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NUTRITIONAL THERAPY AS AN ELEMENT IN THE PREVENTION AND SUPPORT OF NEOPLASTIC DISEASE TREATMENT

The aim of the poll was to evaluate the knowledge of women and men on the impact of proper diet on the course of a neoplastic disease. The study was conducted in April 2014 among 100 people aged from 18 to 61, of which 89% suffered from malignant neoplasm, and 11% from benign neoplasm. Basing on the obtained results, the research hypothesis has been negatively verified: men and women have a low awareness of the impact of diet on the course of a neoplastic disease, because 62% of the patients confirmed the change in the daily diet to a healthier one after disease diagnosis. However, it seems essential to increase consumption of saltwater fish by people with cancer and to introduce appropriate training programs for patients and their families on dietary management.

Keywords: *nutritional therapy, neoplastic diseases, eating habits.*

INTRODUCTION

Most of the observations concerning the relationship between the consumed foodstuffs and the occurrence of malignant neoplasms is not conclusive [2]. Epidemiological studies allow us to believe that the type of diet, nutrition, additional substances, such as preservatives, dyes and flavour improvers, can be counted as factors contributing to the development of neoplastic diseases [7].

Environmental factors are responsible for more than half of all neoplastic diseases, including poor nutrition in about 30–40% and cigarette smoking in about 30% [10].

The number of carcinogenic compounds is very large, and their presence in products very common. This condition is the result of the chemical poisoning of the environment and the use of harmful chemicals in animal breeding and plant growing. This is also the effect of improper food processing and manufacture [7, 10].

Numerous studies have confirmed the presence of antioxidant compounds in fruits, vegetables, cereals and other foods. Chemical compounds of plant origin support immune system, increase the concentration of enzymes and prevent metastases. The most commonly used vegetable in antineoplastic courses of treatment is carrot, containing large amounts of β -carotene. β -carotene increases immunological functions of the human body more than other carotenoids. It has been proven that it has antineoplastic properties, causing regression of the disease [2]. In addition to β -carotene, α -carotene, lycopene, lutein, canthaxanthin and zeaxanthin

have also antioxidant properties. Lycopene has the ability to reduce the occurrence of prostate carcinoma, cervical carcinoma and gastrointestinal carcinoma. Products rich in lycopene mainly include tomatoes, peaches, melons and grapefruits.

Consumption of cruciferous vegetables, such as cabbage, turnip, savoy cabbage, cauliflower, broccoli or Brussels sprouts reduce the risk of neoplastic transformations. These vegetables contain polyphenols and vitamins (C, A, E) with antioxidant properties and sulphur with antibiotic and antiviral properties. Other therapeutic use of cruciferous vegetables is consumption of sauerkraut without added salt. Sauerkraut supports development of intestinal bacterial flora and the absorption of nutrients. It also accelerates regeneration of the gastro-intestinal system.

Onions and garlic are a rich source of quercetin [9], which inhibits the growth of cancer cells [3]. Garlic is especially useful in the treatment of cancer patients, because it contains a large amount of antiviral and antimycotic ingredients [9]. It is recommended to consume half of a raw garlic clove twice a day.

Consumption of other vegetables, depending on the type of disease, is recommended in the treatment of neoplastic diseases, such as eggplants that cure tumours and uterine myomas, sweet peppers that is a source of vitamin C, which reduces swelling and removes food stagnation in people with cases of neoplastic diseases and very weakened digestive function, potatoes and radishes that remove toxic substances produced in the digestion of meat, and asparagus which have beneficial detoxifying and diuretic properties. In addition, it is recommended to consume sprouts being the source of nitriloside, which decomposes into benzaldehydes destroying cancer cells [9]. In cancer prevention, it is recommended to consume sprouts of mung beans, alfalfa, cabbage sprouts and clover. Young shoots of buckwheat and sunflower have also very beneficial effect [3]. Some algae are very useful in the treatment of neoplastic diseases and strengthening of the immune system, because due to the high concentration of β -carotene and chlorophyll, they protect cellular structures. These include: spirulina, chlorella and blue-green algae [9].

