

ORIGINAL ARTICLE

DIETARY INTAKE AMONG BREAST CANCER SURVIVORS IN EAST COAST OF PENINSULAR MALAYSIA

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ABSTRACT

A balanced dietary intake plays an important role in the prognosis of breast cancer and is one of the modifiable factors in preventing cancer recurrence. This study aims to determine the dietary intake among breast cancer survivors in East Coast of Peninsular Malaysia. A total of 125 breast cancer survivors, aged 37 to 72 years, with mean duration of survivorship of 6.1 ± 3.9 years were recruited from two main referral hospitals in Terengganu and Kelantan. Majority of the respondents were Malay (94.4%) with a mean BMI of 27.7 ± 5.07 kg/m², and were diagnosed with stage II cancer (66.0%). Dietary intake was estimated using a semi-quantitative food frequency questionnaire (FFQ). The results show that the mean daily intake of energy was 1764 ± 378 kcal/day, protein was 72.38 ± 33.6 g/day (16.5% of energy), carbohydrate was 243.0 ± 62.2 g/day (55% of energy) and fat was 55.8 ± 15.6 g/day (28% of energy). Overall, breast cancer survivors in this study had an adequate daily intake of vitamins and minerals according to Malaysian Recommended Nutrient Intakes (RNI) except for dietary fibre (10.6 ± 4.2 g/day), monounsaturated fatty acids (20.7 ± 5.7 g/day), polyunsaturated fatty acids (8.0 ± 2.2 g/day), calcium (561.0 ± 257.1 mg/day), iron (18.3 ± 7.2 mg/day) and potassium (1813.4 ± 531.1 mg/day) which was lower than the recommendation. Meanwhile, intake of sodium (2592 ± 1697 mg/day), protein (80.4 ± 33.6 g/day), saturated fatty acids (26.9 ± 14.2 g/day), vitamin B2 (1.9 ± 1.1 mg/day) and vitamin C (151.1 ± 149.3 mg/day) exceeded the recommendation by 135.0%, 139.0%, 166.9%, 154.6% and 152.0%, respectively. There was no significant difference in dietary intake between cancer survivors who were diagnosed in the past five years and those who were diagnosed more than five years ago ($p > 0.05$) except for fat ($p < 0.001$), saturated fatty acid ($p = 0.006$), monounsaturated fatty acid ($p = 0.005$) and polyunsaturated fatty acid ($p = 0.003$). As a conclusion, breast cancer survivors in East Coast of Peninsular Malaysia had an adequate intake of most nutrients except for dietary fibre, monounsaturated fatty acids, polyunsaturated fatty acids, calcium, iron and potassium which was below the recommendation and sodium, protein, saturated fatty acids, vitamin B2, vitamin C which was above the recommendation. The intakes between long-term and short-term survivors were also comparable showing sustained dietary intake throughout survivorship.

Keywords: Dietary intake, nutrient, breast cancer, survivors, food frequency questionnaire

INTRODUCTION

Breast cancer is the most common cancer and the leading cause of cancer death in women worldwide. Among women which were associated with breast cancer in 2008, 23% (1.38 million) were new cancer cases and 14% (458,400) of the total cancer were reported dead¹. In most Asian countries, breast cancer incidence for the past two decades had increased, whereby in Western countries, breast cancer incidence had stabilised or even decreased². In Malaysia, even though breast cancer survival rates had improved in the past three decades, the National Cancer Registry and the National Mortality Registry found that the 5-year overall survival rate was only 49% and continued to lag behind that of our neighbouring countries, particularly Singapore³.

Healthy lifestyle habits including dietary intake

had been promoted as a key to improve health, well-being and longevity amongst growing population of breast cancer survivors⁴. The influence of diet on breast cancer prognosis has been explored in previous studies demonstrating inconsistent results with fat intake and modest inverse associations with fruit and vegetable consumption^{5,6}. Nutrients typically found in fruit and vegetables have been related to better survival, whereas associations of fat intake and survival have been mixed⁷. Cancer survivors are also encouraged to limit red meat and alcohol intake; and avoid consumption of processed meat^{8,9}. In addition to red meat, there is also a convincing evidence that consumption of processed meat is a risk factor for certain types of cancer.

