

# CHANGES IN EATING HABITS IN BREAST CANCER PATIENTS

## SPREMEMBE PREHRANJEVALNIH NAVAD PRI BOLNICAH Z RAKOM DOJK

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### ABSTRACT

#### Keywords:

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alternative diets,  
dietitians

**Introduction:** Receiving a cancer diagnosis is an important moment in anyone's life. Consequently, many patients are prepared to change their everyday habits and begin to look for advice from a wide range of sources. Women with breast cancer are particularly motivated and committed to making changes to their lifestyle and diet. The purpose of this study was to elucidate the changes in nutritional and other lifestyle habits following breast cancer diagnosis in Slovenia. A further goal was to estimate the proportion of breast cancer patients using dietary supplements and alternative diets or ascertain their desire to attend a consultation with a dietician.

**Methods:** A link to an online questionnaire was sent to the email addresses of members of Europa Donna and posted on their website ([www.europadonna-zdruzenje.si](http://www.europadonna-zdruzenje.si)) and Facebook page.

**Results:** A total of 102 patients were included in the study. We found that a majority of breast cancer patients changed their eating habits (68.6%) and/or physical activity level (53.9%) following diagnosis. On average, they increased their fruit and vegetable intake and reduced their intake of sugar, red meat and fat. Alternative diets were used by 29.4% of patients, with a high proportion of patients (75.5%) consuming dietary supplements. More than a half of the patients (69.6%) expressed a desire for a consultation with a dietician.

**Conclusions:** Nutritional support during cancer treatment is part of medical treatment and has an important role to play in secondary and tertiary cancer prevention activities. More dietitians should therefore be incorporated into the health system.

### IZVLEČEK

#### Ključne besede:

rak dojke, spremembe  
prehranjevalnih  
navad, prehranska  
dopolnila, alternativne  
diete, dietetiki

**Uvod:** Diagnoza rak predstavlja pomemben trenutek v življenju posameznika, ko so mnogi pripravljeni na spremembe in začnejo iskati ter zbirati številne nasvete. Še posebno so motivirane in zavzete za spremembe življenjskega stila in prehrane ženske z rakom dojke. Namen raziskave je bil ugotoviti spremembe prehranjevalnih in drugih življenjskih navad, za katere se odločijo bolnice po diagnozi rak dojke v Sloveniji. Prav tako nas je zanimalo, v kolikšni meri se bolnice z rakom dojke odločajo za uživanje prehranskih dopolnil in alternativnih oblik prehranjevanja ter ali se želijo udeležiti posveta z dietetikom.

**Metode:** Povezavo do spletnega vprašalnika, ki je bil namenjen samo bolnicam z rakom dojke, smo poslali na elektronske naslove članic združenja Europa Donna ter jo objavili na njihovi spletni strani [www.europadonna-zdruzenje.si](http://www.europadonna-zdruzenje.si) in Facebooku.

**Rezultati:** V analizo smo vključili 102 bolnic. Ugotovili smo, da bolnice z rakom dojke v življenju po diagnozi največkrat spremenijo prehranjevalne navade (68,6 %) in/ali fizično aktivnost (53,9 %). Prav tako po diagnozi največkrat povečajo vnos sadja in zelenjave ter zmanjšajo vnos sladkorja, rdečega mesa in maščob. Alternativne diete je preizkusilo 29,4 % bolnic, kar velik delež bolnic (75,5 %) uživa tudi prehranska dopolnila. Več kot polovica bolnic (69,6 %) pa je izrazila tudi željo po posvetu z dietetikom.

**Zaključki:** Ker predstavlja prehranska podpora med zdravljenjem raka del medicinske obravnave in je tudi del sekundarne in terciarne preventive raka, bi se na ta način lahko pospešilo vključevanje dietetikov v zdravstveni sistem.

