RESEARCH ARTICLE

Breast Cancer Awareness among Women in Western Amazon: a Population Based Cross-Sectional Study

Marla Presa Raulino Schilling[1]*, Ilce Ferreira da Silva[1], Simone Perufo Opitz[2], Maria Fernanda de Sousa Oliveira Borges[2], Sergio Koifman[1], Rosalina Jorge Koifman[1]

Abstract

Background: A general lack of women`s awareness of breast cancer has been one of the barriers to screening and early presentation. Thus, the aim of this study was to evaluate levels of knowledge about risk factors, and early warning signs of breast cancer, and to determine factors associated with better levels of comprehension. **Methods:** A population-based cross-sectional study was carried out among 478 women over 40 years old, living in Rio Branco city, western Amazon. All were interviewed using the "Breast cancer knowledge, attitudes and practice scale", developed by American Cancer Society. **Results:** Among the respondents, only 28.6% of women were aware that advanced age highly increases the risk. Around 30% of participants recognized nipple retraction as a sign of breast cancer. Breast cancer knowledge varied according to age in such a way that the mean scores were high from 40-69 years and decreased dramatically among those aged ≥70 (β=-0.06,p=0.031). Access to health services such as the Pap-test (β=2.45,p=0.027) and attending a gynecologist in the past two years (β=1.88,p=0.005) were statistically associated with the score of breast cancer knowledge. **Conclusion:** The findings indicate that women living in urban areas, having gynecological assessment, considering herself at high risk of developing breast cancer and thinking that breast cancer is a fatal disease are statistically associated with good knowledge of breast cancer risk factors, signs and symptoms, even adjusting for age and education.

Keywords: Breast neoplasms- epidemiology- knowledge- risk factors- signs and symptoms

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Introduction

Breast cancer in women represents a major public health problem worldwide and in Brazil, where it has the highest incidence of neoplasia and is the main cause of cancer-related deaths in all regions in Brazil, especially in the western Amazon (National Cancer Institute, 2011, 2014; Nakashima et al., 2011, 2012; Ferlay et al., 2015). Breast cancer is a multifactorial disease whose etiology is not completely known. Epidemiological studies have suggested that dietary and lifestyle factors such as obesity, smoking, alcohol consumption, and a sedentary lifestyle play a significant role as risk factors for breast cancer, while breastfeeding can help protect women from this neoplasia (McTiernan, 2003; Tsugane, 2004; International Agency for Research on Cancer, 2010).

Because a delayed presentation of symptomatic breast cancer of three months or more is associated with lower survival rates (Richards et al., 1999), higher rates might be achieved by encouraging women to seek help more quickly. In a population base, it has been observed that the rate of detection of large tumors fell after the introduction of screening mammography, the more favorable size distribution was primarily the result of the additional detection of small tumors. However, the reduction in breast cancer mortality after the implementation of screening mammography was predominantly the result of improved systemic therapy (Blamey et al., 2000). Therefore, women still need to be 'breast aware' and to accurately identify breast symptoms to receive treatment as quickly as possible (symptoms may develop between screening appointments). Accordingly, accurate knowledge about early warning signs and screening methods of disease play an effective role in developing and employing early detection programs in a community (Elmore et al., 2005; Tazhibi and Feizi, 2014). In this sense, women within and outside of the screening age group will still need to be informed of the risks and symptoms of breast cancer.

Thus, understanding the factors that influence patient delay is a prerequisite for the development of strategies to shorten delays. Such factors are likely to relate to women's knowledge and beliefs about breast cancer and its management. Women's knowledge of breast cancer risk factors has been studied in several populations, including

*[1]National School of Public Health, Oswaldo Cruz Foundation; Postgraduate Program in Public Health and Environment, [2]Federal University of Acre; Postgraduate Program in Public Health, Brazil. *For Correspondence: marla.presa.raulino@gmail.com*

different areas of Brazil. Those studies suggest that poor knowledge of symptoms and risk factors is one of the reasons for delay in seeking treatment among women with breast cancer (Paul et al., 1999; Grunfeld et al., 2002; Batiston et a.l, 2011; Jones et al., 2014). However, no studies have focused on the western Amazon when examining women's knowledge of the risks associated with breast cancer and their perceptions of management and outcomes associated with the disease. Furthermore, there are currently no population-based studies in Brazil examining women's knowledge of the range of breast cancer symptoms. Representative and up-to-date data are essential to target educational resources to the women most at need across a screening age population.