In antineoplastic prevention, it is recommended to consume fruit, such as apples, mulberries (detoxicate and soothe the body), papaya (contains enzymes that help decompose the undigested proteins and destroy parasites), cranberries, pomegranates, cherries, raspberries, grapes, and mangoes. Fruits should be a separate meal because they can interfere with digestion of other foods.

Consumption of citrus in the form of fresh fruit or juice supplies the body with vitamins, minerals, and antineoplastic ingredients, such as carotenoids, flavonoids, terpenes, limonoids and coumarins [4]. One of the strong antioxidants contained in citrus is glutathione. There is a proven scientific link between the consumption of citrus, and a reduction in the risk of developing neoplasms of the digestive system: oral cavity, pharynx and larynx, and also stomach (the risk reduction of developing the disease by 40% to 50%) [3].

Fresh grapes, apart from easily digestible carbohydrates glucose and fructose, contain organic acids, and antioxidants. Thanks to flavonoids contained in grapes, their consumption affects the increase in HDL cholesterol concentration in serum,

inhibits the oxidation of LDL cholesterol and prevents atherosclerosis. Grapes are a valuable source of polyphenols, especially resveratrol. The resveratrol concentration in grape and cranberry juice is about ten times lower than in wine [3].

Cereals (e.g. oats) are the source of plant lignin, which has antioxidant and antineoplastic properties, and fibre, the consumption of which can reduce the risk of developing colorectal carcinoma. Fibre shortens the activity of the digestive enzymes, as well as the contact of chyme with the surface of the intestine. In addition, it increases the faecal mass, binds cholesterol and bile acids, and thus prevents them from transformation into carcinogenic compounds. Oats stock or thin porridge remove inflammation and relieve irritation of the gastrointestinal tract, which may appear in the early stages of body detoxication. Rye is considered one of the best grain in the treatment of neoplastic diseases. Easily digestible form of rye is the naturally leavened rye bread. Millet and roasted buckwheat seeds are the base-forming cereals, and neoplastic diseases often develop due to excessive consumption of acidifying products. They are also a source of silica and fibre, as well as create favourable butyrates. To stimulate the healing properties of the cereals, food products processed from them should be thoroughly chewed [4].

Spices are flavouring additives improving the taste and aroma of prepared dishes and enriching the diet with essential oils, glycosides, organic acids and numerous substances stimulating the central nervous system. In addition to flavour, spices also have healing properties. They affect the functioning of the gastrointestinal tract by increasing the secretion of digestive juices and accelerating digestion. In addition, spices stimulate the appetite and increase the secretion of saliva. They contain antioxidant substances, such as vitamin C and E, carotenoids, chlorophyll, flavonoids, terpenes, limonoids, selenium and other minerals [15].

Curcuma is the spice that deserves special attention. Among the valuable medicinal properties of curcuma, there is antimycotic, antibacterial, and even antineoplastic effect. Curcuminoids contained in curcuma, accounting for about 5% of the dried root mass, give it the yellow colour. Curcumin has antioxidant and anticoagulant properties lowering cholesterol (exceeding the potential of vitamin E by several times) and also very strong antineoplastic properties [3]. In addition to preventing the occurrence of tumours caused by various carcinogenic factors, curcumin additionally reduces the formation of new blood vessels in the process of angiogenesis, depriving tumours of energetic substances. Curcumin may be effective in the prevention and treatment of many types of cancer, such as carcinoma of the stomach, colonic carcinoma, colon carcinoma, cutaneous carcinoma, hepatocellular carcinoma, breast carcinoma and ovarian carcinoma. The factor limiting the use of curcumin is its poor digestibility, because it is removed before it fully passes into the bloodstream and then into the tissues. To some extent this can be prevented by combining it with pepper, which raises absorption capacity of this compound. Daily teaspoon of curcuma to foods supplies the body with a sufficient dose of curcumin preventing neoplastic diseases.