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## 1 INTRODUCTION

A cancer diagnosis can provide patients with an opportunity to make lifestyle changes and encourage them to learn more about healthy living (1). Numerous studies indicate that breast cancer patients often change their eating habits following the diagnosis (2-7). In addition to dietary changes, they may also make other lifestyle changes, such as giving up smoking and alcohol, and increasing or moderating physical activity (2, 5, 6). Velicer and Ulrich (8) report that the use of dietary supplements is widespread among oncology patients, especially those suffering from breast cancer. Many patients report a lack of accurate nutritional recommendations, express the need for nutritional advice, and show an interest in alternative therapies and diets (2, 5, 9). Alternative diets can be dangerous because the elimination of certain foods and lower energy intake result in poor nutritional status (10). The clinical dietician is the most important health expert in the process of nutritional treatment (11). Their role is not only to discuss the variety of different eating patterns with patients (10), but also to explain the influence of the patient's nutritional status on the clinical course and prognosis of the disease, together with the resulting effects on quality of life (12). It is even more important to receive appropriate nutritional advice as cancer survivors also have an increased risk of developing secondary cancer and other chronic diseases, such as diabetes, osteoporosis and cardiovascular disease (13). When reviewing the published literature in the PubMed database, we did not find any similar research in patients with breast cancer in Slovenia. We therefore decided to identify dietary and other lifestyle changes among breast cancer patients in Slovenia. We also analysed dietary and lifestyle changes by age, education and period of time since diagnosis, and to compare them with the situation in other countries. Finally, we aimed to estimate the proportion of breast cancer patients who chose to consume dietary supplements and use alternative diets, and whether they wanted to discuss nutritional dilemmas with a qualified professional such as a dietician.

## 2 METHODS

### 2.1 Instrument

In cooperation with the leadership of the Slovenian Association for the Fight against Breast Cancer Europa Donna, we constructed an anonymous questionnaire that included 25 questions and nine sub-questions, and was developed using the freely accessible web application 1KA. For the selection of questions, we used foreign research and articles (4-6) that had already dealt with this issue. The questionnaire included questions about age, region, education, current body weight and height, body weight at diagnosis and one year before diagnosis, period

of time since diagnosis, treatment and related problems, patient lifestyle changes after diagnosis, smoking, alcohol consumption, physical activity and eating habits. We were also interested in the consumption of dietary supplements, the use of different diets and the desire to consult a dietitian.

### 2.2 Data collection

A link to an online questionnaire was sent to the email addresses of members of Europa Donna and published on their website ([www.europadonna-zdruzenje.si](http://www.europadonna-zdruzenje.si)) and Facebook page. The survey was conducted between 4 January and 4 February 2017.

### 2.3 Participants

A total of 133 women began to fill out the questionnaire. However, 31 failed to complete it and they were eliminated from the study. This gave us a total of 102 breast cancer patients (76.7%) who completed the questionnaire completely and voluntarily.

### 2.4 Data analysis

The results obtained through the questionnaire in the 1KA web application were entered into the SPSS computer program (IBM SPSS Statistics version 22) and analysed using univariate and bivariate analysis. Using the chi-squared test, we tested for significant differences in dietary and lifestyle changes according to age, education and period of time since diagnosis. The interdependence of variables was considered to be statistically significant when  $p \leq 0.05$ . The data was also graphically presented using Microsoft Excel 2010.

## 3 RESULTS

### 3.1 Characteristics of patients

The study included 102 breast cancer patients: 65.7% of patients under the age of 50 and 34.3% over the age of 50. The majority of patients (62.7%) had attained a higher education level (i.e. higher than secondary school) and 37.3% of patients had secondary school or lower. The patients were evenly distributed according to the period of time since the cancer diagnosis. The mean BMI of patients was 24.5 kg/m<sup>2</sup> ( $\pm 4.4$  kg/m<sup>2</sup>), which means that, on average, they fell into the normal weight category (18.5-24.9 kg/m<sup>2</sup>) according to the WHO classification.