Considering that knowledge of breast cancer risk factors and early warning signs is one of the barriers for screening (Jones et al., 2014), the aims of the present study were to evaluate the levels of knowledge of risk factors, signs/symptoms, and comprehension about breast cancer, in addition to determine the associated factors.

Materials and Methods

Present study is part of a larger project called "Brazilian Breast Health Knowledge, Attitudes, and Practices (KAP) Survey", based on the "Breast cancer knowledge, attitudes and practice scale" developed by the American Cancer Society's (ACS) International Affairs Department. Cultural validation to Brazilian Portuguese and pilot testing were conducted to ensure the survey was comprehensible to the target group (non-published data).

Study design and participants

A population-based cross-sectional study was carried out among women 40 years and older living in the city of Rio Branco, state of Acre, in the western Amazon. The sampling technique employed was cluster random sampling in two stages. The census sectors were considered as the first stage (250 sectors) defined by the Brazilian Statistic and Geography Institute (IBGE, http://www.ibge.gov.br) for the 2,000 census. The houses in each sector were considered the second stage. From 35 randomly selected sectors, 25 houses in each sector were also randomly selected using StatCalc program (version 5.3), based on the list of houses in each sector, resulting in 875 houses. Inflating the sample size by 15% for non-response, a total 977 houses were selected. All women 40 years and older living in the selected house were included in the study. From the original 977 randomly chosen addresses, less than 10% of women over 40 years of age did not accept to participate in the study. A sample size of 478 women was obtained, representing 31 urban sectors and 4 rural sectors in Rio Branco city, Acre.

Data Collection

Data collection took place between July 2012 and March 2013. Trained female interviewers visited each house and at least three calls were made at different times of the day and week. The women were interviewed using the "Breast cancer knowledge, attitudes and practice scale" developed by the American Cancer Society. Such scale was developed based on HINTS scale (Health Information National Trends Survey) that was previously validated (National Cancer Institute, 2003).

During the survey, a supervisor in each region oversaw the surveyors and verified their work. In addition, 10% of the questionnaires completed each day were randomly inspected for completeness, accuracy and standardization, verified through the identification of possible bias in the responses of each interviewer, such as if an interviewer got the same answer to a for a given question from all women visited during one month. Standardized training was provided to the data entry personnel; double data entry was also performed.

Breast cancer risk and signs Knowledge and comprehension Scale

Knowledge of breast cancer risk factors and warning signs and comprehension were addressed using "Breast cancer knowledge, attitudes and practice scale". On average, it took approximately 30 minutes to complete the interview. The knowledge assessment tool included questions about established breast cancer risk factors as well as questions regarding beliefs related to the disease, signs and symptoms. Demographic characteristics and information regarding preventive behavior, comprehension of the subject's personal breast cancer risk, and severity of the disease were also collected.

The section containing socio-demographic and epidemiological variables included sector (rural/urban), age (years), educational level (years of school completed), marital status (with a partner/no partner), menopause (yes/no), pregnancy (yes/no), breast feeding for more than 1 month (yes/no), and hormone therapy (yes/no). The section related to help-seeking behavior included having undergone a Pap-test in the past year (yes/no), the health system used (public only/private and/or a combination), and having a gynecological assessment in the past 2 years (yes/no). The section related to comprehension of personal risk of developing breast cancer and severity of the disease included "having contact with someone with breast cancer" (yes/no), "likelihood of developing breast cancer" (low/moderate/high), "would you like to know if you had breast cancer" (yes/no), "women with no relative with breast cancer may develop the disease" (yes/no), "probability of death if someone has breast cancer" (fatal disease/probably/low probability), "how much early diagnosis may influence the chance of survival" (a lot/not much/nothing), "do you believe someone may have breast cancer without presenting a breast tumor/nodule" (yes/no), and "what are the chances of having a breast cancer if a women finds a nodule in her breast" (high/moderate/low).