Majority of breast cancer patients considered diet as a contributing factor of breast cancer. Soraya et al. reported that Malaysian breast cancer patients

changed their diet by increasing consumption of fruits, vegetables, fish, low fat milk and soy products and reducing red meat, seafood, noodles and poultry intake¹⁰. The interest in dietary modification also increased with the increase in time since diagnosis as seen among survivors from Finland and Australia¹¹. Since breast cancer survivors are also at increased risk for second primary cancers, diabetes, cardiovascular disease and osteoporosis, American Cancer Society has recommended using several guidelines as a tool for cancer prevention as well as a basis for nutritional advice for them^{12, 13}. However, specific information on dietary intake among breast cancer survivors especially in developing countries is notably lacking. Therefore, this study aims to describe dietary intake especially on nutrients intake among breast cancer survivors in East Coast of Peninsular Malaysia and to compare the intake between short-term (< 5 years) and long-term survivors (≥ 5 years).

METHODS

Study design, period and location

This cross-sectional study was conducted to determine the dietary intake among breast cancer survivors in East Coast of Peninsular Malaysia. This study was approved by Ministry of Health Malaysia Medical Research Ethics Committee and registered with National Medical Research Registry (NMRR-14-1618-23717). Data collection was carried out from November 2015 to May 2016 among breast cancer survivors attending the Breast Clinic, Surgical Out-Patient Department for their biannually appointment with the oncologist of two main referral hospitals in Kelantan and Terengganu, Malaysia. A questionnaire on sociodemographic, medical history and medication was interviewer-administered on one to one basis.

Study participants, inclusion and exclusion criteria

Eighty breast cancer survivors were recruited through non-probability purposive sampling. Subjects were adult women and must have completed three phases of breast cancer treatment which were surgery, chemotherapy with or without radiotherapy treatment. Survivors previously diagnosed at stage I, II or III of breast cancer were selected as subjects if they had lived at least 6 months after completion of treatment. Only survivors who met the inclusion criteria and signed consent form were invited to participate in this study.

Anthropometric and body composition

Anthropometric and body composition analysis such as current weight, height and percent of body fat were measured by body composition analyser

(Tanita BC-587, Japan). Waist measurement was taken at the smallest waist area, rounding up to the nearest 0.1 cm and was performed twice, recorded then averaged for analyses. Obesity index was defined using body mass index classification by World Health Organization (2000).

Dietary intake assessment and analysis

Dietary intake was assessed by using an interviewer-administered semi-quantitative FFQ, which included 203 commonly consumed food and beverages items in Malaysia among adults. For each food or beverage, subjects responded the frequency of consumption over the last 4 weeks and indicated the associated serving size according to common household measurements such as teaspoon, tablespoon, cups, plate and etc. Nutrients intake was calculated using a food composition database derived from Malaysian Food Composition Table¹⁴ and borrowed values from US Department of Agriculture¹⁵ food composition sources.

Statistical analysis

All data were analysed using IBM-SPSS version 22. Descriptive statistics including means, standard deviation and range were used to present subject's demographic information, anthropometric and dietary intake. Independent t-test was used to analyse the difference between the mean of nutrients intake for subjects with survivorships duration below or more than 5 years.

RESULTS

Demographic and clinical characteristics of breast cancer survivors were described in Table 1. The mean age of breast cancer survivors was 52.8 ± 7.9 years old. Most of the subjects were Malay, married and housewives, had monthly income of more than RM 2000. In term of duration of survivorship, majority (61.6%) were classified as long-term survivors (more than or equal to 5 years survivorship). Majority of breast cancer survivors included in this study were previously diagnosed with Stage II cancer (69%) and had undergone all three main treatment modalities. A big proportion of them had reached menopause due to treatment (76.0%). Usage of contraceptive pills was common (44.8%) but only a small proportion took hormone replacement therapy (13.6%). The mean BMI was 27.7 ± 5.07 kg/m² and more than half of breast cancer survivors' BMI (kg/m²) were classified as overweight (44.8%) and obese (29.6%), respectively. The mean waist circumference was 89.6 ± 12.1 .

Table 2 showed the mean nutrient intake among breast cancer survivors and the mean comparison between the subjects with survivorships duration

below and above five years. There were no significant differences found in dietary intake between cancer survivors who were diagnosed in the past five years and of those who were diagnosed more than five years ago ($p>0.05$) except for fat ($p<0.001$), saturated fatty acids ($p=0.006$), monounsaturated fatty acid ($p=0.005$) and polyunsaturated fatty acid ($p=0.003$). Comparisons of nutrients intake by the subjects with Recommended Nutrient Intake (NCCFN 2017) in Figure 1 indicated that breast cancer survivors in this study had an adequate daily intake of vitamins and minerals according to Malaysian

