Assessment of nutritional status and feeding methods in patients with inflammatory bowel disease

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ABSTRACT

Aim. The aim of this study was to evaluate diet of patients with IBD, their nutritional status and potential differences as compared to diet of healthy persons.

Material and methods. The examination included the patients of Internal, Metabolic Diseases and Dietetics Ward and Gastroenterology, Internal Diseases and Human Nutrition Ward of Heliodor Święcicki Clinic in the Poznan University of Medical Sciences in Poznan. The criterion allowing participation into the study involved a diagnosed ulcerative or Crohn’s disease, basing on histopathology and radiological examination. The study was conducted on 50 patients, 25 women and 25 men. The control of group included 50 persons, 30 women and 20 men, potentially healthy and occupationally active. In the study the authors’ own questionnaire was used, which contained questions related to diet and evaluating conditions of nutrition, based on the results of anthropometric measurements and selected biochemical parameters.

Results. The study documented that IBD affected diet, which proved to be distinct from that of potentially healthy person. Course of the disease reduced some laboratory parameters in serum: decreased levels of total protein were detected in 40% patients, reduced levels of albumin in 28% patients and of haemoglobin in 72% patients with IBD. Most of patients introduced some modifications and dietary restrictions to reduce the symptoms and prolong remission. Presentation of such attitudes, indicates a need for an effective multidirectional education, which should affect a conscious decision making about the diet. The Body Mass Index and evaluation of nutrition demonstrated that IBD predisposed development of malnutrition: as compared to the control group, 28% of the patients manifested underweight.

Keywords: inflammatory bowel disease, nutritional status, feeding methods

Introduction

Development of IBD most frequently is noted in young individuals, in their second or third decade of life, or in the period of gaining education and occupational activity, during fulfilment of personal carrier. Manifestation of unpleasant intestinal signs and general symptoms as well as chronic character of the diseases negatively affects daily functioning of the patients. Complications from other organs and the relapsing, frequently severe and unpredictable course of the disease significantly affects quality of patients’ life. An important element of the therapy involves dietetic care, which promotes remission process, alleviates signs/symptoms of the disease, prevents against their development and balances off the already existing alimentary deficits. An appropriately balanced alimentation, adapted to the rate of metabolic transformations and supplementing
Deficits of nutrients improves efficacy of pharmacotherapy, reduces frequency of complications, duration of hospital stay and of rehabilitation.

**Alimentary treatment as an integral part of therapy in IBD**

Introduction of alimentary treatment in the course of IBD is important due to co-existing alimentary disturbances (Table 1). Most frequently, a disturbed nutrition is observed, particularly in patients with Crohn’s disease. The principal causes of malnutrition include:

- Reduced food consumption (fear of relapse in the disease, apprehension that sings/symptoms of the disease will develop, like abdominal pain, diarrhoea, nausea);
- Disturbed absorption (resections, reduced absorbing surface), augmented intestinal loss, administered drugs, reduced resting energy expenditure [1].

The dietetic management depends on stage of the disease: a distinct alimentation is provided to patients during remission and during exacerbation of the disease [4].

**Aim**

The study aimed at evaluation of nutrition and manner of alimentation in non-specific bowel diseases and in particular:

- Effect of the disease on alimentary habits of patients with Crohn’s disease or ulcerative colitis.
- Evaluation of nutriture as related to selected anthropometric parameters and indices.
- Identification of differences in nutriture between the examined group of patients and the control group.
- Alimentary education, the exponent of awareness in patients with IBD.

**Material and methods**

The studies aimed at evaluation of nutriture and manner of alimentation in patients with IBD were conducted in the period from October, 2009 to April, 2014.

The examined group included patients staying in the Ward of Internal Diseases, Metabolic Diseases and Dietetics and the Ward of Gastroenterology, Human Alimination and Internal Diseases, Poznan University of Medical Sciences in Poznan. The criterion qualifying patients to participation in the studies involved diagnosis of ulcerative colitis or Crohn’s disease. The inquiring person clarified doubts upon filling by a patient of the questionnaire, containing data on the purpose of the study and an assurance that the study manifests an anonymous character. Anthropometric measurements were conducted in the wards during registration of the patients. Results of laboratory tests were obtained from information charts describing stay in the hospital.