Knowledge of breast cancer risk factors and early symptoms/signs was assessed by asking the respondents to answer 6 items included in the questionnaire on symptoms/signs and 12 items on risk factors of breast cancer (Table 1). Each correct response for early symptoms/signs received two (2) points and each "do not know" received one (1), while the wrong response received zero (0) points. Each correct answer regarding whether a risk factor would "highly" increase the risk of breast cancer received two (2) points, "fairly" increase the risk received

one (1) point, and "no increase" received zero (0) points. Total scores thus ranged from 0 to 36. Based on mean, median, and percent (33 and 66) breast cancer knowledge scores were categorized as "poor" knowledge (0-15 points), "fair" knowledge (16-22 points), and "good" (from 22 to 36 points).

Statistical Analysis

A descriptive analysis was run for the independent variables and the outcome, that is, knowledge regarding breast cancer risk factors, signs and symptoms considered as a continuous variable and further categorized as "good", "fair", and "poor" knowledge. The proportions of women having good, fair and poor knowledge were estimated. Response frequencies are summarized as percentages in Table 1.

Means, standard deviation, and median were estimated, and student´s t-test were used to evaluate differences between means, according to independent variables. Mean score values of variables with more than two categories were analyzed by ANOVA test. Chi-square tests were used to analyze the categorical responses according to the groups. Multivariate analysis of variance was used to examine group differences in response to the scale data (total risk score and total symptom score). Adjusted variable were included in the multiple analyzes based on their potential confounding effect and p-valued on univariate analyzes. Univariate and multivariate linear regression analyses were used to estimate the association between the independent variables and the scores of breast cancer knowledge, considering a significant level of 5%. All data analyses were performed using SPSS17.0.

Ethical issues

The present study was submitted to the Research Ethical Committee of the National School of Public Health Sergio Arouca, Oswaldo Cruz Foundation for approval (Ethics Approval Number – CAAE 0213.0.031.000-10). Written informed consent was obtained from all women who volunteered to participate in the study.

Results

The mean age of sample was 55.6 ± 11.07 years, and the most common age group was 40 to 49 years (35.6%). Most of the women lived in urban areas (93.1%), and 10.3% had more than 12 years of education. The exclusive use of the Public Health System (SUS) was mentioned by 66.5% of participants, 60.3% reported having a gynecological assessment in the past 2 years, and 9.2% reported never having undergone a Pap test. Approximately 11.0% of women reported having contact with someone with breast cancer. Among the respondents, 9.5% believed they had a high probability of developing the disease and 7.6% would not want to know if they had breast cancer. Of the respondents, 84% believed that early diagnosis increases the chance of breast cancer survival, but 24.2% believed that the disease is fatal. About half of

Table 1. Distribution of Knowledge Risk Factors and Signs/Symptoms of Breast Cancer among Women 40 Years and Older in Rio Branco - AC, 2012 and 2013

