Original paper

Nutritive value of daily food rations of patients with psoriasis vulgaris: a preliminary report

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Abstract

Introduction: Psoriasis is a chronic inflammatory systemic disorder. It has been suggested that dietary factors may influence the course and severity of the disease.
Aim: To assess nutritive values of daily food rations (DFRs) of patients with psoriasis vulgaris and to correlate them with the severity of the disease, as well as to compare them with DFRs of patients with other chronic inflammatory skin disorders.
Material and methods: The study was conducted among 39 out-patients with psoriasis vulgaris and 18 patients with other chronic inflammatory skin disorders. The severity of psoriasis was assessed using the Psoriasis Area and Severity Index (PASI). The dietary habits were evaluated using a 24-hour interview. The energetic and nutritive value of DFRs were calculated using Dieta 2 software and the statistical analysis was performed using Statistica 9.0 software.
Results: Daily food rations in psoriasis patients were characterized by an excessive intake of fats and energy derived from fats in both groups. Males and females with psoriasis consumed more monounsaturated fatty acids than controls. The PASI value in females correlated with the total intake of fatty acids and that of monounsaturated fatty acids. The intake of vitamin D_3 in females of both groups was very low.
Conclusions: The nutritive value of DFRs both in psoriasis patients and in controls was imbalanced taking into consideration various nutrients.

Key words: psoriasis vulgaris, Psoriasis Area and Severity Index, body mass index, daily food rations, nutrients.

Introduction

Psoriasis is an inflammatory chronic and relapsing systemic disorder, mainly with skin and joints involvement, characterized by abnormal keratinization within epidermis and inflammation within dermis [1]. The most frequently seen clinical type is psoriasis vulgaris that affects about 2-3% of the Caucasian population and significantly adversely influences the quality of patients' life [2].

The pathogenesis of the diseases is complex and still investigated. The evidence of genetic background, based on epidemiological studies, indicates the co-existence of psoriasis in 72% of monozygotic twins in Northern Europe. At least 19 psoriasis susceptibility loci (PSORs) were identified in the human genome [3]. The genetic background can be modified by several triggering environmental factors (e.g. infections, some drugs, mechanical trauma, stressful events, alcohol and smoking) [2]. First publications on the role of diet in psoriasis in the Medline™ base appeared in the 1950s and 1960s [4, 5]. The role of dietary factors became of interest because of co-existence of other inflammatory diseases with psoriasis (e.g. arthritis, Crohn's disease) and the increased risk of ischaemic heart disease [6, 7]. It has been suggested that systemic inflammation mediated by

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cytokines (e.g. tumor necrosis factor α – TNF-α, interleukin 1 and 6) influenced the function of endothelium and accelerated atherogenesis [6]. Additionally, the risk of ischaemic heart disease is increased owing to the metabolic syndrome frequently seen in this group of patients [8, 9].

The precise dietary recommendations for psoriasis patients are lacking. In some studies, mostly non-randomized and short-lasting, the beneficial influence of fish-oil, low-energy or gluten-free diet, supplementation with selected vitamins (e.g. B_{12}, D_3, A) or micronutrient (zinc, selenium) on the clinical picture and course of psoriasis was shown [10-22]. The vegetarian and low-energy diet, with the restriction of animal fatty acids, may be beneficial because of a low intake of the arachidonic acid – a source of pro-inflammatory leukotriene B_4 (LTB_4) [7, 14].

The studies on nutritive values of daily food rations (DFRs) in psoriasis patients and their correlation with the clinical picture of the disease in the Polish Medical Bibliography in 1991-2011 are lacking. It has been demonstrated, however, that an abnormal lipids profile in psoriasis patients is similar to that seen in patients with atherosclerosis [23].

Aim

The aim of the study was to assess the nutritive value of DFRs of psoriasis vulgaris patients and to compare it with that of DFRs of patients with other chronic inflammatory disorders, as well as to examine the relationship between the intake of selected nutrients and the severity of clinical picture psoriasis.