Control group included potentially healthy and occupationally active individuals. The participants unaided filled the questionnaire and conducted anthropometric measurements.

The study was performed on 50 patients, including 25 with ulcerative colitis and 25 with Crohn’s disease. The patients included 23 women and 27 men. Mean age of the studied population amounted to 36 ± 14.9 years. At the time of examination the eldest participant was 70 years old, the youngest one was 18 years old.

The control group included 50 persons, 30 women and 20 men. Mean age of the group amounted to

| Table 1. Frequency of feeding disturbances in patients with nonspecific intestinitis [2, 3] |
|---------------------------------|-----------------|-----------------|
| Feeding disturbance             | Prevalence of IBD (%) | Prevalence of Crohn’s disease (%) |
| Loss in body weight             | 18–62            | 65–75            |
| Lactose intolerance            | 25–65            | 30–40            |
| Hypoalbuminaemia               | 25–50            | 25–80            |
| Anaemia                        |                  |                  |
| - Deficiency of folic acid     | 22–68            | 60–80            |
| - Deficiency of vitamin B12    | 5–20             | 50–79            |
| - Deficiency of iron           | 8–30             | 16–48            |
| - Deficiency of calcium        | 30–80            | 10–44            |
| Deficit-induced bone diseases  | 0–15             | 24–39            |
| Deficit of essential fatty acids | 0–2             | 2–5              |
| Deficit of calcium             | 0–46             | 20–60            |
| Deficit of magnesium           | 2–55             | 30–68            |
| Deficit of zinc                | 12–52            | 42–92            |
38 ± 14.3 years. At the time of examination the eldest participant was 63 years old, the youngest one was 22 years old.

The study took advantage of our own questionnaire, consisting of two parts: registration data and evaluation of alimentation manner. The latter was based on replies to 24 closed type questions, in one case with the potential to supplement the reply. Questions related to age, sex and basic anthropometric parameters manifested an open character. Nutriture was evaluated in the basis of anthropometric measurements, such as current body weight and results of biochemical tests conducted during hospital stay of a patient.

Analysis of the collected material and processing of results took advantage of Microsoft Excel 2007 and Statistica 10 Statsoft. The results were regarded statistically significant at \( p \leq 0.05 \). The results were presented below in the form of tables and graphs.

**Results**

**Analysis of alimentation manner**

**Frequency and regularity of meal consumption during day**
A significant difference was disclosed in the number of meals consumed by IBD patients and by control individuals \( (p = 0.00001) \). Patients with IBD consumed more meals in the course of a day: as many as 50% of the patients declared consumption of 5 or more meals in the course of a day. Such a number of meals was declared by only 8% of healthy individuals. Over 50% less patients than healthy individuals declared consumption of only three meals per day (20% vs 42%). No patient consumed only two meals per day (Figures 1, 2).

In the case of regularity of meal consumption a significant difference was noted in times of their consumption: constant vs variable times \( (p = 0.0004) \). 84% (n = 42) of questioned IBD patients consumed meals in constant time points while only 50% (n = 25) of healthy individuals declared regularity of meal consumption (Figure 3).

**Consumption of fruits and vegetables**
Most of participants, either patients or healthy ones (84% and 70%, respectively), consumed fruits and vegetables once or twice a day. The lowest number of either examined population or control individuals (2% and 6%, respectively) consumed fruit and vegetables 5 or more times a day (Table 2).

Among questions related to manifestation of IBD and effects of the form in which fruits and vegetables were consumed (raw/processed) a statistically significant difference was demonstrated \( (p = 0.00077) \). The principal difference was related to consumption of vegetables and fruits in their raw form: as compared to healthy individuals, IBD patients less frequently consumed raw vegetables (70% vs 26%). A similar difference, although less pronounced, was detected in consumption of raw fruits: only 50% patients as compared to 84% healthy individuals preferred fruits in their raw form. On the other hand, close to 100% respondents, both healthy ones and IBD patients (94% vs 98%), consumed vegetables in their processed form (Figure 4).