	Knowledge		
Risk factor	*No increase(%)	*Fairly increase (%)	*Highly increase (%)
Advanced age increases the risk of breast cancer?	230 (48.4)	109 (22.9)	136 (28.6)
Not having children increases the risk of breast cancer?	262 (55.3)	113 (23.8)	99 (20.9)
Do not breast feeding increases the risk of breast cancer?	200 (42.0)	116 (24.4)	160 (33.6)
Use hormone therapy increases the risk of breast cancer?	225 (47.2)	78 (16.4)	174 (36.5)
Use oral contraceptives increases the risk of breast cancer?	198 (41.6)	108 (22.7)	170 (35.7)
Family history of breast cancer increases the risk of breast cancer?	91 (19.1)	94 (19.7)	291 (61.1)
Being overweight increases the risk of breast cancer?	233 (48.9)	117 (24.6)	126 (26.5)
Not do much physical exercise increases the risk of breast cancer?	253 (53.2)	135 (28.4)	88 (18.5)
High-fat diet increases the risk of breast cancer?	151 (31.6)	99 (20.7)	228 (47.7)
Do not eat many fruits and vegetables increases the risk of breast cancer?	167 (35.2)	150 (31.6)	158 (33.3)
Frequent consumption of alcohol (alcohol intake) increases the risk of breast cancer?	155 (32.4)	110 (23.0)	213 (44.6)
Exposure to ionizing radiation increases the risk of breast cancer?	201 (42.2)	85 (17.9)	190 (39.9)
Signs and symptoms	*No	*Yes	*Do not know
Lump in the breast can be a sign of breast cancer?	100 (21.0)	363 (76.1)	14 (2.9)
Redness of breast skin and/or breast shedding can be a sign of breast cancer?	133 (27.9)	270 (56.7)	73 (15.3)
Local discomfort in breast can be a symptom of breast cancer?	123 (25.7)	314 (65.7)	41 (8.6)
Nipple retraction can be a sign of breast cancer?	172 (36.0)	147 (30.8)	159 (33.3)
Nipple discharge liquid can be a sign of breast cancer?	84 (17.6)	347 (72.6)	47 (9.8)
Change in size and shape of the breast can be a sign or symptom of breast cancer?	137 (28.7)	279 (58.4)	62 (13.0)

*Total may change due to missing values

Table 2. Mean Score of Risk Factors and Signs/Symptoms Knowledge and Univariate/Multivariate Analysis of Variables Related to Breast Cancer Knowledge (Linear Regression Model) among Women 40 Years and Older in Rio Branco - AC, 2012 and 2013

	*N (%)	Knowledge score		β coefficient (95% CI)	
		Mean (SD)	p-value	Crude	**Adjusted
Sector					
Urban	445 (93.1)	19.33 (6.65)	0.208	1.56 (-0.87 – 3.99)	1.59 (-0.85 – 4.02)
Rural	33 (6.9)	17.77 (6.61)			
Age					
40 a 49	170 (35.6)	19.53 (6.43)	0.026	-0.06 (-0.12 – -0.01)	-0.06 (-0.12 – -0.006)
50 a 59	143 (29.9)	19.95 (6.33)			
60 a 69	103 (21.5)	19.05 (6.63)			
≥70	62 (13.0)	16.90 (7.68)			
Educational level (completed years)					
0-8	285 (59.6)	19.25 (6.88)	0.283	0.03 (-0.124 – 0.18)	0.01 (-0.92 – 0.94)
9-12	144 (30.1)	18.75 (6.49)			
>12	49 (10.3)	20.53 (5.63)			
Marital status					
No partner	240 (50.3)	18.70 (6.74)	0.096	1.03 (-0.18 – 2.24)	0.84 (-0.39 – 2.07)
A partner	237 (49.7)	19.73 (6.53)			
Pregnancy					
Yes	462 (96.7)	19.17 (6.59)	0.279	-1.84 (-5.16 – 1.49)	0.09 (-0.14 – 0.32)
No	16 (3.3)	21.00 (8.32)			
Breast feeding for more than 1 month					
Yes	416 (90.8)	19.06 (6.56)	0.228	-1.30 (-3.43 – 0.82)	1.33 (-3.45 – 0.79)
No	42 (9.2)	20.37 (6.80)			
Menopause					
Yes	356 (74.5)	19.22 (6.74)	0.971	-0.03 (-1.43 – 1.37)	1.21 (-0.46 – 2.89)
No	122 (25.5)	19.25 (6.42)			
Hormonal therapy					
Yes	107 (22.4)	19.33 (6.38)	0.883	0.11 (-1.35 – 1.57)	0.36 (-1.11 – 1.83)
No	370 (77.6)	19.22(6.74)			
Having undergone a Pap-test					
Yes	434 (90.8)	19.49 (6.59)	0.008	2.84 (0.74 – 4.94)	2.45 (0.28 – 4.62)
No	44 (9.2)	16.64 (6.80)			
Health system used					
Public only	317 (66.5)	19.25 (6.78)	0.934	-0.05 (-1.34 – 1.23)	0.13 (-0.66 – 0.93)
Private and/or mix	160 (33.5)	19.20 (6.45)			
Have you had a consultation with a gynecologist in the last 2 years?					
Yes	286 (60.3)	19.99 (6.33)	0.001	2.04 (0.81 – 3.27)	1.88 (0.57 – 3.20)
No	188 (39.7)	17.95 (6.93)			
Have any of your immediate or extended family members ever had breast cancer?					
Yes	53 (11.1)	19.94 (5.51)	0.412	0.80 (-1.12 – 2.73)	0.77 (-1.15 – 2.69)
No	425 (88.9)	19.14 (6.78)			
Would you say your chance of getting breast cancer is low, moderate or high?					
Low	298 (65.6)	19.09 (6.76)	0.007	0.97 (0.02 – 1.92)	0.85 (-0.09 – 1.81)
Moderate	113 (24.9)	18.66 (6.68)			
High	43 (9.5)	22.33 (5.58)			