### 3.2 Lifestyle changes

The most frequent lifestyle changes undertaken by breast cancer patients following the diagnosis are shown in Figure 1.

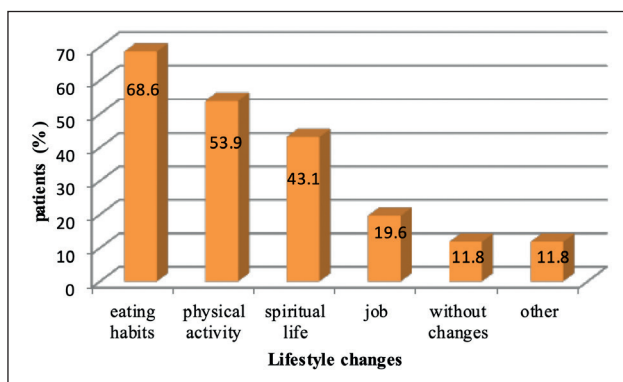


Figure 1. Lifestyle changes after diagnosis.

The analysis showed no statistically significant differences between age, education, and time since diagnosis, with a greater likelihood of changes in eating habits. However, as we can see from Table 1, the analysis showed that physical activity changed more significantly ( $p=0.007$ ) in patients with lower levels of education.

A majority of patients said they had never smoked (58.8%), 16.7% of patients had quit smoking before the disease, and 9.8% of patients had decided to quit smoking after diagnosis. Almost three quarters of patients (73.5%) reported not consuming alcohol. Alcohol consumption was significantly more popular among younger patients (32.8%,  $p=0.044$ ). When we asked how they had changed their physical activity after diagnosis, 54.9% of patients reported an increase and 10.8% reported a decrease in physical activity. Changes in physical activity therefore occurred in 65.7% of patients. Physical activity was increased more in elderly patients (68.6%) with lower levels of education (65.8%) and more than five years after diagnosis (71.4%). Only 2% of patients were not physically active, while 41.2% of patients were active 3-4 times a week and 18.6% of patients were active daily.

### 3.3 Dietary changes

Table 2 shows the different types of food, together with the number of patients who consumed it before and after the diagnosis.

Table 1. Changes after diagnosis by age, education and period of time since diagnosis.

	Eating habits n (%)	Physical activity n (%)	Spiritual life n (%)	Job n (%)
<b>Age</b>				
Chi-squared/p-value	0.824/p=0.364	1.712/p=0.191	0.781/p=0.377	0.205/p=0.650
Under 50 years	48 (71.6)	33 (49.3)	31 (46.3)	14 (20.9)
Over 50 years	22 (62.9)	22 (62.9)	13 (37.1)	6 (17.1)
Sum total	70 (68.6)	55 (53.9)	44 (43.1)	20 (19.6)
<b>Education</b>				
Chi-squared/p-value	0.165/p=0.684	7.153/p=0.007	0.063/p=0.802	0.560/p=0.454
Lower levels of education	27 (71.1)	27 (71.1)	17 (44.7)	6 (15.8)
Higher levels of education	43 (67.2)	28 (43.8)	27 (42.2)	14 (21.9)
Sum total	70 (68.6)	55 (53.9)	44 (43.1)	20 (19.6)
<b>Period of time since diagnosis</b>				
Chi-squared/p-value	1.176/p=0.759	4.708/p=0.194	1.991/p=0.574	11.601/p=0.009
Less than a year	16 (72.7)	13 (59.1)	7 (31.8)	2 (9.1)
1-2 years	19 (70.4)	15 (55.6)	11 (40.7)	1 (3.7)
2-5 years	15 (60.0)	9 (36.0)	12 (48.0)	7 (28.0)
More than 5 years	20 (71.4)	18 (64.3)	14 (50.0)	10 (35.7)
Sum total	70 (68.6)	55 (53.9)	44 (43.1)	20 (19.6)

Table 2. Eating different types of food before and after diagnosis.