**Types of preferred corn products**
Analysis of preferred corn products demonstrated a significant difference in type of selected bread between the examined group and the control group \( (p = 0) \). 80% patients declared preference for purified corn products, which were selected by only 20% members of the control group. The sick individuals also less frequently than control individuals preferred mixed corn products (14% vs 32%). The lowest proportion of patients (6%) preferred full grain corn products, which were most frequently selected by healthy individuals (48%) (Figure 5).

**Consumption of dairy produces**
Most of inquired participants consumed dairy products. However, three-fold more numerous members of the examined group declared abstention from consumption of dairy products than members of the control group (18% vs 6%). Only 14% patients pointed to...
Table 2. Frequency of consuming vegetables and fruits versus incidence of the disease

<table>
<thead>
<tr>
<th>Frequency of consuming vegetables and fruits</th>
<th>1–2 x/day</th>
<th>3–4 x/day</th>
<th>&gt; 5x/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examined group</td>
<td>84% (n = 42)</td>
<td>14% (n = 7)</td>
<td>2% (n = 1)</td>
</tr>
<tr>
<td>Control group</td>
<td>70% (n = 35)</td>
<td>24% (n = 12)</td>
<td>6% (n = 3)</td>
</tr>
</tbody>
</table>

![Figure 3. Manifestation of the disease (IBD) and regularity of meal consumption](image)

![Figure 4. Form of consumed fruits and vegetables](image)
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Figure 5. Preferred type of bread

Figure 6. Types of consumed dairy produce among healthy individuals and those suffering of IBD
introduction of milk to their diet in contrast to healthy individuals of whom as many as 56% respondents declared consumption of milk. Among dairy products a similar proportion of patients and members of the control group most frequently selected cottage cheese (56% vs 58%). Among fermented milk products a similar number of sick and healthy respondents selected fruit yogurts (36% vs 34%). On the other hand patients suffering of IBD less frequently than healthy individuals declared consumption of natural yogurt (28% vs 38%), kefir (10% vs 16%), and butter milk (6% vs 12%) (Figure 6).

Analysis of frequency manifested by milk product consumption showed that 44% patients declaring consumption of milk products consumed them once daily, 37% did so less frequently than once a day. Only 7% of patients consumed milk products 2–3 times a day and only 2% of them 4 or more times a day. In the group of healthy individuals, similarly like among patients, most numerous respondents declared consumption of milk products once a day (36%) but, in contrast to patients, as many as 32% consumed milk products 2–3 times a day (Table 3).

Consumption of meat
Among meat types, most patients (92%) most frequently selected poultry, consumption of beef and pork was declared by the same fraction of respondents (20% vs 20%). Comparing preferences as to the type of consumed meat in the examined group and the control group, sick individuals were found to select pork less frequently than healthy individuals did (20% vs 34%). In cases of poultry and beef a similar proportion of the two groups of respondents declared their consumption (Figure 7).

Statistical analysis of preferred culinary processing demonstrated effect of the processing on manifestation of IBD ($p = 0.033$). In the examined group of patients

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**Table 3. Frequency of consuming dairy produces in control group and examined group**

<table>
<thead>
<tr>
<th>Frequency of consuming dairy produces</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 once per day</td>
<td>15 (37%)</td>
<td>14 (30%)</td>
</tr>
<tr>
<td>once per day</td>
<td>18 (44%)</td>
<td>17 (36%)</td>
</tr>
<tr>
<td>2–3 times per day</td>
<td>7 (17%)</td>
<td>15 (32%)</td>
</tr>
<tr>
<td>4 and more times a day</td>
<td>1 (2%)</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Total</td>
<td>41 (100%)</td>
<td>47 (100%)</td>
</tr>
</tbody>
</table>

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**Table 4. Manifestation of IBD and type of preferred culinary processing**

