



Is a Family History of the Breast Cancer Related to Women's Cancer Prevention Behaviors?

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Published online: 7 August 2018

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Abstract

Families share behavioral risk factors that can increase the risk of cancer development. We examined whether having a positive family breast cancer history is associated with health behaviors/screening practices. Analyses were based on a cross-sectional sample of 545 Brazilian National Cancer Institute Hospital patients with newly diagnosed breast cancer in 2013/2014. Women were categorized according to their breast cancer family history. Age-adjusted Poisson regressions with robust variance were performed to estimate the association between breast cancer family history and selected health-related behaviors and screening practices. About one fourth of women reported a positive family history of breast cancer. Contrary to expectation, we found that women with a family history of breast cancer did not report healthier behaviors more often than those without a family history. However, those with a family history were more likely to report a mammographic exam prior to the mammographic diagnosis. Our study suggests that having a family history of cancer is not sufficient to change women's behaviors about physical activity, weight control and diet, smoking, and drinking, but it seems to influence their breast cancer screening behavior. Our results suggest the need to increase women's information and/or understanding that healthier lifestyles contribute to cancer prevention.

Abbreviations

SD Standard deviation
BMI Body mass index
CI Confidence interval

Introduction

In addition to age, important risk factors for breast cancers include overweight/obesity [1], alcohol intake [2], reproductive and hormonal history [3], a family history of ovarian or

breast cancer [4], and in about 5–10% of cases, BRCA1 and BRCA2 gene mutations [5]. A family history of breast cancer is not synonymous with hereditary cancer, and it may occur because family members often share behavioral/environmental risk factors [6]. Previous studies have shown that migrant groups have cancer incidence rates different from those of the population of their country of origin, highlighting the importance of environmental risk factors [7, 8].

A recent study in Brazil has shown that at least 17% of postmenopausal breast cancer could be prevented by behavioral changes, such as weight control, increase in physical activity, avoidance of regular alcohol intake, breastfeeding, and avoiding use of oral contraceptives [9]. For cancers with both genetic and environmental risk factors, preventions focused on modifiable risk factors and early detection are important strategies [10].

In Brazil, where almost 60,000 new breast cancers are expected in 2018 [11] and over 15,000 deaths were notified in 2015 [12], mammographic screening is recommended for women aged 50 to 69 years [13]. Yet, as in many other countries, there are no specific guidelines for the management of women with a breast cancer family history, although recommendations include individualized medical monitoring [13], and moving beyond the “one-size-fits-all formula” for breast cancer screening [14, 15].

Electronic supplementary material The online version of this article (<https://doi.org/10.1007/s12529-018-9737-9>) contains supplementary material, which is available to authorized users.

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Our study explored associations of breast cancer family history with healthy behaviors and screening practices. We hypothesized that having a family member who experienced a breast cancer was related to a woman's risk perception and lifestyle. The expectation was that results of our study may help in the evaluation of strengths and weaknesses of country's breast cancer control policy and therefore support more effective strategies for the disease prevention.

Materials and Methods

We conducted a cross-sectional study, from June 2013 through October 2014, which included 545 incident breast cancer female cases treated at the Brazilian National Cancer Institute Hospital III (HCIII-INCA) located in Rio de Janeiro City. The Institute is the principal reference center of the Brazilian Public Health System (SUS) for breast cancer treatment in Rio de Janeiro State. Eligible subjects were women aged ≥ 18 years old who had a histopathological diagnosis within 6 months of their first HCIII-INCA visit. Participants signed a consent form and face-to-face interviews were conducted. The study was approved by the National Cancer Institute Ethics Committee (CAAE 0031.1.007.000-11).

Familial cancer was self-reported by participants [16]. Cancer family history was obtained for first- (mother, father, and/or sister/brother) and second-degree (half-sister, half-brother, grandmother, grandfather, uncle, and/or aunt) relatives. Based on this information, we defined women with a family history as those who reported at least one first- or second-degree relative with a previous diagnosed cancer. Although this definition is not standard, we believe it suggests how women perceive susceptibility to the disease [6, 17]. Our main analyses focused on breast cancer history. Supplementary Table 1 presents results for both "any cancer" and "breast cancer" history in patients' families.