Green tea is a source of considerable amounts of catechins having antibacterial and fungicidal properties [12]. Among the catechins found in green tea, the richest

antineoplastic source is epigallocatechin-3-gallate (EGCG) [3]. It has been proven that EGCG inhibits the *in vitro* growth of many strains of cancer cells, including: myeloid leukaemia, carcinoma of the kidney, cutaneous carcinoma, breast carcinoma, oral cavity carcinoma and prostatic carcinoma. Additional studies on animals have shown that green tea prevents the development of numerous tumours induced by carcinogens, in particular cutaneous carcinoma, breast carcinoma, pulmonary carcinoma, esophagus carcinoma, gastric carcinoma and colon carcinoma. Green tea should be consumed always freshly brewed, preferably three cups a day. Recommended brewing time is eight-ten minutes. The same leaves can be brewed up to three times, and the most valuable brew is usually the second brew.

The biggest mistake when composing a diet is not sufficient share of omega-3 fatty acids, which prevent cardiovascular diseases, reduce high levels of LDL cholesterol and triglycerides, strengthen the immune system and the nervous system. Consuming foods that contain omega-3 fatty acids in combination with limited intake of saturated animal fats (e.g. red meat), significantly reduces the risk of developing neoplastic diseases. Omega-3 fatty acids easily undergo autooxidation processes, which is why it is recommended to consume foods being their natural source, for example, oily fish, two-three times a week. Especially valuable are the saltwater fish, such as sardines or mackerels. A good way to increase your intake of omega-3 fatty acids is the consumption of one tablespoon of flaxseed per day [3, 4].

In discussing the problem of thermal treatment in terms of formation of carcinogenic compounds in food, it is impossible to ignore the fact that food contains a number of mutagenic and carcinogenic compounds. Nitrosamines, heterocyclic aromatic amines (HCA), polycyclic aromatic hydrocarbons (PAHs) and acrylamides are the compounds with proven mutagenic and carcinogenic effect [8].

Nitrosamines occur in food products in a variety of concentrations, depending on the method of preparation. They are in cured meat, smoked fish, and in beer, soy sauce and other products. Some vegetables, for example, lettuce and red beets (nitrates V) and cured meat and bakery products (nitrates III) have large amounts of nitrosamine precursors. Nitrosamines are formed by nitrosation reaction in an acidic environment (e.g. in the stomach) of amines present in food, involving nitrites (III) or nitrates (V) reduced to nitrites (III) by bacteria in the mouth. Nitrosamines are responsible for the induction of tumours of the liver, colon, lung, pancreas, stomach, kidney, bladder, oesophagus and tongue [8].

Heterocyclic aromatic amines (HAA) is a group of compounds being the pyrolysis products of amino acids and proteins, which are produced during the thermal treatment of food (cooking, frying, baking and grilling), especially red meat and fish. At high temperatures ($150 \leq 300^\circ\text{C}$), amino acids building meat proteins, react with creatine and saccharides present in muscles (Maillard reaction), thereby forming HAA. They are formed mainly on the surface of meat and fish roasted over an open fire. At the lower temperature ($150\text{--}200^\circ\text{C}$), derived products of the protein breakdown are formed on the surface of fried meat and in meat broth, that is: quinoline, quinoxaline and pyridine, as dangerous as HAA.

Polycyclic aromatic hydrocarbons (PAHs) are formed as a result of incomplete breakdown of organic matter. An example of a highly carcinogenic compound is benzo[α]pyrene. PAHs are formed, e.g. during frying and broiling in the process of pyrolysis, i.e. thermal decomposition of fat without oxygen. Another source of PAHs is the smoke (smoked fish and meat) and environmental pollution (e.g. fish caught in industrialized areas).