<table>
<thead>
<tr>
<th>Type of culinary processing</th>
<th>Yes</th>
<th>No</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling</td>
<td>35 (70%)</td>
<td>16 (32%)</td>
<td></td>
</tr>
<tr>
<td>Steaming</td>
<td>21 (42%)</td>
<td>19 (38%)</td>
<td></td>
</tr>
<tr>
<td>Roasting</td>
<td>15 (30%)</td>
<td>16 (32%)</td>
<td></td>
</tr>
<tr>
<td>Frying</td>
<td>9 (18%)</td>
<td>29 (46%)</td>
<td>0.033</td>
</tr>
</tbody>
</table>

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Figure 7. Preferred types of meat consumed in the examined group and among control individuals

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most frequently boiling (70%), steaming (42%), roasting (30%), and least frequently frying (9%) was used. On the other hand in the case of control group the distribution of culinary processing was inverse: boiling and steaming were used least frequently (32% each), followed by roasting (38%) and frying (46%) (Figure 8, Table 4).

Use of lipids
A statistically significant proved to be the difference between control group and the examined group of patients in the type of lipids used for smearing of bread (p = 0.023). In cases of fats used to smear bread more respondents in the examined group of patients than in the control group smeared bread with butter (78% vs 48%). On the other hand, soft margarine was more frequently used by healthy individuals than by the patients (32% vs 18%). In either examined group of patients or healthy individuals none of the participants declared that they did not smear bread (Figure 9).

Consumption of condiments: coffee and alcohol
A significant difference was disclosed between the examined group and the control group in consumption...
of coffee by respondents (p = 0.0001). Among participants of the examined group of patients 60% declared that they drink no regular or instant coffee as compared to healthy individuals of whom 78% declared drinking coffee (Figure 10).

Statistical analysis demonstrated that IBD affected frequency of alcohol consumption by participants (p = 0). The affected individuals less frequently consumed alcohol than healthy individuals: 62% of patients declared that they do not drink alcohol while only 8% of healthy individuals provided such a reply. In the examined group of patients none of the participants declared alcohol consumption 4–6 x/week or daily. On the other hand in the control group daily alcohol consumption was declared by 2% participants while 8% consumed alcohol 4–6 x/week (Figure 11).

**Use of sharp spices**

Presence of the disease significantly affected use of sharp spices by participants (p = 0). Among the participants, patients with IBD less frequently used sharp spices than healthy individuals (14% vs 62%) (Figure 12).

**Evaluation of nutriture**

Nutriture was evaluated on the basis of BMI index and results of selected laboratory tests performed on the patients. On the other hand, results of laboratory tests in the control group were accepted to represent normal values (Table 5).

In the studied population mean value of body mass index (BMI) amounted at the level of 21.4 ± 4.03 kg/m². The lowest value of the index involved 14.94 kg/m², and the highest one was 30.4 kg/m². In the control group the mean was higher, 23.8 ± 3.5 kg/m², with the minimum value of 18.7 kg/m² and the maximum value of BMI amounting to 32.5 kg/m² (Table 5).

Statistical analysis demonstrated effect of IBD on frequency of malnutrition among participants (p = 0.0049). Deficit of body weight was disclosed in 28% patients manifesting BMI at the level of <18.5 kg/m². In the control group, on the other hand, none of the participants manifested malnutrition. The normal nutriture was more frequently manifested by healthy participants than by the patients (70% vs 48%) although differences in frequency of manifestation of an excessive body weight in the examined group of patients and the control individuals were less pronounced (24% vs 30%) (Table 6).

A statistically significant negative correlation was demonstrated between age and frequency of malnutrition (r = -0.014). Deficits in body weight were manifested less frequently in individuals older than 40 years of age (10%), as compared to patients between 18 and 30 years of age and between 31 and 40 years of age (respectively: in 44% and 29%) (Table 7).

In the examined group of patients the highest proportion of patients with deficit of body weight involved patients at the age of 18 to 30 years (43%), followed by those between 31 and 40 years of age (29%), and, the least frequent, patients older than 40 years of age.
Figure 11. Frequency of alcohol consumption among healthy individuals and the patients.

