Healthy eating index among women with breast cancer

Índice de alimentação saudável entre mulheres com câncer de mama

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ABSTRACT

Introduction: Breast cancer is the most common carcinoma among women. Diet quality indices as Healthy Eating Index (HEI) can be used to evaluate the food intake of patients with cancer. The objective of the present study was to assess the diet quality of women with breast cancer. **Methods:** Case-control study performed in a public hospital in Belo Horizonte, MG, Brazil. Clinical, anthropometric and dietary data of 43 women with breast cancer and 78 control were collected. The diet quality was assessed by the HEI adapted for Brazilian population. Statistical analyzes were performed using PASW Statistics 17.0 software, considering the level of statistical significance of 5%. **Results:** According to HEI analysis, a lower frequency of women with breast cancer presented satisfactory diet (25.6% compared to 47.4%) and a higher frequency showed diet requiring improvement (44.2% compared to 24.4%) than control group (p=0.036). Besides, 30.2% of the cases and 28.2% of the control group showed poor diet. Women with breast cancer showed lower intake of cereals and legumes and a high intake of dairy products in comparison to control group. **Conclusions:** Most women with breast cancer showed inadequate diet by the classification of the HEI. Future research should be performed with others dietary quality index since is very important to study diet, nutrition and breast cancer in a more overall way.

RESUMO

Introdução: O câncer de mama é o tipo mais comum entre as mulheres. Os índices de qualidade da dieta como o Índice de Alimentação Saudável (IAS) podem ser usados para analisar o consumo alimentar de pacientes com câncer. O objetivo do presente estudo foi avaliar a qualidade da dieta de mulheres com câncer de mama. **Método:** Estudo caso-controle realizado em um hospital público em Belo Horizonte, MG, Brasil. Foram coletados dados clínicos, antropométricos e alimentares de 43 mulheres com câncer de mama e 78 controle. A qualidade da dieta foi avaliada pelo IAS adaptado para a população Brasileira. As análises estatísticas foram realizadas utilizando software PASW versão 17.0, considerando o nível de significância estatística de 5%. **Resultados:** De acordo com a análise do IAS, menor frequência de mulheres com câncer de mama apresentou dieta satisfatória (25,6% em comparação com 47,4%) e uma maior frequência mostrou dieta exigindo melhorias (44,2% em comparação com 24,4%) em relação ao grupo controle (p = 0,036). Além disso, 30,2% dos casos e 28,2% do grupo controle apresentaram dieta insatisfatória. Mulheres com câncer de mama apresentaram menor ingestão de cereais e leguminosas e alta ingestão de produtos lácteos em comparação ao grupo controle. **Conclusões:** A maioria das mulheres com câncer de mama mostrou dieta inadequada pela classificação do IAS. Pesquisas futuras devem ser realizadas com outros índices de avaliação da qualidade da dieta, uma vez que é fundamental estudar dieta, nutrição e câncer de mama de uma forma mais completa.

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INTRODUCTION

Breast cancer is the type of carcinoma of the highest incidence among women and the second most common cancer in the world[1]. The world estimates for 2012 were 1.67 million new cases of this neoplasia (25% of all cancers)[1]. In Brazil, estimates for 2014 were about 57 thousand new cases of the disease. In Minas Gerais and Belo Horizonte, the estimates were nearly 5000 and 1000 new cases of the disease, respectively[2].

There are several risk variables for breast cancer including hormonal and reproductive factors such as early menarche, age of first pregnancy, nulliparity, decrease in the number of pregnancies, duration of breastfeeding, not having breastfeeding, use of contraceptives and hormone replacement therapy[3,4]. Moreover, the decrease of physical activity, increased alcohol consumption, smoking and dietary changes have acquired greater importance in studies about etiology of breast cancer[4].

Evidences suggest that dietary factors may influence the cancer stages as initiation, promotion and progression[5,6]. The World Cancer Research Fund (WCRF)/American Institute for Cancer Research (AICR)[7] conducted an extensive review to determine risk factors for breast cancer[7]. In research about diet and breast cancer, dietary patterns may be a helpful complementation to the traditional approach which has focused on isolated nutrients and foods[8,9], since these kind of studies have generated controversial results[10].