We defined "regular physical activity" as exercising at least once a week for the past 3 months or longer. Frequency of cervical cancer screening, clinical breast examination, and mammography screening was categorized as "at least once every three years," "once every two years," and "once a year," respectively. "First perception of the disease" was categorized as self-perception (by breast self-examination or partner's perception) or resulting from medical diagnosis (by a clinical examination or medical imaging exams). TNM stage was classified as early (0, I, or IIA) or advanced (IIB, III, or IV).

Descriptive analyses are presented, and comparisons of women's characteristics by age group (18–49 vs. 50–87) were conducted using a chi-square test. Age-adjusted

prevalence ratios were calculated by using Poisson regression with robust variance to evaluate the associations between family history-based breast cancer risk and each lifestyle/behavior. Analyses were performed in Stata v.12.

Results

Most women were non-white and married and had a monthly income lower than the average income of the Rio de Janeiro State population. Approximately one third of women were aged 18–49 years and two thirds were aged 50–87 years. Younger individuals were more likely to have a higher educational level, be married, and have a higher income and a lower age at menarche. In addition, as expected, menopause was more common in the older women, but ages at first Pap smear, clinical examination of the breast and first mammogram were lower in the younger women (Table 1).

Of the study participants, 68.1% reported a positive family history of any cancer and about one fourth reported a family history of breast cancer (Supplementary Table 1). There was no statistically significant difference in breast cancer family history between the age groups (22.2% in younger and 25.9% in the older groups).

More than one half of the women reported having had breast examination and mammography performed on a regular basis. In unadjusted analyses, no statistically significant differences in these variables were found between those with and those without a family history (Table 2). Tumor stage at diagnosis was also not significantly different according to presence of family history. On the other hand, a mammogram prior to the diagnostic mammography was more often reported by those with a family history ($p = 0.03$), but disease detection by breast self-examination or perception by partner was more common in those without a family history ($p < 0.05$). No significant differences were found for regular Pap smears, body mass index, regular physical activity, smoking, and alcohol consumption. These patterns remained after age adjustment.

In age-adjusted analysis, greater percentages of women with than without a family history reported a mammogram prior to the diagnostic mammogram and disease detection by clinical exam. On the other hand, proportions of alcohol and tobacco use, BMI, and physical activity were fairly similar in those with and without family history. In addition, women with a breast cancer family history were not more likely to perform regular clinical breast examinations and to detect the disease in early stages than those without a family history.

Table 1 Socio-demographic and clinical characteristics by age group. Brazilian National Cancer Institute, 2013/2014

	Total		Age group				<i>p</i> value ^a
			18–49 years		50–87 years		
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Total	545	100.0	167	30.6	378	69.4	–
Race/color							
White	191	35.1	49	29.3	142	37.6	< 0.01
Mixed	258	47.3	75	44.9	183	48.4	
Black	89	16.3	37	22.2	52	13.8	
Other	7	1.3	6	3.6	1	0.3	
Education							
Complete primary education	285	52.3	66	39.5	219	57.9	< 0.01
Incomplete high school or more	260	47.7	101	60.5	159	42.1	
Marital status							
Married/cohabiting	278	51.0	106	63.5	172	45.5	< 0.01
Divorced/separated	80	14.7	16	9.6	64	16.9	
Single	99	18.2	42	25.2	57	15.1	
Widowed	88	16.2	3	1.8	85	22.5	
Monthly income (per capita*)							
Up to R\$1.193	392	75.2	138	84.2	254	71.2	< 0.01
More than R\$1.193	129	24.8	26	15.9	103	28.9	
Age at menarche							
Less than 12 years old	136	25.2	51	30.7	85	22.8	0.11
12–13 years old	236	43.8	64	38.6	172	46.1	
14 years or older	167	31.0	51	30.7	116	31.1	
Menopause (stop menstruating for at least 1 year)							
Yes	351	65.9	11	6.6	340	92.9	< 0.01
No	182	34.2	156	93.4	26	7.1	
Age at first Pap smear							
Less than 25 years old	285	66.7	132	89.8	153	54.6	< 0.01
25–39 years old	106	24.8	10	6.8	96	34.3	
40 years or older	36	8.4	5	3.4	31	11.1	
Age at first breast clinical examination							
Less than 25 years old	189	54.2	96	79.3	93	40.8	< 0.01
25–39 years old	108	31.0	18	14.9	90	39.5	
40 years or older	52	14.9	7	5.8	45	19.7	
Age at first mammogram							
Less than 40 years old	130	39.6	63	67.7	67	28.5	< 0.01
40 years or older	198	60.4	30	32.3	168	71.5	