Material and methods

The study was conducted among 57 out-patients: 39 with psoriasis vulgaris (22 males – M and 17 females – F). Eighteen patients with other chronic inflammatory skin disorders (8 M and 10 F) constituted the control group. The severity of the clinical picture of psoriasis was assessed using the Psoriasis Area and Severity Index (PASI) [24].

The nutritive status of patients was evaluated taking into consideration the measurement of their weight and height (using a medical balance of WPT 200.0C type RADWAG).

The body mass index (BMI) was calculated for each person as follows: weight (in kilograms) divided by height (in meters, raised to the second power) and the nutritive status was classified as follows: underweight (BMI ≤ 18.5 kg/m^2 in F, BMI ≤ 19.9 kg/m^2 in M), correct (BMI ≤ 24.9 kg/m^2), overweight (BMI ≥ 25.0 kg/m^2 ≤ 29.9 kg/m^2) and obesity (BMI ≥ 30.0 kg/m^2) in both sexes [25].

The evaluation of dietary habits was performed using a 24-hour interview, covering three consecutive days of the week, calculating then the mean value. Only DFRs of patients, who claimed not having changed dietary habits after the disease onset were evaluated. The size of portions consumed and food products prepared at home was estimated and using measures of the 'Album of photographs of food products and dishes' [26]. The Diet 2 software, taking into account the loss of nutrients during the cooking process used in order to assess the energy and nutrients daily intake elaborated at the National Food and Nutrition Institute (NFNI) in Warsaw, Poland was used. Extra-dietary vitamin and mineral supplementation or salt added, during the preparation of dishes, was not taken into account in the assessment of DNRs.

The mean energetic value of DFRs as well as the intake of the following nutrients: proteins, carbohydrates, fiber, fats (among them, saturated, SFAs, and unsaturated fatty acids, monounsaturated (MUFAs) and polyunsaturated (PUFAs) fatty acids), cholesterol. The SFAs, MUFAs and PUFAs should cover 7%, 10%, 8% of energetic demands, respectively [27]. Also the intake of selected micronutrients and vitamins was evaluated, namely that of sodium, potassium, phosphorus, calcium, magnesium, iron and zinc and vitamin A, E, B_1, B_2, B_6, B_{12}, PP, C and D_3. The percentage of energy intake coming from proteins, fats and carbohydrates was calculated. The results were compared with the dietary recommendations elaborated by Jarosz and Bulhak-Jachymczyk for persons with low physical activity, as it was concluded on the basis on data gathered from patients' history on their life style habits and occupation [27]. The values of 100 ±10% of the recommended value were considered as adequate.

Statistical analysis

The statistical analysis of results was performed using Statistica 9.0 software (StatSoft Co. Cracow, Poland). The mean values were compared using *t*-test with Yates correction, proportions – using u-test and relationships – using *r* Pearson's correlation coefficient. The *p* value was set at $\alpha = 0.05$.

Results

The mean age of psoriasis males was 37.14 ±22.64 years and these of the control group – 48.00 ±11.58 years; the mean age of females – 47.05 ±15.60 years and 41.70 ±18.38 years ($p > 0.05$), respectively. The mean PASI value in males was 10.08 ±5.96 and in females 8.21 ±3.96 ($p > 0.05$).

The mean BMI value in males with psoriasis was 29.85 ±5.50 kg/m^2 and 27.40 ±2.60 kg/m^2 in male patients in the control group ($p > 0.05$). The mean BMI value in female psoriasis patients was 26.01 ±5.60 kg/m^2 and 23.50 ±4.30 kg/m^2 in controls ($p > 0.05$).

The proportion of overweight males was statistically significantly higher in controls than in psoriasis patients and obese – in psoriasis patients than in controls; in females the differences in proportions were not statistically significant (Table 1).

