, but also for the control of food intake. The incorrect daily number of meals consumed by the men, as well as skipping II breakfasts and afternoon snacks were generating long breaks between meals and, thus, fluctuations in blood level of glucose and hunger sensation that was most often satisfied by the men with confectionery. The fluctuations in glucose level could contribute to, among other things, changes in metabolic rate, reduced thermogenesis and storing part of the consumed food by the body in the form adipose tissue [Farshchi et al. 2005]. In addition, the postprandial glycemia is also affected by GI and GL values [Brand-Miller and Marsh 2008]. In the reported survey, the value of resultant GI of three-day menus of the men was low (GI 27-32), but significantly higher in the men with BPH. Simultaneously, some food products with a low GI in a commonly-consumed portion contain a considerable quantity of available carbohydrates, hence the GL which reflects the quality

and quantity of dietary carbohydrates [Sheard et al. 2004], is a more useful measure and indicator of the risk of diabetes, cardiovascular diseases, increased lipids concentration in blood and arterial hypertension incidence [Asp 1995]. The average sum of GL of three-day menus of the surveyed men, though not significantly different between the ailments, was exceeding the permissible value of 120 by as many as 20-30 units, thus inducing high postprandial glycemia which in turn contributed to fatty tissue synthesis. In a case-control study, the odds ratios of prostate cancer were elevated in men with high average dietary GI or GL [Augustin et al. 2004]. Furthermore, the saccharose-containing confectionery products consumed by the men influence the metabolism of glucose by the cycle of citric acid and pentose phosphate pathway providing carbon atoms and NADPH for fatty acids synthesis as well as fructose phosphorylated by hexokinase to fructose-6-phosphate which is further transformed into acetyl-CoA precursor of fatty acid synthesis. In addition, high values of the WHtR parameter noted in every third men with both BPH and PC are indicative of the high risk of type 2 diabetes development owing to the ageing process of the body likely to involve disorders of balance between insulin secretion and its biological activity [Grundy et al. 2005] and owing to the intake of food products with a high glycemic load.

Adverse to the health status of the surveyed men is also the fact of a low intake of calcium and magnesium (resulting from low consumption of dairy products, cereal products, vegetables and fruits, and legume grains), whose incorrect concentrations in the body might enhance the accumulation of fatty tissue and induce disorders of carbohydrate metabolism. However, higher dairy product and dietary calcium intakes are modestly related to increased risk for prostate cancer, particularly nonaggressive disease [Ahn et al. 2007]. Studies have shown a negative correlation between magnesium intake and a drop in its concentration inside cells with a suppressed cellular uptake of glucose [Kao et al. 1999]. In turn, calcium – through its impact on adipocytes metabolism – has been shown to stimulate lipolysis and to inhibit lipogenesis [Zemel et al. 2000]. The low intake of the aforementioned calcium- and magnesium-containing food products may also result in a lower intake of chromium being a constituent of Glucose Tolerance Factor (GTF), which stimulates glucose uptake by cells and intensifies the rate of glucose oxidation and the rate of glycogenesis in muscles. Deficiency of this element in the body triggers disorders in glucose consumption as an energetic substrate in liver and muscles, involving triacylglycerols synthesis from glucose excess and their further deposition in adipocytes and/or lipoproteins [Anderson 1998].

The high intake of animal protein by the surveyed men may contribute to the development of atherogenesis owing to both significant contents of saturated fatty acids and cholesterol as well as the presence of methionine known to enhance homocysteine level increase [Remer 2000]. Furthermore, protein excess in a diet may predispose to the development of osteoporosis due to: the possibility of acidosis development which enhances urinal excretion of calcium and magnesium (whose intake in diets was low) [Etcheverry et al. 2012], and high intakes of sodium and phosphorus at a concurrently low intake of vitamin D. In homeostasis of the osseous tissue in men, a significant role is ascribed to androgens, especially to testosterone deficiency progressing with age. Androgens stimulate the proliferation, differentiation and functioning of osteoclasts, affect interactions between them and reduce the sorption of osseous tissue by osteoclasts [Rudman et al. 1994]. In addition, in the case of men suffering from PC and treated with gonadoliberin analogs (GnRh), a significant reduction is observed in bone mass. Studies have shown that as soon as after two weeks since analogs administration, the concentration of testosterone dropped to the value typical of post-castration states [Stoch et al. 2001]. Especially alarming was the low intake of vitamin D by the surveyed patients (ca. 22% of RDA) that should compensate for the suppressed synthesis of 7-dehydrocholestrol in skin resulting from shorter periods spent outdoor and reduced contact with UV rays [Glerup et al. 2000], as well as for lesser hydroxylation of this vitamin in kidneys, as especially obese individuals are at risk of diminished availability of 25(OH)D [Wortsman et al. 2000]. The active metabolite of vitamin D_3 – 1,25-dihydroxycholecalciferol – displays an inhibiting effect on the proliferation of prostatic gland cells [Brawley and Barnes 2001] and, as indicated by in vitro studies, reduces the likelihood of remote metastases to lungs [Chen and Giovannucci 2001]. The mechanism

of dihydroxycholecalciferol impact on the prevention of prostate cancer development seems to be manifold and may include: anti-proliferating effect, stimulation of cancer cells apoptosis and promotion of their differentiation [Chen and Holick 2003]. So far, sparse individual results of clinical trials indicate that in patients with diagnosed prostate cancer the administration of vitamin D analogs decelerates progression and increase of Prostate Specific Antigen (PSA) [Peehl and Feldman 2003]. The low intake of vitamin D in all men could be due to low consumption of fish, because as demonstrated in a study [Augustsson et al. 2003] in men consuming fish more than 3 times a week the risk of prostate cancer incidence was lower compared to individuals consuming fish less than 2 times a month.