Recommended Nutrient Intakes except for dietary fibre (10.6 ± 4.2 g/day), monounsaturated fatty acids (20.7 ± 5.7 g/day), polyunsaturated fatty acids (8.0 ± 2.2 g/day), calcium (561.0 ± 257.1 mg/day), iron (18.3 ± 7.2 mg/day) and potassium (1813.4 ± 531.1 mg/day) which was lower than the recommendation. Meanwhile, intake of sodium (2592 ± 1697 mg/day), protein (80.4 ± 33.6 g/day), saturated fatty acids (26.9 ± 14.2 g/day), vitamin B2 (1.9 ± 1.1 mg/day) and vitamin C (151.1 ± 149.3 mg/day) exceeded the recommendation by 135.0%, 139.0%, 166.9%, 154.6% and 152.0%, respectively.

Table1: Characteristics of breast cancer survivors (n=125)

Characteristics		n	%	Mean \pm SD
Ethnicity	Malay	118	94.4	
	Chinese	7	5.6	
Marital Status	Single	5	4.0	
	Married	96	76.8	
	Widowed	20	16.0	
	Divorced	4	3.2	
Occupation	Professional	23	22.5	
	Support staff	14	11.2	
	Self-worker	26	20.8	
	Housewife	45	36.0	
	Retiree	15	12.0	
Monthly income (RM)	Others	2	1.6	
	< RM 500	22	17.6	2407.63 \pm 2347.77
	RM 500 - 1000	32	25.6	
	RM 1000 - 2000	25	20.0	
> RM 2000	46	36.8		
Duration of survivorship (year)	< 5 year	48	38.4	6.1 \pm 3.9
	\geq 5 year	77	61.6	
Cancer stage	Stage I	22	17.6	
	Stage II	69	55.2	
	Stage III	34	27.2	
Treatment	Surgery	124	99.2	
	Chemotherapy	125	100.0	
	Radiotherapy	107	85.6	
Had menopause - yes		107	85.6	
Cause menopause	Naturally	31	29.0	
	Treatment	76	71.0	
Contraceptive intake - ever		56	44.8	
Hormone replacement therapy - ever		17	13.6	
Family history of cancer - yes		35	28.0	
Morbidityies	Diabetes mellitus	22	17.6	
	Hypertension	31	24.8	
	Heart Disease	2	1.6	
Body weight (kg)				66.4 \pm 12.6
BMI (kg/m ²)	Underweight	3	2.4	27.7 \pm 5.7
	Normal	29	23.2	
	Overweight	56	44.8	
	Obese	37	29.6	
Waist circumference (cm)	< 80 cm	28	22.4	89.6 \pm 12.1
	> 80 cm	97	77.6	

Table 2: Nutrients Intake of breast cancer survivors

Nutrients	All (n=125)	Duration of survivorship		p value
		< 5 years (n=48)	≥ 5years (n=77)	
Energy (kcal/day)	1764 (378)	1702 (348)	1802 (392)	0.151
Carbohydrate (g/day)	243.0 (62.2)	243.6 (65.3)	242.6 (60.6)	0.928
Carbohydrate (%)	55.0 (6.3)	56.8 (6.6)	53.8 (5.9)	
Protein (g/day)	72.38 (33.6)	69.1 (15.41)	74.4 (18.3)	0.092
Protein (%)	16.5 (2.8)	16.3 (2.4)	16.7 (3.0)	
Fat (g/day)	55.8 (15.6)	50.1 (11.0)	59.3 (17.1)	<0.001*
Fat (%)	28.5 (4.9)	26.8 (5.0)	29.5 (4.6)	
SFA ^a (g/day)	24.7 (8.1)	22.4 (5.9)	26.1 (9.0)	0.006*
MUFA ^b (g/day)	20.7 (5.7)	19.0 (4.1)	21.7 (6.4)	0.005*
PUFA ^c (g/day)	8.0 (2.2)	7.4 (1.6)	8.4 (2.4)	0.003*
Fibre (g/day)	10.6 (4.2)	10.6 (4.8)	10.7 (3.9)	0.953
Calcium, Ca (mg/day)	561 (257.1)	540.7 (256.3)	573.8 (258.5)	0.486
Phosphorus, P (mg/day)	844.1 (247.7)	810.9 (224.7)	864.9 (260.3)	0.237
Iron, Fe (mg/day)	18.3 (7.2)	18.0 (8.6)	18.6 (6.3)	0.678
Sodium, Na (mg/day)	2024.5 (623.6)	1916.4 (583.8)	2091.9 (641.6)	0.127
Potassium, K (mg/day)	1813.4 (531.1)	1753.4 (610.5)	1850.8 (475.4)	0.321
Vitamin A (µg/day)	573.2 (226.8)	569.5 (182.1)	575.6 (251.8)	0.877
Vitamin B1 (mg/day)	1.2 (0.4)	1.22 (0.4)	1.2 (0.4)	0.501
Vitamin B2 (mg/day)	1.7 (0.8)	1.7 (0.7)	1.7 (0.8)	0.774
Niacin (mg NE/day)	14.0 (4.2)	13.9 (3.9)	14.1 (4.4)	0.799
Vitamin C (mg/day)	106.5 (66.5)	114.7 (77.9)	101.4 (58.2)	0.277
Added sugar (g/day)	44.2 (20.1)	43.7 (20.7)	44.5 (19.8)	0.820