Table 1. Nutritional status of patients with ordinary psoriasis and patients with other chronic inflammatory skin diseases evaluated on the basis of BMI

	Underweight, *n* (%)	Correct, *n* (%)	Overweight, *n* (%)	Obesity, *n* (%)
Females – psoriasis (*n* = 17)	1 (6.00)	8 (47.00)	3 (17.60)	5 (29.40)
Females – control group (*n* = 10)	2 (20.00)	3 (30.00)	4 (40.00)	1 (10.10)
Males – psoriasis (*n* = 22)	0	4 (18.00)	7 (32.00)	11 (50.50)
Males – control group (*n* = 8)	0	1 (12.50)	6 (75.00)	11 (12.50)
P (a-b)	> 0.05	> 0.05	> 0.05	> 0.05
P (c-d)	> 0.05	> 0.05	0.02	0.04

The mean energetic value of DFRs and the intake of nutrients (basic nutrients, selected vitamins and micronutrients) in male and female patients with psoriasis and controls is presented in Tables 2 and 3. The intake of fats in general, that of monounsaturated fatty acids in both male and female psoriasis patients was higher than in controls, in females the difference was statistically significant. The intake of polyunsaturated fatty acids was lower than recommended in both groups studied. The higher intake of vitamin C and D_3, and lower that of proteins, vitamin E and B_{12} was noticed in psoriasis males as compared with males of the control group (Table 2). The intake of vitamin E, C, D_3 and B_1 was higher in psoriasis patients than in controls, for vitamin B_1, E, and C – the differences in females were statistically significant (Table 3).

A statistically significant correlation between the PASI value and the total intake of fats, that of saturated and monounsaturated fatty acids in female psoriasis patients was found ($r = 0.57$ and $r = 0.60$, $p < 0.05$, respectively). Such correlation in male patients was not noticed (data not shown). No statistically significant correlation between the PASI value and the intake of polyunsaturated fatty acids, vitamin A nor D_3 in male and female psoriasis patients was found.

The PASI value in males and females did not correlate with BMI of patients ($r = -0.11$ and $r = 0.29$, $p > 0.05$, respectively).

Discussion

The present study is, to the best of our knowledge, the first one assessing in detail the nutritive value of daily food rations of out-patients with psoriasis and other chronic skin disorders. By including only out-patients into the study we can assume, with a certain degree of probability, that their DFRs reflect everyday dietary habits. As a consequence, there are a few studies with which, at least in part, the results of the present study can be compared and discussed.

In 2011, Zhang *et al.* found that overweight and obesity are more frequently seen in psoriasis patients than in the healthy population [11]. In addition, the study by Gisondi *et al.* demonstrated that the weight loss in obese psoriasis patients may be helpful in the treatment of the disease [12]. It has been found in the present study that both overweight and obesity affected about one fourth of psoriasis female patients, and one third and a half of male patients, respectively.

The mean energetic value of DFRs of male and female patients in both groups was lower than recommended. The study on dietary habits of selected populations of Lower Silesia, of similar age to that examined in the present study, also demonstrated the trend for a low energy intake in their diets (78.40% and 85.00% of recommended values in females and males, respectively) [28].

The mean intake of proteins in DFRs was insufficient in females (82.00% of recommended values – patients with psoriasis; 84.30% of recommended values – control group) and excessive only in males of the control group (228.50%). It has been demonstrated that among inhabitants of Lower Silesia, a daily protein intake was high in healthy males (132.10% of recommended values), in healthy females it was 111.50% of recommended values [28]. The proteins should deliver 12-15% of daily energy [27], which is the proportion approached by females with psoriasis of the present study.

According to Polish recommendations, a daily dietary intake of carbohydrates should cover 55-60% of energetic requirements [27], which was not found in the patients studied: the average carbohydrates intake was low and covered only up to 70% of recommended dietary requirements.