So instead of analyzing single nutrients or dietary components, dietary index can be used to assess the global diet quality through nutrients, food groups and dietary patterns[11]. The Healthy Eating Index (HEI)[12] was developed by the Department of Agriculture of the United States in order to build an index of overall diet quality that grouped nutritional needs and dietary guidelines for Americans[11,12]. Studies have been conducted mainly in US and Europe to assess diet quality of women with breast cancer[9,13]. Fung et al.[13] suggested a possible association between increased diet quality scores of the HEI and reduced risk of breast cancer.

Considering the differences between the Brazilian dietary patterns and the American diet standards, HEI was adapted to assess the diet quality of Brazilian population[14]. Among the changes was the inclusion of legumes, since it consumption is part of the traditional Brazilian diet[15].

The objective of the present study was to investigate the diet quality of women with breast cancer cared at a public hospital in Belo Horizonte, MG, Brazil.

METHODS

Study population

The case-control study was conducted from January to July 2006 in a public hospital located in Belo Horizonte, MG, Brazil.

Women who referred for surgical procedures on the breast and women who received other types of mastology or gynecology care services were invited to participate in the study.

So the convenience sample resulted in 43 women with breast cancer and 78 women control, considering the proportion about 2 controls to each case, without pairing. The case group consisted of women who had a histological diagnosis of malignant breast cancer. The control group consisted of women undergoing routine visits or gynecological surgeries with no personal history of breast cancer and that presented results of mammography categories I or II according to the criteria of BI-RADS from Brazilian Society of Mastology.

Data collection

Weight was obtained with a Tanita Body Fat Monitor Scale, Model TBF 531®. Height was measured with the Alturexata® stadiometer and waist circumferences with inelastic tape. The body mass index (BMI) was calculated (kg/m^2). Clinical, gynecological and obstetric data, family history and lifestyle were obtained using a structured questionnaire.

Food frequency questionnaire

The food frequency questionnaire (FFQ) used in this study was developed based on a validated questionnaire[16]. The FFQ aimed to determine food intake relative to the previous period preceding the date of the interview. The questionnaire was composed of 146 items divided in groups of grains, vegetables, fruits and juices, legumes, milk and dairy products, meat and derivatives, fish, eggs and fats. In order to estimate more effectively the amount of food consumed it was used the photographic record of servings and household measures utensils.

The frequency of dietary intake was assessed as daily, weekly, fortnightly, monthly, rarely or never consumed. For the analysis of food consumption, the dietary data obtained in household measures were converted to grams, milligrams, liters or milliliters and analyzed by DietPro software version 5.0.

Diet quality

Data of the FFQ were used to classify the diet quality according to the HEI proposed by Gomes et al.[17] based on original HEI[12], since the Brazilian dietary patterns differ in some aspects of the US diet standard.

Therefore, the HEI adapted to the Brazilian population[17] evaluated the intake of nutrients (total fat, saturated fat and cholesterol) and diet variety as the methodology of the original HEI[12]. The score portions of groups of cereals, vegetables, fruits, legumes, milk and dairy products, meat and derivatives, fish and eggs was calculated based on the recommendations set out in the Adapted Food Pyramid[18] and Food Guide for the Brazilian Population[15]. To calculate the diet variety it was recorded the number of different foods consumed daily, considering only the consumption of foods with at least half the amount recommended by Philippi et al.[18]. The index score ranged from zero to 10 for each of their components. Intermediate values of the majority index components between the maximum score of 10 and minimum of zero were calculated proportional to

the quantity consumed. While intermediate values of total fat between 31% to 44.9%, saturated fat between 10-14%, cholesterol between 301-449 mg and dietary variety among 4-7 different foods were awarded 5 points[11,14].

Statistical analysis

Statistical analyzes were performed using PASW Statistics 17.0 software, considering the level of statistical significance of 5%. Chi-square and Fisher's exact tests were used to compare distributions between the groups of categorical variables (clinical, gynecological, obstetric, lifestyle and diet quality), while the mean or medians values of continuous variables were compared between groups using Student's t test and Mann-Whitney-U test.

Ethical aspects

The study was approved by the Ethics Committee of the Hospital Foundation of the State of Minas Gerais, Brazil (protocol number: 1889/2005). All participants signed in duplicate an informed consent form prior to the beginning of research.