Figure 12. Use of sharp spices versus manifestation of IBD.
(10%). Among healthy individuals, no body mass deficits were detected in any age group. Most numerous patients at the age of 31 to 40 years manifested normal body weight (71%), and an excessive body weight in group older than 40 years of age (50%). In turn, in the control group participants at the age of 18 to 30 years most frequently manifested a normal or excessive body weight (88% and 56%, respectively) (Figures 13, 14).

In the examined group of patients 28% manifested a lowered level of albumins (< 3.5 g/dl). Their average level amounted to 4.74 ± 0.7 g/dl, with the lowest value of 2.42 g/dl, and the highest one of 6.73 g/dl (Tables 9, 10).

In the case of total protein level, the lowest value amounted to 4.16 g/dl, and the highest one to 8.47 g/dl. The mean level was 6.83 ± 1.5 g/dl. However, in 40% participants its level was lower than the normal value (6.4 g/dl) (Tables 11, 12).

Concentration of haemoglobin in serum in 72% examined individuals was exceedingly low (< 13.5 g/dl). The minimum level noted oscillated around 11.9 ± 1.13 g/dl, the maximum level was 15.9 g/dl, the average level was 6.7 g/dl (Tables 13, 14).

A positive correlation was disclosed between albumin level and value of BMI (r = 0.28). In 71% of examined individuals manifesting normal body weight value of albumin level remained in the normal range. In patients with deficit of body weight the level of albumin equally frequently remained below or within the normal range (50% vs 50%). Among individuals with an excessive body weight, 73% of them manifested normal level of albumin (Table 15, Figure 15).

### Discussion

The manner of nutrition in patients with confirmed diagnosis of IBD is an integral element of therapy, sig-
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Significantly affecting course of the disease and efficacy of its treatment. Errors in alimentation may abbreviate the period of remission and accelerate its relapse. Therefore, the need arises to introduce individual modifications and restrictions in diet.

In the current knowledge no data are available allowing definition of clear alimentation recommendations for patients with inflammatory disease of intestines. Nevertheless, the patients frequently state that specific food products influence clinical signs/symptoms of the disease. Cohen AB et al. described patients’ opinions on advantages and harms related to selected food products, related to the disease course. The food types which, according to the questionnaire,
Table 9. Level of albumin

<table>
<thead>
<tr>
<th>Number (n)</th>
<th>Mean</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albumin</td>
<td>50</td>
<td>4.74 g/dl</td>
<td>2.42 g/dl</td>
<td>6.73 g/dl</td>
</tr>
</tbody>
</table>

Table 10. Level of albumin as related to the norm

<table>
<thead>
<tr>
<th>Albumin (g/dl)</th>
<th>Examined group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 3.5</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Norm 3.5–5.2</td>
<td>33 (66%)</td>
</tr>
<tr>
<td>Above 5.2</td>
<td>3 (6%)</td>
</tr>
</tbody>
</table>

Table 11. Level of total protein

<table>
<thead>
<tr>
<th>Number (n)</th>
<th>Mean</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total protein</td>
<td>50</td>
<td>6.83 g/dl</td>
<td>4.16 g/dl</td>
<td>8.47 g/dl</td>
</tr>
</tbody>
</table>

Table 12. Total protein as related to the norm

<table>
<thead>
<tr>
<th>Total protein (g/dl)</th>
<th>Examined group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 6.4</td>
<td>20 (40%)</td>
</tr>
<tr>
<td>Norm 6.4–8.3</td>
<td>3 (6%)</td>
</tr>
<tr>
<td>Above 8.3</td>
<td>27 (54%)</td>
</tr>
</tbody>
</table>

Table 13. Haemoglobin level

<table>
<thead>
<tr>
<th>Number (n)</th>
<th>Mean</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemoglobin</td>
<td>50</td>
<td>11.9 g/dl</td>
<td>6.7 g/dl</td>
<td>15.9</td>
</tr>
</tbody>
</table>

Table 14. Level of haemoglobin as compared to the mean

<table>
<thead>
<tr>
<th>Haemoglobin (g/dl)</th>
<th>Examined group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 13.5</td>
<td>36 (72%)</td>
</tr>
<tr>
<td>Norm 13.5–17.2</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Above 17.2</td>
<td>0</td>
</tr>
</tbody>
</table>

were selected by the patients as improving clinical signs/symptoms included yogurt, rice and bananas. Food products which were indicated as deteriorating the signs/symptoms included leafed vegetables, spicy food, fruits, nuts, fried meals, milk, red meat, popcorn, milk products, alcohol, food rich in cellulose, maize, fatty meals, seeds, grains of coffee [5].