Values are presented as mean (SD)

* Significant difference with p<0.05 (t-test)

^a SFA = Saturated fatty acid, ^b Monounsaturated fatty acid, ^c Polyunsaturated fatty acid

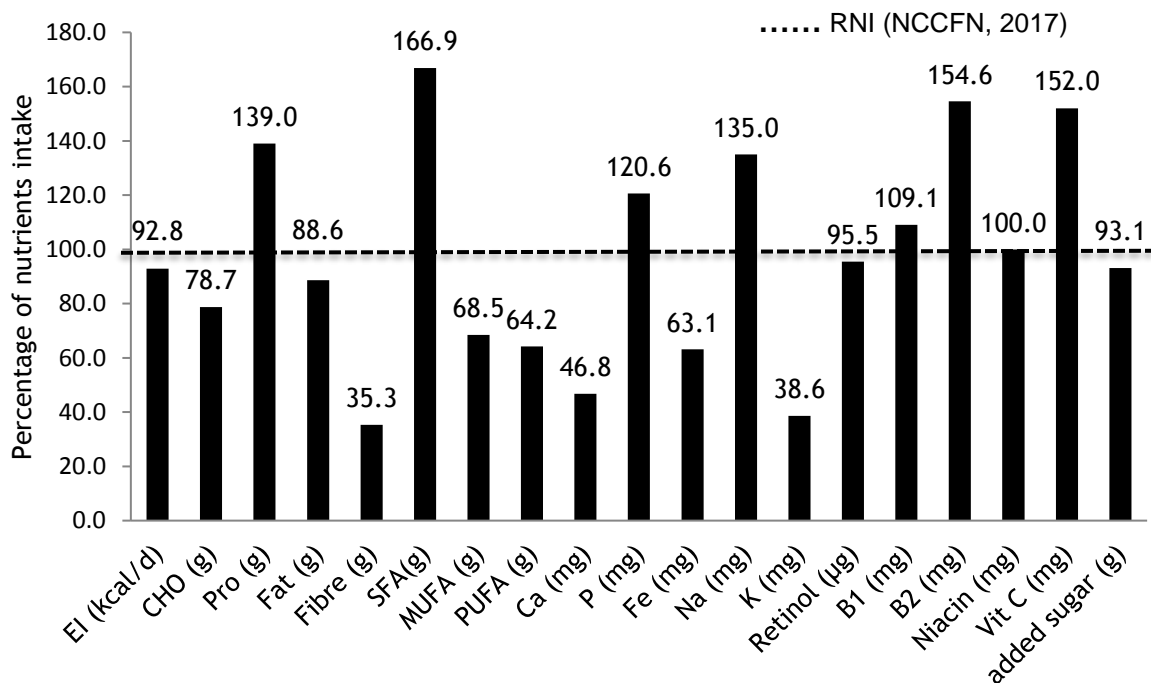


Figure 1: Nutrients intake of subjects based on Malaysian RNI (NCCFN 2017)

DISCUSSION

This cross-sectional study was conducted to determine the dietary intake among breast cancer survivors in East Coast of Peninsular Malaysia. Healthy lifestyle habits including healthy dietary pattern practiced had been proved by previous studies as a key to improve health, well-being and longevity amongst growing population of breast cancer survivors^{4, 7, 16}. Dietary intake among breast cancer survivors in this present study showed that almost all macronutrient and most of the micronutrient intake of breast cancer survivors had met Malaysian RNI (NCCFN, 2005). The same pattern was previously reported by Mohammadi et al.¹⁸ and Shaharudin et al.¹⁰. It was noteworthy to mention that fibre, calcium and potassium were lower than the recommended intake while sodium, vitamin B2 and C were higher than the recommended intake in this study. Survivors in the present study might be motivated to reduce the risk of both cardiovascular and cancer recurrence as previously shown in Wang et al.¹⁹ and had increased their consumption of fruits intake indicated by marked increase of vitamin C but not vegetables which was reported to be lower. Milliron et al.²⁰ compared dietary intakes between breast cancer survivors and healthy US women and they found that the survivor's dietary intakes were poor and failed to meet their dietary guidelines for most of the food groups, similar to their healthy counterparts.