Different types of food	BEFORE DIAGNOSIS “Did you eat this ? - YES”		AFTER DIAGNOSIS Intake unchanged		AFTER DIAGNOSIS Intake increased		AFTER DIAGNOSIS Intake decreased	
	n	%	n	%	n	%	n	%
Whole milk products	77	75.5	54	52.9	6	5.9	42	41.2
Skimmed milk products	62	60.8	61	59.8	13	12.7	28	27.5
Cheese	95	93.1	61	59.8	5	4.9	36	35.3
Red meat	88	86.3	37	36.3	3	2.9	62	60.8
Pork	76	74.5	40	39.2	1	1.0	61	59.8
Poultry	96	94.1	59	57.8	12	11.8	31	30.4
Fish	89	87.3	60	58.8	36	35.3	6	5.9
Eggs	101	99.0	65	63.7	17	16.7	20	19.6
Vegetables	100	98.0	27	26.5	75	73.5	0	0.0
Fruit	101	99.0	31	30.4	64	62.7	7	6.9
Cereals	95	93.1	57	55.9	32	31.4	13	12.7
Legumes	97	95.1	69	67.6	33	32.4	0	0.0
Fried dishes	67	65.7	44	43.1	3	2.9	55	53.9
Grilled food	86	84.3	62	60.8	3	2.9	37	36.3
Fast food	64	62.7	47	46.1	2	2.0	53	52.0
Sugar	78	76.5	31	30.4	3	2.9	68	66.7
Sweets	81	79.4	36	35.3	3	2.9	63	61.8
Ice cream	88	86.3	48	47.1	3	2.9	51	50.0
Nuts	92	90.2	55	53.9	39	38.2	8	7.8
Vegetable oil	91	89.2	57	55.9	38	37.3	7	6.9
Margarine	24	23.5	72	70.6	2	2.0	28	27.5
Butter	90	88.2	66	64.7	12	11.8	24	23.5
Coffee	87	85.3	64	62.7	3	2.9	35	34.3
Wine	56	54.9	65	63.7	4	3.9	33	32.4
Beer	35	34.3	71	69.6	1	1.0	30	29.4
Spirits	15	14.7	82	80.4	1	1.0	19	18.6

Following the diagnosis, there was increased intake mainly of so-called “healthy foods” and a decrease in the intake of sugary, fatty and energy-rich foods. More than half of breast cancer patients followed the principles of healthy eating and consumed at least five meals a day. Ninety-seven per cent of patients ate lunch and 86.3% had breakfast. The majority skipped the afternoon snack and 39.2% of patients did not consume one on a daily basis. One person did not comment on their meal consumption. Analysis revealed a statistically significant association of age ( $p=0.003$ ) with consumption of fast food. Fast food was consumed by several younger patients (73.1%) before diagnosis. Likewise, younger patients consumed wine (56.7%), but the analysis did not show an association with a specific characteristic. However, higher

education (65.6%,  $p=0.005$ ) and a period of time since diagnosis between one and two years (74.1%,  $p=0.045$ ) were found to be statistically significantly in relation to wine consumption. Higher education was also typically significantly associated with the consumption of beer and spirits ( $p=0.009$ ,  $p=0.008$ ).

### 3.4 Use of dietary supplements and alternative diets

Nutritional supplements were used by 75.5% of patients, with 24.5% of patients responding that they had not opted for them. The consumption of dietary supplements was slightly more prevalent among younger patients (77.6%) with lower education (78.9%) and with a period of less than one year since diagnosis (81.8%).

Exactly 70.6% of patients answered that they did not and do not use any other diets, while 29.4% of patients did follow a diet. Among them, vegetarian (12.7%) and Budwig (11.8%) diets were the most frequently used.