The level of the food fiber intake was also low, slightly higher in males than in females, but reached more than 60% of requirements only in male psoriasis patients. A similarly low intake of fiber was noticed in the diet of inhabitants of Wroclaw (Lower Silesia) [28]. The results of clinical studies confirmed that a higher fiber intake is of help in weight loss [27]. The consumption of adequate amounts of food fiber may be helpful in BMI correction in overweight and obese patients.

The average total intake of fats in male and female psoriasis patients exceeded the recommendations (148.50% and 118.10%, $p > 0.05$, respectively). The average proportion of energy coming from fatty acids did not

Table 2. Average energy value and content of selected nutrients in daily food rations of men with psoriasis vulgaris and men with other chronic diseases of the skin

Energy and nutrients	Psoriasis (n = 22)				Control group (n = 8)			Value of p
	Unit	Mean ± SD	Norm	% of the norm	Mean ± SD	Norm	% of the norm	
Energy	kcal	2094.10 ±1157.30	2450.00	85.40	1906.30 ±568.60	2450.00	77.80	0.61
Total protein	g	86.80 ±36.30	91.90	94.40	210.00 ±404.20	91.90	228.50	0.13
Total carbohydrates	g	244.10 ±99.00	367.50	66.40	251.30 ±78.70	367.50	68.30	0.83
Dietary fiber	g	19.50 ±10.45	30.00	65.00	17.60 ±5.00	30.00	58.60	0.57
Fat	g	101.00 ±88.40	68.00	148.50	64.20 ±31.00	68.00	94.40	0.18
Saturated fatty acids	g	35.50 ±34.80	19.00	186.80	28.00 ±18.00	19.00	147.30	0.49
Monounsaturated fatty acids	g	37.80 ±37.00	27.20	139.00	23.80 ±11.00	27.20	87.50	0.21
Polyunsaturated fatty acids	g	10.70 ±8.50	21.80	49.00	7.20 ±4.30	21.80	33.00	0.20
Cholesterol	mg	273.10 ±155.70	300.00	91.00	328.70 ±333.00	300.00	109.50	0.53
Sodium	mg	4204.80 ±2223.00	1500.00	280.30	4782.50 ±2676.50	1500.00	318.80	0.52
Potassium	mg	3121.00 ±1866.80	4700.00	66.40	2996.30 ±1138.80	4700.00	63.70	0.83
Phosphorus	mg	1292.40 ±540.00	580.00	222.80	1433.00 ±759.00	580.00	204.70	0.55
Calcium	mg	584.20 ±463.60	1000.00	58.40	581.30 ±532.50	1000.00	58.10	0.99
Magnesium	mg	316.80 ±131.70	350.00	90.50	302.20 ±111.30	350.00	86.30	0.75
Iron	mg	11.80 ±4.40	6.00	196.60	15.20 ±17.10	6.00	253.30	0.42
Zinc	mg	12.40 ±5.00	9.40	132.00	12.20 ±6.00	9.40	130.00	0.91
Vitamin A (µg of retinol equivalent)	µg	1004.80 ±874.40	630.00	159.40	1155.50 ±1038.20	630.00	183.40	0.67
Vitamin E (mg of α-tocopherol equivalent)	mg	8.80 ±8.30	10.00	88.00	24.40 ±60.10	10.00	244.00	0.27
Vitamin B_1	mg	1.90 ±1.40	1.10	172.70	1.33 ±0.80	1.10	118.20	0.24
Vitamin B_2	mg	1.50 ±0.60	1.10	136.30	2.30 ±2.80	1.10	209.00	0.24
Vitamin B_6	mg	2.10 ±1.20	1.10	191.00	2.10 ±0.80	1.10	191.00	0.85
Vitamin B_{12}	µg	3.50 ±2.80	2.40	145.80	9.20 ±19.50	2.40	383.30	0.22
Niacin	mg	22.00 ±13.20	12.00	183.30	21.50 ±16.40	12.00	179.10	0.93
Vitamin C	mg	127.40 ±260.00	75.00	170.00	59.00 ±44.60	75.00	78.60	0.38
Vitamin D_3 (µg of cholecalciferol)	µg	4.60 ±7.50	5.00	92.00	2.70 ±2.10	5.00	54.80	0.40
% of energy from protein	%	22.40 ±17.40			19.00 ±7.70			
% of energy from carbohydrates	%	46.20 ±11.60			50.00 ±11.80			
% of energy from fat	%	34.10 ±11.70			29.90 ±11.50			