Although diets of the male patients contained an increased concentration of zinc indispensable for, i.a., metabolism of nucleic acids, exhibiting antioxidative effect and inhibiting the oxidation of unsaturated fatty acids, its uptake by prostate tissue is an androgen-dependent process whilst its content in these tissues increases in BPH and decreases in PC [Thomas 1999].

The key mechanisms of vitamin E action likely to contribute to PC prevention include: removal of free oxygen species, induction of cellular differentiation, inhibition of cell growth, induction of apoptosis and enhancement of the immune function [Kline et al. 2001]. The content of vitamin E in diets of the surveyed men with BPH was too low, whereas in diets of the patients with PC – too high. There are ample theoretical premises indicative of the potential efficacy of vitamin E in PC prevention. For instance, in the case of tobacco smokers it has been shown to contribute to both reduced incidence and reduced mortality rate due to this carcinoma [The effect... 1994].

Other improper nutritional habits of the analysed men include insufficient intake of water which is indispensable for the apt course of metabolic pathways, functioning of the nervous system, thermoregulation, excretion of metabolites, and detoxification especially during therapy [Bossingham et al. 2005].

Many nutritional flaws of the men examined that affected their nutritional status might result from insufficient knowledge on proper nutritional habits in these types of diseases or from reluctance to change the developed habits. Barely 30% of the men declared that they had received nutritional guidelines (mainly from a physician) when discharged from the hospital, with only 4/5 of them declaring to comply with these guidelines. For this reason, both the health-promoting education of men in terms of prostate diseases prophylaxis as well as nutritional support during therapy seem necessary.

CONCLUSIONS

The analysis of study results showed that:

1. Over 4/5 of the surveyed men, irrespective of disease history, were characterised by improper nutritional status.

2. Daily food rations of the surveyed men were notwell balanced in terms of energy and nutritive value, which was due to incorrect structure of food products consumption;

3. Daily food rations of the surveyed men were characterized by high values of Key's atherogenicity index and 24-h glycemic load.

4. Daily food rations of the men with PC were significantly exceeding the RDAs for fat, saturated and polyunsaturated fatty acids, zinc, iron and vitamins (E, B_1, B_2 and PP) compared to diets of the men with BPH.

5. The presented nutritional habits of the men fail to improve their health status and even predispose them to the development of other diet-dependent diseases; therefore correction of diets and health-promoting nutritional education of men in the aspect of prostate diseases and other civilization diseases seem necessary.

6. Reasonable to continue research among a larger population of men with prostate disease.

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STAN ODŻYWIENIA I SPOSÓB ŻYWIENIA MĘŻCZYZN Z ŁAGODNYM ROZROSTEM STERCZA LUB RAKIEM STERCZA – BADANIA WSTĘPNE

STRESZCZENIE

Wstęp. W okresie starzenia u mężczyzn najczęstszymi zmianami chorobowymi dotykającymi gruczoł krokowy są łagodny przerost stercza (benign prostatic hyperplasia BPH) lub rak stercza (prostate cancer PC), do przebiegu których może przyczynić się nieprawidłowy stan odżywienia i sposób żywienia. Celem pracy była ocena stanu odżywienia i sposobu żywienia mężczyzn, u których zdiagnozowano i leczono jedno z w.w. schorzeń.

Materiał i metody. U 30 mężczyzn z klinicznie potwierdzoną i leczoną chorobą gruczołu krokowego, w tym 15 mężczyzn (w wieku 51-75 lat) z BPH oraz 15 (w wieku 51-73 lat) z PC oceniono stan odżywienia na podstawie wartości wskaźników BMI, WC, WHR, WHtR. Oceniono wartość energetyczną i odżywczą 90 całodziennych racjach pokarmowych (crp). Obliczono wskaźnik aterogenności diety Keysa oraz wartość wypadkowego Indeksu Glikemicznego i Ładunku Glikemicznego.

Wyniki. Większymi wartościami wskaźników BMI, WC, WHR i WHtR charakteryzowali się mężczyźni z PC, częściej występowała u nich otyłość obwodowa i wisceralna. Crp mężczyzn charakteryzowały się niską wartością energetyczną oraz małym spożyciem węglowodanów przyswajalnych, błonnika, K, Ca, Mg, witamin D i C oraz płynów przy jednocześnie dużym spożyciu białka ogółem i zwierzęcego, cholesterolu, Na, P, Fe, Cu oraz witamin B_2 i PP. Udział energii pochodzącej z podstawowych składników odżywczych odbiegał od zalecanych wartości. Ponadto crp charakteryzowały się dużymi wartościami wskaźnika Keysa oraz całodobowym GL. Różnice w realizacji norm na niektóre składniki odżywcze pomiędzy grupami badanych mężczyzn były statystycznie istotne.

Wnioski. Nieprawidłowy stan odżywienia mężczyzn może wynikać z nieprawidłowego sposobu żywienia, który nie sprzyja poprawie ich zdrowia, a nawet predestynuje do rozwoju innych chorób dietozależnych. Dlatego konieczna wydaje się korekta diety u badanych mężczyzn i prowadzenie profilaktycznej prozdrowotnej edukacji żywieniowej w aspekcie chorób stercza.

Słowa kluczowe: łagodny przerost stercza, rak stercza, stan odżywienia, sposób żywienia, indeks glikemiczny, ładunek glikemiczny, wskaźnik Keysa

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