### 3.5 Nutritional advice

A total of 69.6% of breast cancer patients expressed a need for nutritional advice. Patients who had been diagnosed less than one year previously (81.8%) expressed the greatest desire for nutritional advice. Patients who did not use alternative diets (73.6%) were slightly more interested in consulting a dietician, although 60% of patients who used alternative diets also indicated that they would like to receive advice.

## 4 DISCUSSION

### 4.1 Changes in dietary and other lifestyle habits

After being diagnosed with breast cancer, most patients changed their eating habits (68.6%) and/or physical activity levels (53.9%) (Figure 1). Alfano et al. (6) reported similar results, with 58% of women reporting positive changes in physical activity and/or eating habits after diagnosis. In our study, the percentage of patients who changed their eating habits after diagnosis was higher than the figures among Australian and Finnish breast cancer patients (5) (30% of Finnish and 39% of Australian breast cancer patients reported changing their eating habits). That study also found that higher levels of education, lower age and longer period of time since diagnosis were significantly associated with the likelihood of making changes to diet. Our chi-squared analysis did not show a statistically significant difference between age, level of education and period of time since diagnosis in relation to changes to eating habits. However, one disadvantage of our survey was the low number of people who took part.

Some studies have reported that breast cancer patients are most likely to reduce their intake of animal fat, sugar and red meat and increase their intake of fruit and vegetables, wholegrain foods and fibre (2, 3, 5, 7). Our study also confirmed this. Patients reported increased intake of vegetables (73.5%) and fruit (62.7%) following diagnosis. Thomson et al. (4) also reported increased intake of fruit and vegetables, although intake was slightly lower (vegetable intake increased by 60% and fruit intake by 58%). The most commonly reported reductions of intake were in relation to red meat (61%), cheese (53%), hamburgers (52%), fast food (49%), sweets (47%) and pizza (46%) (4). These results were similar to ours, except that our consumption of sugar (66.7%) and sweets (61.8%) saw the greatest reductions, followed by red meat (60.8%), pork (59.8%), fried foods (53.9%), fast food (52.0%) and ice cream (50%). Cheese intake remained unchanged for 59.8% and was reduced by 35.3% of respondents. Breast cancer

patients are already more prone to developing frailty, and reduced intake of protein may follow these dietary changes (14). This may further promote the development of frailty in this group of patients, as lower protein intake contributes to the development of sarcopenia, a key determinant of frailty (15).

Our breast cancer patients recognised the importance of physical activity and its positive effects on body composition, psychological outcome and quality of life (16). Only 2% of patients were not physically active. Women with breast cancer who had increased physical activity after diagnosis had fewer fatigue-related problems than those women who had reduced their physical activity or maintained it at pre-diagnosis levels (6). While we did not obtain this data in our study, we did find that physical activity after diagnosis changed to a significantly greater degree ( $p=0.007$ ) in patients with lower levels of education. Some studies (17-19) report an increase in weight in women following breast cancer diagnosis. This was also observed in our study (58.8% of patients had increased body weight, with an average weight gain of 6 kg ( $\pm 5.2$  kg)). Most women experience a gradual increase in weight during and after chemotherapy, radiotherapy or hormone therapy (20), with weight gain ranging on average from 2.5 to 6.2 kg in the first year after the breast cancer diagnosis (21). Salminen et al. (5) report that 6% of Australian and 4% of Finnish patients had quit smoking. In our country, 9.8% of patients decided to quit smoking after diagnosis and 16.7% of patients had quit smoking before the disease.