Heating food above 120°C, especially during long deep frying and baking, is also associated with the formation of carcinogenic acrylamide compound. This particularly applies to products with high starch content produced and processed at high temperatures, such as French fries, potato chips, biscuits, cereals, fried potatoes and vegetables. Temperature and time of heating (to a lesser extent) affects the formation of mutagens. Therefore, depending on the used culinary techniques, the daily intake doses of mutagenic substances may be very different [13].

The aim of this poll was to evaluate the knowledge of women and men on the effect of proper diet on the course of a neoplastic disease.

1. MATERIALS AND METHODS

The poll was conducted in April 2014 among 100 people aged from 18 to 61, of which 89% suffered from malignant neoplasm, and 11% from benign neoplasms. 44% of the patients had been suffering from malignant neoplasm for a year, 14% for two years, 15% for three - four years, and 27% for five years and longer.

It was found that in 55% of the respondents, there were no reported cases of neoplastic diseases in the family, and in case of 45%, a genetic load was confirmed.

It was determined that 43% of the patients had undergone testing for tumour markers, 30% had undergone biopsy, 17% cythopathologic tests, and 10% blood and urine tests. In the group of 78% of the respondents, there had been relapse, 12% had relapsed after a year, and 10% after three years.

It was shown that 57% of patients had undergone chemotherapy, and 43% had been treated by surgery. No exposure to radiation nor radiotherapy had been applied on any of the respondents.

The results of the poll allowed us to evaluate the knowledge of a selected group of women and men on the importance of proper diet in the course of a neoplastic disease. Eating habits of people diagnosed with cancer have were specified. Diet was evaluated based on frequency of consumption of selected food products, such as milk and dairy products, fruits and vegetables, meat, fish, spices, processed foods and sweets. Thermal treatment methods on food, preferred by the respondents, were also analysed.

2. RESULTS AND DISCUSSION

It was found that as many as 60% of the respondents had not used diet therapy during the medical treatment process. More than half (55%) of the respondents declared that they had not received any information from the physician about diet during and after treatment, 37% had received general information only which foods they can and which they cannot eat, and only 8% patients had received detailed information on diet after surgery. As many as 62% of the respondents reported changing their diet after diagnosis of the disease. It was found that 37% of the patients consumed the correct number of meals throughout the day (5–6 meals), 38% three – four meals/day, 10% two – three meals/day, and 15% were unable to determine the amount of meals during the day, because of their irregularity. It was shown that 76% of the patients regularly consumed fresh fruits and vegetables at least once a day, 4% 3 times a week, 8% 1 once a week, and 12% consumed them rarely. Frequent consumption of vegetables and fruits has a positive impact on reducing the risk of developing cancers of the colon and rectum [5]. A diet rich in antioxidant vitamins and trace elements, can greatly reduce the risk of neoplastic disease, particularly gastrointestinal tract carcinoma. The process of carcinogenesis occurs when the balance between the production of reactive oxygen species and their deactivation by the antioxidant protective barrier of the system is disturbed [6]. Therefore, consumption of adequate amounts of vegetables, fruits and herbs containing antioxidants in its composition has a beneficial effect on the human body and reduces the risk of cancer. It was found that only 23% of the patients consumed onion and garlic daily, 25% each twice and once a week and as many 27% once a month. Green tea brew was drunk every day by 32% of the respondents, 19% once a week, 21% once a month, and 28% had not drunk it at all. Eighty percent of the respondents gave up smoking after diagnosis of the disease, and 20% remained in addiction. The results of the study showed that milk and dairy products were consumed daily by 59% of the respondents, 3% consumed it three times a week, 7% once a week, and 31% occasionally.

It was found that only 29% of the patients used steaming, and 16% cooked in water to prepare easily digestible food. Other respondents preferred other methods of thermal processing, such as frying (24%), baking in the oven (21%) and stewing (10%). The consumption of processed foods 1–2 times a month was declared by 37% of the respondents, 32% 1 once every six months, and 31% completely resigned from this type of food. Twenty-five percent of the respondents declared consumption of sweets every day, 17% three times a week, 34% once a week and 24% of the respondents declared a total resignation from the consumption of sweets.