In the study, half of the patients were demonstrated to consume five or more meals per day, which in cases of IBD is recommended The same number of meals was declared by only 8% of examined healthy individuals. Only 20% of the patients declared consumption of three meals per day. However, taking into account the healthy Polish population, 76% individuals consume three meals a day [6]. The number of meals per pay involves an important aspect since the more numerous they are, the more favourably they affect function of alimentary tract and the less they embark the inflamed intestinal mucosa. In this way the contained in them nutrients may be used to a maximum extent for body needs.

The patients are increasingly aware that apart from higher number of meals per day it remains important to plan them and to consume them in stable time points of the day. Eighty-four % of examined patients consumed meals in stable times of a day and only every other healthy individual indicated regularity of meal consumption.

In the examined populations everybody declared consumption of fruits and vegetables. However, current norms of alimentation recommend consumption of fruits and vegetables five times a day. Most of the patients
(84%) and of healthy individuals (70%) declared their consumption only once or twice a day. Only 14% of the patients consumed fruits and vegetables 3 to 4 times a day and only a single patient consumed them 5 or more frequently a day. Taking into account healthy Polish population [6] only 5% of healthy individuals consume fruits more than once a day.

Even if patients with IBD declare consumption of fruits and vegetables, most of them take advantage of fruits and vegetables in their processed form. Processing of vegetables and fruits (boiling, rubbing through a strainer, peeling) causes that they are less irritant to pathologically altered intestinal mucosa and they are digested easier. Such actions allow that valuable vitamins (vitamins K, C, B group vitamins, folic acid, β-carotene) and mineral components (Ca, K, Mg, Zn, Fe, Se) are absorbed by the body, the need for which in the patients is higher than in healthy individuals due to, i.a., losses resulting from diarrhoea. Therefore, most of the patients (98%) prefer vegetables in their processed form and only 26% of them in their raw form, as compared to healthy population in which 70% individuals consume vegetables in their raw form. In cases of fruits, every other persons consumed them in their unprocessed form (50%).

The interviewed patients among the types of bread products most frequently selected purified products (80%). Mixed corn products and full grain products were selected decisively less frequently. This is consistent with recommendations for persons with IBD [7]. The resignation of corn products other than purified ones may reflect intensification of symptoms

Table 15. Relationship between albumin level and BMI index in examined group

<table>
<thead>
<tr>
<th>BMI</th>
<th>Albumin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deficiency</td>
<td>7 (50%)</td>
</tr>
<tr>
<td>Norm</td>
<td>4 (19%)</td>
</tr>
<tr>
<td>Excess</td>
<td>4 (27%)</td>
</tr>
</tbody>
</table>

Figure 15. Relationship between BMI and albumin level in patients with NChZJ

Graph of the scatter: BMI (kg/m²) vs. albumin (g/dl)

Albumin g/dl = 2.6699 + ,06138 * BMI (kg/m²)

Correlation: r = ,28140

X: BMI kg/m²
N = 50
Mean = 21.359600
SD = 4.031032
Max = 30.400000
Min = 14.940000

Y: Albumin g/dl
N = 50
Mean = 3.981000
SD = 0.879293
Max = 6.730000
Min = 2.420000
(abdominal pain, discomfort, diarrhoea) after their consumption.