Table 2. Continued

	*N (%)	Knowledge score Mean (SD)	p-value	β coefficient (95% CI) Crude	**Adjusted
If you had breast cancer would you want to know?					
Yes	439 (92.4)	19.40 (6.59)	0.032	2.54 (0.23 – 4.86)	2.58 (0.27 – 4.89)
No	36 (7.6)	16.85 (6.89)			
Do you think that a woman who has never had any family members with breast cancer can get breast cancer?					
Yes	427 (90.5)	19.33 (6.52)	0.58	0.67 (-1.39 – 2.72)	0.46 (-1.62 – 2.53)
No	45 (9.5)	18.67 (7.75)			
How likely do you think it is that someone will die if they get breast cancer?					
Fatal disease	114 (24.2)	20.23 (6.75)	0.059	0.97 (0.16 – 1.77)	1.03 (0.22 – 1.85)
Probably	200 (42.5)	19.49 (6.66)			
Low probability	157 (33.3)	18.32 (6.47)			
What extent do you think that early detection of breast cancer will influence a person´s chance of surviving the breast cancer?					
A lot	398 (84.0)	18.97 (6.47)	0.137	-1.43 (-3.11 – 0.26)	-1.28 (-2.53 – -0.03)
Not much/nothing; a little/none	76 (16.0)	20.39 (7.52)			
Do you think you can have breast cancer without having a lump or nodule?					
Yes	232 (50.9)	20.19 (6.71)	0.001	2.08 (0.84 – 3.32)	2.12 (0.87 – 3.37)
No	224 (49.1)	18.11 (6.57)			
If a woman finds a lump or nodule in her breast, would you say the chances of it being breast cancer are low, moderate or high?					
High	151 (32.1)	21.52 (6.53)	<0.001	1.88 (0.94 – 2.81)	1.88 (0.95 – 2.81)
Moderate	259 (55.0)	18.10 (6.48)			
Low	61 (13.0)	18.77 (6.38)			
Belief					
High	150 (32.3)	23.13 (5.69)	<0.001	0.86 (0.75 – 0.97)	0.85 (0.74 – 0.96)
Moderate	194 (41.7)	19.65 (5.73)			
Low	121 (26.0)	14.52 (5.70)			

*Total may change due to missing values; ** Adjusted by age and education

the respondents believed that a woman may have breast cancer without presenting a breast lump and 32.1% reported that the chance of having breast cancer is higher if a woman has a breast lump (Table 2).