### 4.2 Use of dietary supplements and alternative diets

Velicer and Ulrich (8) state that the use of dietary supplements is very widespread among cancer patients, with the highest intake being observed among breast cancer patients, with the use of vitamins, minerals and multivitamins ranging from 57 to 87%. Demark-Wahnefried et al. (22) stated that breast cancer patients (75%) were significantly more likely to report consuming dietary supplements than prostate cancer patients (66%) ( $p=0.001$ ). Our study confirmed these findings, with 75.5% of patients using dietary supplements. Velentzis et al. (7) report that 25.8% of women with breast cancer had never consumed dietary supplements, while 47.4% consumed them before and after diagnosis. Salminen et al. (5) found that 50% of Australian and 47% of Finnish breast cancer patients consumed dietary supplements. The use of dietary supplements among Finnish patients was reported to be more frequent among younger patients (53.1%,  $p=0.032$ ) and those with higher levels of education (58.6%,  $p=0.014$ ). In Slovenia, the consumption of dietary supplements was also slightly more widespread among younger patients (77.6%), but the analysis did not show any specific significant association. A high proportion of

breast cancer patients consuming nutritional supplements has also been reported by Greenlee et al. (23), with 82% of patients consuming at least one dietary supplement of vitamins or minerals at six months after diagnosis.

Many oncology patients use various alternative diets for which there is no scientific evidence of real efficacy. This can be very dangerous for the health of individuals who are already weakened by cancer or by chemotherapy, biological therapy and radiotherapy (24). A total of 70.6% of respondents stated that they did not practice any diet or had changed their eating habits. This means that 29.4% of patients did use diets, most often vegetarian (12.7%) and Budwig (11.8%) diets. Lee et al. (9) state that among the alternative therapies in women with breast cancer, the most common were dietary therapies (26.6%), with 8.2% of women consuming vitamin preparations containing high levels of vitamins and 19.8% of women using special diets. They also found that lower age and higher levels of education were consistently associated with the use of alternative therapies. In our study, both age groups opted for different diets, with a slightly higher use of diets in older patients (31.4%). While several patients with higher education levels did use some diets (35.9%), the chi-squared test showed no statistically significant association with diet.

#### 4.3 Nutritional advice

In our study, 69.6% of patients expressed the need for nutritional advice. This is similar to the study produced by Demark-Wahnefried et al. (22), which reported that 79% of women with breast cancer showed an interest in nutritional and health programmes. Interest was significantly higher in younger women. They concluded that the best time for intervention would be shortly after diagnosis. We did not observe a significant difference in age and education between those who expressed a desire to consult a dietician, but the patients who had been diagnosed with cancer less than a year previously (81.8%) were more interested in consulting a dietician.

The primary healthcare system and general practitioner seem to be the most suitable places for evaluating the nutritional status of cancer patients at home. This evaluation must be personalised and part of comprehensive breast cancer care. A proposal was made in Slovenia to follow a clinical pathway for nutritional evaluation in which the GP monitors the patient and cooperates with a dietitian in the process of nutritional care (25). Under this pathway, the patient should be monitored nutritionally at both the secondary and primary levels, before and after the completion of treatment. This enables a patient to receive the same and traceable nutritional support, which will have a positive effect on her quality of life.

The survey also had some weaknesses or limitations. Due to a lack of fully completed questionnaires, there were problems with data analysis. We expected a greater number of patients to fill in the questionnaires since, according to the data, more than 1,200 women receive a breast cancer diagnosis every year (26). The limitations of the survey were also reflected in the unsuccessful completion of the online questionnaire and differing interpretations of the questions. The questionnaire was anonymous and, since it was published online, there was no possibility of helping respondents by clarifying the questions. Because it was published online, the younger population were more likely to fill in the questionnaire. Self-reported changes in eating and other lifestyle habits made by patients following their diagnosis are only measured through each subjective opinion and may not correspond to actual changes. Data on the intake of specific foods was also based on patient reporting and were not verified through an actual nutrition diary. Further, more detailed research will be needed to ascertain actual changes in eating and other lifestyle habits, and actual changes in the intake of specific foods by breast cancer patients in Slovenia.

#### 5 CONCLUSION

Based on our study, a majority of breast cancer patients (69.6%) would like additional advice and information on appropriate diet. We therefore believe that the nutritional advice provided by qualified dietitians at primary healthcare centres should be accessible to all breast cancer patients during treatment, together with further nutritional care to promote healthy lifestyles and the option of discussing alternative diets.

#### CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

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#### ETHICAL APPROVAL

All of the respondents of the research completed the anonymous questionnaire on a voluntary basis via the freely accessible web application 1KA. The research carried no risk of the violation of ethical principles.

## REFERENCES

1. McBride CM, Clipp E, Peterson BL, Lipkus IM, Demark-Wahnefried W. Psychological impact of diagnosis and risk reduction among cancer survivors. *Psychooncology*. 2000;9(5):418-27. doi: 10.1002/1099-1611(200009/10)9:5<418::aid-pon474>3.0.co;2-e.
2. Salminen EK, Langström HK, Heikkilä SP, Salminen SJ. Does breast cancer patients' change dietary habits? *Eur J Clin Nutr*. 2000; 54(11):844-8. doi: 10.1038/sj.ejcn.1601103.
3. Maunsell E, Drolet M, Brisson J, Robert J, Deschênes L. Dietary change after breast cancer: extent, predictors, and relation with psychological distress. *J Clin Oncol*. 2002;20(4):1017-25. doi: 10.1200/JCO.2002.20.4.1017.
4. Thomson CA, Flatt SW, Rock CL, Ritenbaugh C, Newman V, Pierce JP. Increased fruit, vegetable and fiber intake and lower fat intake reported among women previously treated for invasive breast cancer. *J Am Diet Assoc*. 2002;102(6):801-8. doi: 10.1016/s0002-8223(02)90180-x.
5. Salminen E, Bishop M, Poussa T, Drummond R, Salminen S. Dietary attitudes and changes as well as use of supplements and complementary therapies by Australian and Finnish women following the diagnosis of breast cancer. *Eur J Clin Nutr*. 2004;58(1):137-44. doi: 10.1038/sj.ejcn.1601760.
6. Alfano CM, Day JM, Katz ML, Herndon JE 2nd, Bittoni MA, Oliveri JM, et al. Exercise and dietary change after diagnosis and cancer-related symptoms in long-term survivors of breast cancer: CALGB 79804. *Psychooncology*. 2009;18(2):128-33. doi: 10.1002/pon.1378.
7. Velentzis LS, Keshtgar MR, Woodside JV, Leatham AJ, Titcomb A, Perkins KA, et al. Significant changes in dietary intake and supplement use after breast cancer diagnosis in a UK multicentre study. *Breast Cancer Res Treat*. 2011;128(2): 473-82. doi: 10.1007/s10549-010-1238-8.
8. Velicer CM, Ulrich CM. Vitamin and mineral supplement use among US adults after cancer diagnosis: a systematic review. *J Clin Oncol*. 2008;26(4):665-73. doi: 10.1200/JCO.2007.13.5905.
9. Lee MM, Lin SS, Wrench MR, Adler SR, Eisenberg D. Alternative therapies used by women with breast cancer in four ethnic populations. *J Natl Cancer Inst*. 2000;92(1):42-7. doi: 10.1093/jnci/92.1.42.
10. Huebner J, Marienfeld S, Abbenhardt C, Ulrich C, Muenstedt K, Micke O, et al. Counseling patients on cancer diets: a review of the literature and recommendations for clinical practice. *Anticancer Res*. 2014;34(1):39-48.
11. Mlakar Mastnak D. Pregled prehranske podpore bolnikov z rakom na Onkološkem inštitutu Ljubljana. In: Rotovnik Kozjek N, editor. 2. kongres klinične prehrane in presnovne podpore z mednarodno udeležbo, Portorož, 15.-17. november 2013. Ljubljana: Slovensko združenje za klinično prehrano, 2013:111-3.
12. Rotovnik Kozjek N. Klinična prehrana rakavih bolnikov. *Farm Vestn*. 2009; 60(2):80-4.