*Cutoff due to average monthly income of Rio de Janeiro State population in 2014 (R\$1.193 = ~US\$450), according to IBGE. Accessed at: <ftp.ibge.gov.br>. Minimum wage in 2014: R\$724

^a Chi-squared test

Table 2 Association of breast cancer family history with women's behavioral characteristics and tumor stage at diagnosis. Brazilian National Cancer Institute, 2013/2014

	Total		Without family history		With family history		<i>p</i> value*	Model: with vs. without family history		
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		PR ^a	95% CI	<i>p</i> value
Clinical breast examination regularly performed										
Yes	257	57.2	192	56.6	65	59.1	0.65	1.05	(0.87–1.25)	0.62
No	192	42.8	147	43.4	45	40.9		1.00	–	
Mammogram regularly performed										
Yes	223	55.6	157	53.8	66	60.6	0.22	1.13	(0.93–1.35)	0.21
No	178	44.4	135	46.2	43	39.5		1.00	–	
Tumor stage at diagnosis										
Early (< IIB)	311	57.8	237	58.5	74	55.6	0.56	0.94	(0.79–1.11)	0.46
Advanced (≥ IIB)	227	42.2	168	41.5	59	44.4		1.00	–	
Another mammogram prior to the diagnosis exam performed										
Yes	401	73.6	292	71.2	109	80.7	0.03	1.12	(1.01–1.24)	0.03
No	144	26.4	118	28.8	26	19.3		1.00	–	
Disease detection (first signs)										
Breast self-examination/perceived by partner	370	68.4	288	70.8	82	61.2	0.04	1.00	–	0.05
Clinical exams	171	31.6	119	29.2	52	38.8		1.30	(1.01–1.69)	
Pap smear regularly performed										
Yes	342	64.8	250	63.5	92	68.7	0.28	1.09	(0.95–1.25)	0.20
No	186	35.2	144	36.6	42	31.3		1.00	–	
Body mass index (kg/m ²)										
Underweight or normal weight (< 25)	162	32.3	115	30.8	47	36.4	0.24	1.19	(0.90–1.56)	0.22
Overweight/obesity (≥ 25)	340	67.7	258	69.2	82	63.6		1.00	–	
Regular physical activity										
Yes	285	52.3	207	50.5	78	57.8	0.14	1.15	(0.97–1.37)	0.10
No	260	47.7	203	49.5	57	42.2		1.00	–	
Smoking status										
Never smoked	348	63.9	262	63.9	86	63.7	0.97	1.01	(0.87–1.16)	0.93
Former or current regular smoker	197	36.2	148	36.1	49	36.3		1.00	–	
Alcohol consumption in life (at least 1 dose per month, for at least 6 months)										
Yes	269	49.6	200	49.0	69	51.5	0.62	1.00	–	0.60
No	273	50.4	208	51.0	65	48.5		0.95	(0.78–1.16)	
Monthly doses in the last 12 months (on average)										
None or less than 1 per month	345	64.3	262	64.9	83	62.4	0.61	0.96	(0.83–1.12)	0.59
At least 1 per month	192	35.8	142	35.2	50	37.6		1.00	–	

Bold values mean $p < 0.05$

*Chi-squared test

^aAge-adjusted prevalence ratios, using Poisson regression

Discussion

Interestingly, but contrary to expectation, we found that women with a family history of breast cancer did not report healthier behaviors more often than women without a family history. Nevertheless, they reported more often previous mammogram screening exams than those without a family history of the disease.