Patients are cautious in selection of food products which might intensify their complaints: in the examined group of patients three-fold more numerous members of the examined group declared avoidance of milk products than in the control group (18% vs 6%). Only 14% of patients who declared consumption of milk products introduced milk to their diet, which might reflect fear of unfavourable signs/symptoms. Literature data indicate that frequency of lactose intolerance in ulcerative colitis amounts to 25–65%, and in Crohn’s disease 30–40% [3].

The conducted study indicates that 44% of the patients declared consumption of milk products once daily while the same frequency was declared by 36% healthy individuals. In studies by CBOS [6] similar results were obtained: 44% of healthy Polish population consumes milk products every day. The patients less frequently consumed milk products twice to three times a day (7% vs 32%). Upon absence of intolerance, the patients should as frequently as possible introduce milk products to their diet, since this allows them to cover their requirement of calcium, increased as a sequel of steroid therapy. Moreover, milk and milk products supply other valuable components, such as protein of full value and vitamins A, D and group B vitamins.

The obtained data related to type of preferred meat indicate that most of studied patients (92%) selected poultry. Moreover, the patients less frequently than healthy individuals selected pork (20% vs 34%). The patients made an appropriate choice as to an appropriate manner of culinary processing of meat: boiling, steaming and roasting was selected by most respondents (boiling 70%, steaming 42%, roasting 30%). Only 9% of the patients preferred frying, as compared to 42% of healthy examined controls.

The data related to the type of preferred meat and the used processing manner are satisfactory. Most of the patients preferred poultry, the meat rich in protein and containing low level of fat, consistent with principles of easily digested food and appropriate for this group of patients. In addition, the preferred manner of preparing meat for consumption is favourable [8].

Out of the patients who participated in the study more, as compared to healthy individuals, used butter to smear bread (78% vs 48%). This choice resulted perhaps from alimentary habits from the period before development of the disease or from the fact that butter represents the easily digested and best absorbed animal fat.

The conducted study showed that more than every other patient with IBD declared avoidance of regular or instant coffee as compared to healthy individuals, of whom only 22% provided such an reply. Elimination of coffee from diet of affected individuals is justified since it accentuates intestinal peristalsis and may intensify diarrhoea. Such behaviour is consistent with alimentary recommendations for patients with IBD [4]. Nevertheless there exist authors who, on grounds of their own results, found consumption of coffee and infusions of chamomile to represent well tolerated drinks and safe for patients with ulcerative colitis [9].

The examined patients less frequently than healthy individuals consumed alcohol: 38% of examined patients declared consumption of alcohol, as compared to as many as 92% healthy individuals. Study of TNS OBOP demonstrated similar data: 85.5% of Polish adults consume alcohol. Moreover, none of the patients declared consumption of alcohol 4–6 x/week or daily. Reduction of alcohol consumption in IBD is very favourable since alcohol stimulates fermentation processes in intestines and may promote intensification of diarrhoea [10].

The need of an easily digested diet is noticeable even in cases of spices: the patients give up application of sharp spices, which unfavourably affect condition of intestinal mucosa, intensifying complaints. Only 14% patients and 62% healthy individuals declared use of sharp spices.

Among the examined population mean value of BMI amounted to 21.4 ± 4.03kg/m². On the basis of the index malnutrition was diagnosed in 28% patients. The BMI value within normal range was disclosed in 48% patients, 24% patients manifested an excessive body weight. Literature of the subject presents slightly divergent results related to mean values of BMI. According to results obtained by Zawadzka et al. [11], mean value of BMI in two groups of patients suffering of ulcerative colitis or Crohn’s disease oscillates around 20.7 ± 3.08 kg/m². In the quoted study, BMI of around 26% patients pointed to malnutrition. According to Poniewierka et al. [12] mean value of BMI in ulcerative colitis amounted to 23.74 ± 4.72 kg/m² and in Crohn’s disease it was 21.61 ± 3.64 kg/m². The BMI value within normal limits was detected in around 62% patients, in 14% patients malnutrition and in 23% an excessive body weight were disclosed. Ripoli J et al. compared nutritive parameters (dietetic, biochemical and anthropometric ones) in patients with ulcerative colitis (n = 65, 24 with active form of the disease, 41 patients in remission) monitored for a period

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of one year. The authors detected a marked reduction in BMI, decreased consumption of energy, proteins, lipids, calcium, iron and phosphorus in the group of patients with active disease as compared to patients in remission [13].