SD – standard deviation

differ significantly between males and females in both groups. In the Multicentre National Population Health Status Study, fatty acids were the source of about 37% and 35% of energy in males and females, respectively [29]. According to NFNI recommendations, the proportion of energy from fats acids should not exceed 30%. The imbalanced diet with the excessive fats intake may lead to overweight [27].

In both groups studied, in males and females, the intake of saturated fatty acids was above the recom-

Table 3. Average energy value and content of selected nutrients in daily food rations of women with psoriasis vulgaris, and women with other chronic diseases of the skin

Energy and nutrients		Psoriasis (n = 17)			Control group (n = 10)			Value of p
	Unit	Mean ± SD	Norm	% of the norm	Mean ± SD	Norm	% of the norm	
Energy	kcal	1434.60 ±410.50	1750.00	82.00	1274.80 ±507.20	1750.00	72.80	0.38
Total protein	g	53.80 ±21.80	65.60	82.00	55.30 ±22.20	65.60	84.30	0.87
Total carbohydrates	g	184.00 ±54.80	262.50	70.00	173.20 ±77.10	262.50	66.00	0.68
Dietary fiber	g	16.00 ±3.70	30.00	53.30	12.70 ±6.70	30.00	42.30	0.12
Fat	g	57.40 ±24.50	48.60	118.10	43.20 ±26.00	48.60	88.80	0.16
Saturated fatty acids	g	20.00 ±8.80	13.60	147.00	19.00 ±13.40	13.60	139.70	0.80
Monounsaturated fatty acids	g	25.10 ±12.20	19.40	129.30	15.40 ±9.10	19.40	79.30	0.03
Polyunsaturated fatty acids	g	7.50 ±4.30	15.60	48.00	5.30 ±3.50	15.60	34.00	0.17
Cholesterol	mg	177.60 ±86.00	300.00	59.20	203.20 ±86.00	300.00	67.70	0.52
Sodium	mg	3207.70 ±1483.10	1500.00	213.80	2265.60 ±833.00	1500.00	151.00	0.06
Potassium	mg	2536.10 ±759.60	4700.00	53.90	2322.10 ±813.50	4700.00	49.40	0.49
Phosphorus	mg	816.70 ±320.50	580.00	141.00	900.50 ±405.30	580.00	155.20	0.56
Calcium	mg	297.30 ±158.50	1000.00	29.70	436.40 ±293.50	1000.00	43.60	0.14
Magnesium	mg	245.70 ±71.00	265.00	92.70	208.20 ±106.30	265.00	78.50	0.29
Iron	mg	8.40 ±2.30	8.00	105.00	8.00 ±2.30	8.00	100.00	0.66
Zinc	mg	8.50 ±3.30	6.80	125.00	7.30 ±4.10	6.80	107.30	0.41
Vitamin A (µg of retinol equivalent)	µg	656.60 ±465.00	500.00	131.30	526.40 ±418.60	500.00	105.30	0.46
Vitamin E (mg of α-tocopherol equivalent)	mg	7.30 ±3.70	8.00	91.20	4.40 ±2.60	8.00	55.00	0.02
Vitamin B_1	mg	1.20 ±0.50	0.90	133.30	0.80 ±0.30	0.90	88.80	0.04
Vitamin B_2	mg	1.10 ±0.30	0.90	122.20	1.10 ±0.40	0.90	122.20	0.79
Vitamin B_6	mg	1.50 ±0.50	1.10	136.40	1.20 ±0.40	1.10	109.00	0.06
Vitamin B_{12}	µg	2.00 ±1.60	2.00	100.00	2.50 ±1.70	2.00	125.00	0.46
Niacin	mg	13.70 ±5.60	11.00	124.50	12.00 ±5.60	11.00	109.00	0.42
Vitamin C	mg	107.40 ±63.70	60.00	179.00	53.00 ±37.80	60.00	88.30	0.01
Vitamin D_3 (µg of cholecalciferol)	µg	2.20 ±2.00	5.00	44.00	1.20 ±0.60	5.00	24.00	0.11
% of energy from protein	%	15.20 ±5.10			18.20 ±5.60			
% of energy from carbohydrates	%	48.30 ±9.10			51.20 ±11.80			
% of energy from fat	%	34.80 ±7.60			29.00 ±12.10			