RESULTS

Table 1 shows anthropometric, gynecologic, obstetric, clinical and lifestyle characteristics. Women with breast cancer had a higher mean age (p=0.006), higher frequency of menopause (p<0.001), higher frequency of family history of breast cancer (p<0.001), fewer children (p=0.010) and they were older at 1st pregnancy (p<0.001) than control group.

Table 1 – Descriptive characteristics of the study population, Belo Horizonte, Brazil, 2006.

	Total	Case	Control	p
Mean ± SD1 or Median (Interquartile Range)				
Age (years)	47 (42-53)	50 (43-68)	46 (41-51)	0.006†
BMI (kg/m²)	26.82±5.64	26.66±6.28	26.91±5.29	0.814*
Waist circumference (cm)	89.67±13.78	89.78±15.17	89.61±13.06	0.950*
Age at menarche (years)	13.27±1.88	13.37±1.93	13.22±1.86	0.668*
Age of first pregnancy (years)	22.13±5.45	25.64±6.50	20.71±4.25	<0.001*
Parity	2 (1-4)	1 (0-4)	3 (2-4)	0.010†
Age at menopause (years)	46.70±4.75	47.21±5.27	46.17±4.21	0.462*
n (%)				
Oral contraceptive use				
Yes	74 (61.7)	21 (48.8)	53 (68.8)	0.031§
No	46 (38.3)	22 (51.2)	24 (31.2)	
Breastfeeding				
Yes	91 (75.8)	27 (62.8)	64 (83.1)	0.013§
No	29 (24.2)	16 (37.2)	13 (16.9)	
Menopause				
Yes	50 (41.7)	27 (62.8)	23 (29.9)	<0.001§
No	70 (58.3)	16 (37.2)	54 (70.1)	
Hormone replacement				
Yes	15 (12.4)	6 (14.0)	9 (11.5)	0.700§
No	106 (87.6)	37 (86.0)	69 (88.5)	
Family history of breast cancer				
Yes	12 (10.08)	12 (27.9)	0 (0)	<0.001‡
No	107 (89.92)	31 (72.1)	76 (100)	
Alcohol abuse				
Yes	34 (34.0)	13 (35.1)	21 (33.3)	0.854§
No	66 (66.0)	24 (64.9)	42 (66.7)	
Smoking habit				
Yes	18 (14.9)	5 (11.6)	13 (16.7)	0.456§
No	103 (85.1)	38 (88.4)	65 (83.3)	
Physical activity				
Yes	61 (50.4)	18 (41.9)	43 (55.1)	0.162§
No	60 (49.6)	25 (58.1)	35 (44.9)	

1SD: Standard Deviation; 2BMI: Body Mass Index.
†Mann-Whitney U test, *Student´s t test, §Chi-square test, ‡Fisher´s exact test.

Table 2 – Healthy Eating Index (HEI) items and its scores between women with breast cancer and control group, Belo Horizonte, Brazil, 2006.

Components of the HEI	Mean ± SD								
	T1			T2			T3		
	Case	Control	p*	Case	Control	p*	Case	Control	p*
Cereals (servings)	4.76±2.12	5.03±2.21	0.728	7.14±2.55	9.85±4.24	0.022**	5.77±3.56	6.66±3.64	0.477
Vegetables (servings)	4.05±2.18	3.14±2.09	0.231	5.51±4.03	6.82±5.17	0.388	4.66±1.32	5.46±3.37	0.448
Fruits (servings)	2.47±1.54	2.43±1.85	0.946	5.57±3.20	6.81±3.83	0.281	5.81±2.84	5.59±3.63	0.852
Legumes (servings)	0.83±0.61	1.15±0.97	0.296	1.68±0.90	2.68±1.52	0.018**	1.25±0.62	1.84±1.38	0.180
Dairy Products (servings)	2.30±0.73	0.73±0.54	0.003**	2.33±1.72	2.46±1.99	0.827	1.29±1.43	1.10±1.14	0.630
Meat (servings)	2.02±1.43	1.97±1.47	0.924	1.84±0.83	2.17±1.51	0.415	1.81±1.41	1.98±1.28	0.691
Total Fat (%)	34.53±7.63	32.02±10.75	0.467	25.11±5.70	24.32±5.99	0.679	28.39±7.33	28.05±8.04	0.899
Saturated Fat (%)	11.48±3.77	9.90±4.12	0.268	7.53±2.05	7.42±2.30	0.879	9.07±3.98	8.07±2.81	0.352
Cholesterol mg)	272.50±179.54	254.13±161.60	0.757	201.72±81.43	304.19±126.17	0.192	204.70±119.41	262.89±165.39	0.285
Diet Variety	4.23±2.74	3.91±1.82	0.697	8.16±2.69	6.95±3.04	0.203	5.82±2.36	5.71±2.36	0.613

*P-value to Student's t test; **p<0.05 T1: <71.90 points; T2: 71.90-81.87 points; T3: > 81.87 points.