In Brazil, breast cancer control is part of the Brazilian Strategic Action Plan for the Control of Chronic Non-communicable Diseases (Portuguese acronym, NCDs) and the Brazilian Public Health System (SUS) annually run public awareness campaigns about breast cancer, including information on prevention and risk factors, screening exams, and early detection [18]. Our study suggests that, among women seen at the Brazilian National Cancer Institute Hospital, there is insufficient information and/or understanding that healthier lifestyles can contribute to cancer prevention.

Although the proportion of women with advanced cancer is still high (over 40% in both those with and those without a family history), it is lower than what had been observed in previous years, suggesting a process of downstaging [19]. However, changing our definition of “advanced stage” from TMN stages \geq IIB to \geq III, as done in previous studies [20, 21], the prevalence of “advanced stage” was about 29%, again without statistically significant difference according to family history. In addition, although a screening program is recommended by the Brazilian Ministry of Health for all women aged 50–69 years, women with a family history of breast cancer, regardless of age, were more likely to have had a mammogram.

Similar findings to those presented in our study were also observed in other countries [6, 22, 23], but to our knowledge, ours is the first study on the association of health behaviors with family history in a developing country where breast cancer is a leading cause of cancer mortality in women [11]. Previous studies have suggested that women with a family history of cancer are more likely to be up-to-date with regard to screening exams because, in addition to information received from prevention campaigns and from health professionals, they also have relatives who have experienced the disease. However, in our study, prevention knowledge was not associated with a healthier lifestyle, suggesting that this information may not be properly discussed by health professionals and patients [23, 24, 25]. Another possibility is that women may consider that health-related behaviors are irrelevant if they have familial cancer history and believe that screening is sufficient as a preventive strategy. Further investigation is necessary on this topic.

In Brazil, overweight/obesity is responsible for 10.3% of breast cancer cases in post-menopausal women [9]. In our study, over two thirds of the patients were obese or overweight, a prevalence that is higher than that of the Brazilian population without cancer (51.9%) [26]. We also observed a

fairly low proportion of women reporting clinical breast examination, in agreement with another Brazilian study [27]. As a result, the majority of women reported detecting the disease’s first signs by breast self-examination. This finding may have resulted from insufficient access to and/or availability of health services.

Among our study’s limitations is its cross-sectional design, which is amenable to both selection and temporal biases. In addition, we do not have detailed information about ovarian cancer family history, which should be considered in the definition of familial cancer, given its association with breast cancer. Because the study was conducted in only one hospital, its external validity is limited. Future studies should try to better understand whether, regardless of family history, women are aware of the importance of healthier lifestyles to cancer prevention and the extent to which they believe that screening exams is a way to prevent the disease. Towards this end, a control group without breast cancer would allow not just evaluating health-related behaviors in women without breast cancer according to family history, but also providing a counterfactual to which the cases could be compared.

We suggest that more effective evidence-based programs in breast cancer prevention are needed to reduce its human and economic burden.

Conclusion

Overall, we found that women with a family history of breast cancer were more likely to undergo screening exams, however did not report healthier behaviors more often than those without such a history. Breast cancer control programs must emphasize the importance of physical activity, weight control, and healthier diet, including smoking cessation and reduction of alcohol drinking. These recommendations should be for everyone but especially for women with an increased risk to develop cancer.

Acknowledgements The authors thank Alexandre do Carmo, Beatriz Jardim, and Francisca Lucena for the support on the study design and data collection.

Funding Information This study was supported by the Brazilian National Cancer Institute.

Compliance with Ethical Standards

Conflict of Interest The authors declare there is no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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