Malnutrition in this group of patients tends to manifest complex pathogenesis. The malnutrition results from fear of exacerbation of the disease signs/symptoms causing that the patients in advance eliminate from their diet meals which might intensify gastric and intestinal complaints. Frequently individuals experiencing unfavourable symptoms following consumption of milk in advance eliminate also milk products. Most of them remain unaware that they might introduce to their diet fermented milk products, containing lower amounts of lactose. In addition, the long-term intensified losses of nutrients due to intensified diarrhoea, an intensified catabolism and loss of appetite lead to development of malnutrition.

The studies conducted heretofore demonstrated that the average level of total protein amounted to 6.83 ± 1.5 g/dl. In 40% patients the concentration was below the normal level (6.4 g/dl). The maximum level noted amounted to 8.47 g/dl, the lowest one was 4.16 g/dl. In the study of Zawadzka et al. [11], the mean level of total protein amounted to 6.0 ± 1.04 g/dl in ulcerative colitis and 6.4 ± 0.9 g/dl in Crohn’s disease. The amplified losses, a disturbed intestinal absorption and hypercatabolism linked to mediators of inflammatory condition may result in exceedingly low level of total protein.

Mean albumin level in IBD patients amounted to 4.74 ± 0.7 g/dl. More than every other patient (66%) manifested normal albumin concentration, 28% of the patients manifested their decreased level (< 3.5 g/dl). In studies conducted by Zawadzka et al. [11], the mean albumin level amounted to 3.3 ± 0.8 g/dl in ulcerative colitis and 2.9 ± 0.8 g/dl in Crohn’s disease. Around 61% of the patients demonstrated an exceedingly low level of albumin. Deficiency of albumin may represent a sequel of the progressing inflammatory condition, leading to reduced synthesis of albumin, their degradation and clear losses in the vascular bed. In the study conducted by Vanis N et al. on 210 patients with IBD in the years of 2010–2012 the authors detected hypoalbuminaemia in 37.6% participants, with a significantly lower albumin level in the group of moderately or high activity of IBD, at p < 0.05 (ANOVA) [14].

Concentration of haemoglobin in serum was below the norm (< 13.5 g/dl) in 72% patients even if in none of the participants the exceedingly low concentrations were detected. The mean detected haemoglobin level amounted to 11.9 ± 1.13 g/dl. In the studies of Zawadzka et al. [11] the mean level of haemoglobin in patients with ulcerative colitis amounted to 10.3 ± 3 g/dl and in patients with Crohn’s disease it was 11.1 ± 1.6 g/dl. According to literature data anaemia affects around 30% of patients with IBD, but some authors quote somewhat higher incidence of anaemia, detecting it even in up to 40% patients with IBD [14, 15]. Aetiology of anaemia manifest a complex character and it may reflect chronic loss of blood (overt or occult) from the damaged intestinal mucosa, erythropoiesis disturbed due to abnormal course of immune reactions and undesired effects of drugs [15]. Following a long-term analysis (years of 2009 to 2013) of 410 patients with IBD Koutroubakis IE et al. concluded that anaemia (persistent or relapsing one) correlated with a more aggressive course of the disease and lowered life quality of the patients as compared to patients free of the accompanying anaemia [16].

In order to obtain higher efficacy of treatment and to gain a generally better health in patients with IBD it would be indicated to introduce routine alimentary education worked out by clinical dieteticians.

Conclusions

1. Non-specific inflammatory diseases of intestines determine the manner of patient alimentation and require that dietetic modifications are introduced.
2. Changes in alimentary habits and modification of diet in relation to activity of IBD provide evidence for growing awareness of the patients.
3. In the studied group BMI values and evaluation of nutriture prove that IBD represent a factor promoting development of malnutrition.
4. It was confirmed that course and activity of IBD reduce selected laboratory indices in the serum, such as total protein level, levels of albumin and haemoglobin.

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