SD – standard deviation

mended values (over 130.00%) and the intake of polyunsaturated fatty acids was insufficient (males with psoriasis and controls – 49.00% and 33.00%, $p > 0.05$, respectively, females with psoriasis and controls – 48.00% and 34.00%, $p > 0.05$, respectively). An interesting finding was the positive correlation between the PASI value and the intake of total fats and that of monounsaturated fatty acids in female patients, despite that their intake was lower than in men with psoriasis. Similar results of the intake of SFA and PUFA were obtained by Ilow

et al. [28]. The majority of studies indicate that limitation of food rich in saturated fatty acids and a higher intake of polyunsaturated fatty acids, especially these of the n-3 family, is recommended in the diet of psoriasis patients [13, 14].

The intake of cholesterol was adequate in males and lower than recommended in females in both groups. The main source of cholesterol are animal products, especially meat. In the skin of psoriasis patients, a high concentration of arachidonic acid and their pro-inflammatory derivatives, e.g. LTB_4 was observed. The arachidonic acid may enhance the production of interleukin 1 and the tissue reactivity to cytokines. The vegetarian diet may lead to the limitation of the production of LTB_4 [14].

Patients' daily food rations, except these in females of the control group, were characterized by over two-fold excess in the sodium intake. The excessive consumption of sodium is one of the risk factors for hypertension and the stroke [30]. It has been demonstrated for more than a decade that ischaemic heart diseases and other cardiological disorders are ones of the principal co-morbidities in psoriasis patients [7, 8].

The mean intake of potassium in females of both groups was lower than in males and also lower than recommendations. The electrolytic imbalance may be an important factor in pathogenesis of cardiovascular disorders, including atrial hypertension, myocardial infarct and cardiac insufficiency [31].

The intake of calcium was insufficient, in contrast to that of phosphorus, in males and females in both groups, which could be a risk factor for osteoporosis. An adequate intake of calcium could be one of prophylactic factors impeding the development of osteoporosis [32].

The intake of magnesium in females and males in the control group was low (208.20 ±106.30 mg and 302.20 ±111.30 mg, $p > 0.05$, respectively). Similar results were noticed for the inhabitants of the whole country, where the average intake was 300 mg in males and 223 mg in females. In all voivodships, the magnesium intake was lower than recommended values [29].

The intake of iron in DFRs of males with psoriasis and these of the control group was two-fold higher than recommended values, in females – the consumption was adequate.

Zinc is essential in skin metabolism providing antioxidative stress defense, regulation of the metabolism of vitamin A and that of fatty acids. It plays a role in the production of prostaglandins that regulate the secretion function of the skin, accelerates wound healing and helps to maintain the resistance of the skin to infections [14, 33, 34]. The average dietary zinc intake in both groups was satisfactory and covered over 100% of recommended amounts in males and females. The supplementation with zinc sulphate, however (45 mg per day for 12 weeks) did not result in the reduction in the PASI value [16].