It was interesting to note that the poor intake of certain nutrients in the present study might be associated with low intake of vegetables, milk and milk product. A similar finding was reported by Shu et al.²¹ where their cohort of breast cancer survivors often had intrinsically insufficient levels of calcium intake prior to diagnosis and this deficiency was carried forward after treatment. Skeie et al.²² also reported that cancer survivors in their study were avoiding milk and dairy products. Malaysian breast cancer survivors were previously reported to believe that high intake of protein including red meat, milk and dairy product, will help spread cancer²³. Kroenke et al.²⁴ indicated a suggestive association of high-fat dairy with breast cancer recurrence and significant association with breast cancer mortality. The lack of association of low-fat dairy with breast cancer outcomes was consistent with the hypothesis that dairy fat intake may increase the risk of adverse post diagnosis breast cancer outcomes through effects on oestrogens. Hence, reducing consumption of dairy and dairy product instead of limiting only the fat intake may possibly be a modifiable dietary pattern. However, limiting dairy products will lower the calcium in diet which is also important for women at this age group who

are prone to osteoporosis. The study also found that cancer survivors not more than 5 years have significantly lower intake of fat, MUFA and PUFA compared to cancer survivors more than 5 years. Previous study shows that by reducing dietary fat intake, cancer survivors was associated with longer relapse-free survival of breast cancer²⁵

The current study also found that there were no significant differences in nutrients intake between short-term and long-term survivors indicating that the survivors might have sustained their dietary intake throughout their survivorship. Skeie et al.²⁶ suggest that short-term survivors, long-term survivors and even healthy women have similar diets and lifestyle in most aspects. Only nutrients related with fruit and vegetable consumption was significantly higher among short-term survivors compared to long-term survivors and healthy Norwegian women. This might indicate that changes in diet among breast cancer survivors are a temporary phenomenon and it is possible that breast cancer survivors increase their consumption of fruits and vegetables when diagnosed, and fall back towards the lower intake pattern of healthy women as time passes. However, the major limitation of the previous and present study are that they are cross-sectional studies and should be explored further in a prospective study. There is a possibility that the breast cancer survivors changed their diet from pre-diagnosis, and that their earlier diet was less healthy than the current diet of the healthy women. Therefore, if breast cancer survivors try to make healthier choices, nutritionists and other health professionals should be prepared to support and enforce these choices in order to make them permanent. Healthy eating reinforcement via dietary counseling during cancer treatment and follow-up can help guide post-treatment health behaviours and has been associated with improved outcomes²⁷.

The strength of this study is on quantifying dietary intake of breast cancer survivors using a semi-quantitative FFQ. This method was able to identify habitual intake and compare between short-term and long-term survivors. However, the small sample size of breast cancer survivors stratified between short-term and long-term survivors might have contributed to non-significant findings. The analysis also did not exclude women with comorbidities, which might also affect their dietary intake. Recall bias is a well-known limitation when using FFQ as a dietary assessment tool. However, the study subjects were asked to recall the past week, instead of past month or year, making this bias less likely.

CONCLUSION

In conclusion, breast cancer survivors in East Coast of Peninsular Malaysia had an adequate intake of most macronutrients and micronutrients. They achieved the recommendations set up for healthy individuals except for dietary fibre, polyunsaturated fatty acids, calcium, potassium and exceeded the recommendation for sodium, protein, saturated fatty acids, vitamin B2, vitamin C. Dietary intake of short-term (< 5 years) and long-term survivors (\geq 5 years) were comparable with no significant differences. Breast cancer survivors should be encouraged to consume more plant-based diet particularly by increasing the intake of vegetables, whole grains and dairy products which are high in dietary fibre, polyunsaturated fatty acids, potassium, calcium and avoid processed foods which are high in sodium. They should also limit intakes of red meat which is high in protein and saturated fatty acids. It is also essential to integrate nutrition education and promotion into standardized models of care during transition from treatment to survivorship and continue to provide longer term support to sustain the positive changes.

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