On the other hand, control group reported a higher frequency of oral contraceptive use (p=0.031), and higher frequency of breastfeeding (p=0.013).

In this study, the total score of the index was stratified into tertiles and the diet was classified according to the HEI tertiles: tertile 1 (<71.90 points; inadequate diet), tertile 2 (71.90 to 81.87 points; diet requiring improvement) and tertile 3 (>81.87 points; satisfactory diet).

According to HEI analysis, a lower frequency of women with breast cancer presented satisfactory diet (25.6% compared to 47.4%) and a higher frequency showed diet requiring improvement (44.2% compared to 24.4%) than control group (p = 0.036). Besides, 30.2% of the cases and 28.2% of the control group showed poor diet.

The consumption of food groups and dietary variety among tertiles of the HEI was compared between women with breast cancer and control group. The results presented in Table 2 indicated that among women with breast cancer, the medium consumption of dairy products were higher in tertile 1 of the HEI, whereas the medium consumption of cereals and legumes were lower in tertile 2 compared with control group (p<0.05). There was no difference in the consumption of the other food groups and dietary variety between case and control group (p>0.05). However, women with breast cancer showed low diet variety (≤ 8 different types of foods per day).

DISCUSSION

There is evidence that the factors associated with the risk of the disease are related to the interaction of genetic, hormonal, reproductive and environmental variables such as lifestyle and diet[3,4]. Our results indicated that most women with breast cancer showed diet requiring improvements. This enhancement can be considered particularly in regard to low-diet variety. Besides, the HEI evaluated the intake of fat, cereals, vegetables, fruits, legumes, dairy products and meat[12].

Choose a varied diet based predominantly on fruits and vegetables, cereals, legumes, roots and tubers with minimal of processed foods and simple sugars are the recommendations proposed by the WCRF/AICR[7]. Dietary pattern characterized by low intake of fruits and vegetables and high consumption of fat and dairy products may be associated with increased risk of breast cancer[9,19]. Among dietary factors, fat intake has been considered as one of the most important risk factors for breast cancer[19]. Moreover, consumption of dairy products has also been associated with breast cancer risk because of the fat and hormones that

could contribute with cell proliferation[19]. While the intake of fruits and vegetables have a protective effect against breast cancer[7].

Regarding the evaluation of diet quality, study conducted in southern Brazil with women before and during treatment for breast cancer showed that they improved their diet score quality passing to the upper tertiles after a breast cancer diagnosis[20]. Fung et al.[13] analyzed the ability of diet quality indices to predict breast cancer risk and the results showed that women who had a higher score of the HEI had a lower risk of estrogen receptor negative breast cancer[13].

The study of dietary factors is challenging, since it has limitations. Concerning the food groups, data collected by FFQ may have restrictions, since they depend on the information provided by the interviewed and may be reported according to the consumption considered desirable. However, the FFQ used in the present study was previously validated and it was applied by trained nutritionists which might render reliable results. Another limitation is related to the sample size and the selection of participants by convenience sampling which don't allow to extrapolate the results to other populations. Nevertheless, breast cancer and control women presented differences in risk variables such as age, age of first pregnancy, number of child and other characteristics according to expected by literature[3,4], indicating no bias in participants selection.

Despite some limitations, the present study showed to be relevant to science and public health since it was proposed to study the quality diet of Brazilian women with breast cancer. This will contribute to further research in the area with others indices as Diet Quality Index, Mediterranean Diet Score, Recommended Food Score, Overall Nutritional Quality Index, World Health Organization Healthy Diet Index and others. So future research should be performed to evaluate the association among diet quality and breast cancer in Brazil.

Furthermore, it would be important to formulate a specific dietary index with food groups, nutrients and no nutrients related to the risk or prevention of breast cancer. This would be useful for epidemiological studies on nutrition and breast cancer.

ACKNOWLEDGEMENTS

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