In the prevention of neoplastic diseases, in addition to the consumption level of edible fats, their chemical composition is also essential, particularly the proportion of saturated fatty acids and mono- and polyunsaturated fatty acids, as well as the adequate ratio of consumed n-6 to n-3 fatty acids of 4:1 [1]. Thirty-six percent of the patients applied olive oil in thermal processing of foods, 18% other vegetable oils, 19% margarine, and the remaining respondents, representing respectively 21%

and 6% of the study group, butter and lard. The most common meat consumed by the respondents was poultry (79%), and then pork (9%), game (8%), veal (3%) and beef (1%). Twenty-three percent of the patients consumed meat every day, 25% twice and once a week and 27% once a month. The frequency of fish consumption was at a far lower level. Only 16% of the respondents declared daily consumption of fish, 6% consumed it three times a week, 23% twice a week, and more than 55% of the examined group of patients only once a week.

An important factor in the treatment of cancer patients is their psychological support. Based on the poll, it found that only 20% of the studied group of patients had consulted a psychologist, and up to 80% had not received any psychological support. In the postoperative period, and especially after definitive surgery, depression, anger and rebellion that are a response to mutilation, disfigurement or other restrictions, are very common among cancer patients. Reactions of this type can be particularly severe if the result of a surgery means a limited contact with the environment (head and neck cancer), perpetual-motor disorder (amputation of limbs, stoma) or lowering of self-esteem, including sexual attractiveness (breast cancer, cancer of reproductive organs, testis and prostate).

Psychological support turns out to be a very important condition for rehabilitation and proper adaptation to new circumstances in case of many patients after the removal of the above-mentioned tumours.

The study of cancer treatment consequences focuses on the fact that with the progress in good control of somatic side effects (e.g. nausea, vomiting or diarrhoea), psychological support for the patient is becoming increasingly important as well. This fully justifies the need for psycho-oncology in the process of cancer patient treatment to a greater degree than so far [14].

The major problem of the ailing society is still low awareness on the causes of cancers and how to treat them. Based on the survey, we can certainly confirm that cancer patients underwent conventional methods of treatment, i.e. surgery or chemotherapy. The study group of patients had not received psychological support. Unfortunately, most of the study group had not received any recommendations for the dietary management after medical treatments. Still, as many as 62% of the patients confirmed a change to a healthier diet and these changes were initiated by family members of patients, although patients themselves did not fully understand, why such changes had to be made.

Nutritional therapy tailored to individual needs of each patient should be part of a comprehensive oncological procedure. It should be remembered, however, that nutritional support does not cure cancer, but improvement of nutritional status makes a patient better prepared for surgery, radiotherapy and chemotherapy [11].

CONCLUSIONS

1. The cancer patients consumed the right number of meals (4–6 meals throughout the day).
2. High consumption of vegetables and fruits (76% of the total number of respondents consumed them every day) and low consumption of onion and garlic (as many as 73% of the total number of respondents consumed them once a week) was confirmed.
3. 59% of the respondents confirmed the consumption of products containing probiotics at least once a day.
4. The most consumed meat was the recommended poultry (79% of the total number of respondents).
5. The surveyed population has reduced consumption of animal fats in favour of vegetable fats (73% of the total number of respondents) and of highly processed foods (63% of the total number of respondents)
6. Only 20% of patients received psychological support after diagnosis and during cancer treatment.
7. It seems essential to increase consumption of saltwater fish by people with cancer and to introduce appropriate training programs for patients and their families on dietary management.