The consumption of vitamin A among male and female psoriasis patients was higher than recommended. In males with psoriasis it was slightly lower than in males in the control group. Vitamin A is essential for normal keratinization – both its deficiency and excess leads to disturbances of keratinization [35].

In contrast to the results of other authors' study [28], we have not demonstrated the high intake of vitamin E. In the present study, the consumption of this vitamin was statistically significantly higher in female psoriasis patients (7.30 ±3.70 mg) than in females in the control group (4.40 ±2.60 mg); an inverse situation was seen among males (8.80 ±8.30 mg – patients with psoriasis; 24.40 ±60.10 – patients in the control group), but the difference was not statistically significant. The average daily intake of vitamin E in the Polish population was 12 mg in males and 9 mg in females – higher than recommended minimal values (8 mg per day) [25]. It has been shown that additional supplementation of patients with severe psoriasis with vitamin E during therapy helped to improve the clinical picture, which paralleled the reduction of the oxidative stress parameters in peripheral blood neutrophils and in psoriatic epidermis [36].

The intake of group B vitamins in male patients was high and exceeded recommended values, without differences between psoriasis patients and controls; the exception was more than two-fold lower intake of vitamin B_{12} among male psoriasis patients as compared with controls (Table 2). The female patients with psoriasis consumed high amounts of vitamins of this group; the intake of vitamin B_1 was significantly higher than in controls. Group B vitamins are water-soluble and thus promptly eliminated from the organism. Constant consumption is necessary for the maintenance of their stable level [35]. The 12-week topical application of vitamin B_{12} with avocado oil significantly improved the clinical picture of plaque psoriasis [37].

In group B vitamins, an important function in skin is attributed to vitamin PP [34, 38]. It can be of value in the treatment of psoriasis and other inflammatory skin disorders because of its capacity to inhibit the expression of ICAM-1, the production of TNF-α, interleukin 1, 12, as well as neutrophil chemotaxis [38]. The intake of vitamin PP in the group of psoriasis patients and controls was adequate.

The consumption of vitamin C, important for its antioxidative properties, was higher in psoriasis male and female patients as compared to the control group; for females the difference was statistically significant (179.00% vs. 88.30% of recommended values, $p < 0.05$, respectively). An insufficient intake of vitamin C was found among inhabitants of Warsaw and too high – among inhabitants of Wroclaw [28, 39].

The intake of vitamin D_3 was higher in psoriasis males than in controls (92.00% vs. 54.80%, $p > 0.05$, respectively). The intake of vitamin D_3 was very low in females

in both groups (44.00% and 24.00%, $p > 0.05$, respectively). The lower active form of vitamin D_3 (1α,25-dihydroxycholecalcipherol) was noticed in psoriasis patients' sera [18]. The results of several studies demonstrated that oral supplementation with vitamin D_3 is an effective therapy in psoriasis [19, 40-42]. Also analogues and derivatives of this vitamin applied topically have an established value in the treatment of psoriasis vulgaris [43].

In summary, our preliminary study results indicate that dietary habits, both in psoriasis patients and in patients with other chronic inflammatory disorders, are not correct. The DFRs were not balanced, taking into consideration several nutrients, including micronutrients and vitamins. The positive correlation between the PASI value and the consumption of total fatty acids and with monounsaturated fatty acids in female psoriasis patients suggests that an imbalanced (deficiency or excess in some nutrients) diet may influence the severity of the clinical picture and may also contribute to the development of co-morbidities associated with psoriasis.

Conclusions

The daily food rations in patients with psoriasis and these with other chronic inflammatory disorders were characterized by a low energy intake as well as by a low intake of carbohydrates, fiber, calcium and vitamin E in psoriasis males and that of D_3 in female patients in both groups and in males of the control group. The high intake of total fats and monounsaturated fatty acids may worsen the clinical picture of psoriasis. There is a need for initiating the prophylactic measures directed at patients with skin disorders and the promotion of correct dietary recommendations.

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