13. Demark-Wahnefried W, Aziz NM, Rowland JH, Pinto BM. Riding the crest of the teachable moment: promoting longterm health after the diagnosis of cancer. *J Clin Oncol*. 2005;23(24):5814-30. doi: 10.1200/JCO.2005.01.230.
14. Bennett JA, Winters-Stone KM, Dobek J, Nail LM. Frailty in older breast cancer survivors: age, prevalence, and associated factors. *Oncol Nurs Forum*. 2013;40(3):E126-34. doi: 10.1188/13.ONF.E126-E134.
15. Lorenzo-López L, Maseda A, de Labra C, Regueiro-Folgueira L, Rodríguez-Villamil JL, Millán-Calenti JC. Nutritional determinants of frailty in older adults: A systematic review. *BMC Geriatr*. 2017;17(1):108. doi: 10.1186/s12877-017-0496-2.
16. Travier N, Fonseca-Nunes A, Javierre C, Guillamo E, Arribas L, Peiró I, et al. Effect of a diet and physical activity intervention on body weight and nutritional patterns in overweight and obese breast cancer survivors. *Med Oncol*. 2014;31(1):783. doi: 10.1007/s12032-013-0783-5.
17. Rock CL, Flatt SW, Newman V, Caan BJ, Haan MN, Stefanick ML, et al. Factors associated with weight gain in women after diagnosis of breast cancer. *J Am Diet Assoc*. 1999; 99(10): 1212-21. doi: 10.1016/s0002-8223(99)00298-9.
18. Halbert CH, Weathers B, Esteve R, Audrain-McGovern J, Kumanyika S, DeMichele A, et al. Experiences with weight change in African-American breast cancer survivors. *Breast J*. 2008;14(2):182-7. doi: 10.1111/j.1524-4741.2007.00551.x.
19. Yaw YH, Shariff ZM, Kandiah M, Mun CY, Yusof RM, Othman Z, et al. Weight changes and lifestyle behaviors in women after breast cancer diagnosis: a cross-sectional study. *BMC Public Health*. 2011;11:309. doi: 10.1186/1471-2458-11-309.
20. Demark-Wahnefried W, Campbell KL, Hayes SC. Weight management and its role in breast cancer rehabilitation. *Cancer*. 2012;118(Suppl 8):2277-87. doi: 10.1002/cncr.27466.
21. Rock CL, Demark-Wahnefried W. Nutrition and survival after the diagnosis of breast cancer: a review of the evidence. *J Clin Oncol*. 2002;20(15):3302-16. doi: 10.1200/JCO.2002.03.008.
22. Demark-Wahnefried W, Peterson B, McBride C, Lipkus I, Clipp E. Current health behaviors and readiness to pursue life-style changes among men and women diagnosed with early stage prostate and breast carcinomas. *Cancer*. 2000;88(3):674-84.
23. Greenlee H, Kwan ML, Ergas IJ, Strizich G, Roh JM, Wilson AT, et al. Changes in vitamin and mineral supplement use after breast cancer diagnosis in the Pathways Study: a prospective cohort study. *BMC Cancer*. 2014;14:382. doi: 10.1186/1471-2407-14-382.
24. Cancer Research UK. The safety of metabolic therapy and alternative diets. Accessed January 20th, 2017 at: <http://www.cancerresearchuk.org/about-cancer/cancers-in-general/treatment/complementary-alternative/about/harm/the-safety-of-alternative-diets>.
25. Kovač Blaž M. Clinical pathway in primary care healthcare. *Med Razgl*. 2017;56(Suppl 1):53-60.
26. Rak v Sloveniji 2013. Ljubljana: Onkološki inštitut Ljubljana, Epidemiologija in register raka, Register raka Republike Slovenije, 2016. Accessed January 20th, 2017 at: [http://www.onko-i.si/fileadmin/onko/datoteke/dokumenti/RRS/LP\\_2013.pdf](http://www.onko-i.si/fileadmin/onko/datoteke/dokumenti/RRS/LP_2013.pdf).