REFERENCES

1. Achremowicz K., Szary-Sworst K., *Wielonienasycone kwasy tłuszczowe czynnikiem poprawy stanu zdrowia człowieka*, Żywność. Nauka. Technologia. Jakość, 2005, Vol. 44, nr 3.
2. Ball S., *Naturalne substancje przeciwnowotworowe*, Medyk, Warszawa 2000.
3. Beliveau R., Gingras D., *Dieta w walce z rakiem*, Delta W-Z, Warszawa 2009.
4. Carper J., *Żywność twój cudowny lek*, wyd. I, Vesper, Poznań 2008.
5. Gałaś A., *Zwyczaje żywieniowe jako element zapobiegania chorobom nowotworowym jelita grubego – trudności i wyzwania*, Uniwersytet Jagielloński, Collegium Medicum, Katedra Epidemiologii i Medycyny Zapobiegawczej, Zakład Epidemiologii, Kraków 2009, Vol. 90, nr 4.
6. Klimczak A., Malinowska K., Kubiak K., *Choroby nowotworowe a żywienie*, Uniwersytet Medyczny w Łodzi, Wydział Fizjoterapii, Katedra Historii Medycyny i Farmacji, Zakład Historii Nauk i Medycyny Wojskowej, Łódź 2009.
7. Konopka P., *Rak, układ odpornościowy a odżywianie*, MedPharm, Warszawa 2009.
8. Nowak A., Libudzisz L., *Karcynogeny w przewodzie pokarmowym człowieka*, Żywność. Nauka. Technologia. Jakość, 2008, Vol. 59, nr 4, s. 9–14.
9. Pitchford P., *Odżywianie dla zdrowia*, Galaktyka, Łódź 2010.
10. Servan-Schreiber D., *Antyrak*, Albatros, Warszawa 2008.
11. Szczygieł B., *Niedożywienie u chorych na raka przełyku: występowanie, przyczyny, następstwa, rozpoznanie, leczenie*, Journal of Oncology, 2010, No. 5.
12. Szweykowska A., Szweykowski J., *Słownik botaniczny*, wyd. II, Wiedza Powszechna, Warszawa 2003.

13. Toribio F., Busquets R., Puignou I., Galceran T., *Heterocyclic aromatic amines in griddled beef steak analyzed using a single extract clean-up procedure*, Food and Chemical Toxicology, 2007, No. 45, p. 667–675.
14. Walden-Gałuszko K., *Psychologiczne następstwa leczenia chorych na nowotwory*, Zakład Medycyny Paliatywnej Akademii Medycznej w Gdańsku, Onkologia Polska, 1998.
15. Wieczorek-Chmielewska Z., *Żywność w chorobach nowotworowych*, Wydawnictwo Lekarskie PZWL, Warszawa 2006.

TERAPIA ŻYWIENIOWA JAKO ELEMENT ZAPOBIEGANIA I WSPOMAGANIA LECZENIA CHORÓB NOWOTWOROWYCH

Streszczenie

Celem przeprowadzonego badania była ocena wiedzy kobiet i mężczyzn w zakresie wpływu właściwego sposobu żywienia na przebieg choroby nowotworowej. Badanie przeprowadzono w kwietniu 2014 roku w grupie 100 osób w wieku od 18 do 61 lat, spośród których 89% chorowało na nowotwory typu złośliwego, a 11% na nowotwory typu łagodnego. Na podstawie uzyskanych wyników zweryfikowano negatywnie postawioną hipotezę badawczą: kobiety i mężczyźni mają niską świadomość w zakresie wpływu sposobu żywienia na przebieg choroby nowotworowej, ponieważ 62% pacjentów potwierdziło zmianę codziennej diety na prozdrowotną po zdiagnozowaniu u nich choroby. Niezbędne jednak wydaje się zwiększenie konsumpcji ryb morskich przez pacjentów onkologicznych oraz wprowadzenie odpowiednich programów szkoleniowych dla chorych i ich rodzin z zakresu postępowania dietetycznego.

Słowa kluczowe: *terapia żywieniowa, choroby nowotworowe, zachowania żywieniowe.*