The mean score of breast cancer risk factors and signs/symptoms knowledge was 19.23 ± 6.66 (median= 19 points). Family history of breast cancer was the most frequently cited risk factor (80.8%), while the least recognized factors were not having children (44.7%) and lack of exercise (46.9%). Approximately 29% of women recognized that advancing age highly increases the risk of breast cancer. Factors poorly recognized as significantly increasing the risk of breast cancer were oral contraceptive use (35.7%), a high fat diet (47.7%), excess weight (26.5%), alcohol consumption (44.6%) and ionizing radiation (39.9%). Most women identified a nodule or lump in the breast (76.1%) and nipple discharge (72.6%) as signs of breast cancer. However, only 30.8% of the participants recognized nipple retraction as a sign of the disease (Table 1). Univariate analysis suggests that mean scores of breast cancer knowledge were statistically related to age (p=0.026), having a Pap-test (p=0.008), having a gynecological assessment in the past 2 years (p=0.001), "likelihood of developing breast cancer" (p=0.07), "wanting to know if they had cancer" (p=0.032), "believing that one can have cancer even without a breast lump" (p=0.001) and "believing that women with a breast lump are at high risk of breast cancer" (p<0.001) (Table 2).

After adjusting by age and education (Table 2), having undergone a Pap-test (β=2.45; 95%CI:0.28-4.62), having a gynecological assessment in the past 2 years (β=1.88; 95%CI:0.57-3.20), "being willing to be informed if they had cancer" (β=2.58; 95%CI:0.27-4.89), "believing that anyone who has breast cancer is at high risk of death"

Table 3. Categorized Knowledge as "Good", "Fair" and "Poor", Considering Socio-Demographic and Epidemiological Characteristics, Help-Seeking Behavior, and Comprehension of Personal Risk and Severity Of Disease

Variables	*N (%)	**Knowledge			
		*Good N(%)	*Fair N(%)	*Poor N(%)	P value
Sector					
Urban	445 (93.1)	147 (96.7)	161 (92.0)	125 (91.2)	0.12
Rural	33 (6.9)	5 (3.3)	14 (8.0)	12 (8.8)	
Age					
40 a 49	170 (35.6)	57 (37.5)	61 (34.9)	47 (34.3)	0.212
50 a 59	143 (29.9)	47 (30.9)	59 (33.7)	36 (26.3)	
60 a 69	103 (21.5)	34 (22.4)	37 (21.1)	28 (20.4)	
≥70	62 (13)	14 (9.2)	18 (10.3)	26 (19.0)	
Educational level (completed years)					
0-8	285 (59.6)	94 (61.8)	99 (56.6)	82 (59.9)	0.132
9-12	144 (30.1)	41 (27.0)	53 (30.3)	48 (35.0)	
>12	49 (10.3)	17 (11.2)	23 (13.1)	7 (5.1)	
Marital status					
No partner	240 (50.3)	70 (46.4)	89 (50.9)	76 (55.5)	0.303
A partner	237 (49.7)	81 (53.6)	86 (49.1)	61 (44.5)	
Pregnancy					
Yes	462 (96.7)	146 (96.1)	168 (96.0)	134 (97.8)	0.63
No	16 (3.3)	6 (3.9)	7 (4.0)	3 (2.2)	
Breast feeding for more than 1 month					
Yes	416 (90.8)	128 (88.3)	153 (91.6)	122 (92.4)	0.438
No	42 (9.2)	17 (11.7)	14 (8.4)	10 (7.6)	
Menopause					
Yes	356 (74.5)	114 (75.0)	134 (76.6)	99 (72.3)	0.683
No	122 (25.5)	38 (25.0)	41 (23.4)	38 (27.7)	
Hormonal therapy					
Yes	107 (22.4)	36 (23.7)	42 (24.0)	26 (19.1)	0.538
No	370 (77.6)	116 (76.3)	133 (76.0)	110 (80.9)	
Having undergone a Pap-test					
Yes	434 (90.8)	142 (93.4)	164 (93.7)	116 (84.7)	0.01
No	44 (9.2)	10 (6.6)	11 (6.3)	21 (15.3)	
Health system used					
Public only	317 (66.5)	104 (68.4)	108 (62.1)	94 (68.6)	0.365
Private and/or mixt	160 (33.5)	48 (31.6)	66 (37.9)	43 (31.4)	
Have you had a consultation with a gynecologist in the last 2 years?					
Yes	286 (60.3)	101 (67.8)	110 (62.9)	67 (49.3)	0.004
No	188 (39.7)	48 (32.2)	65 (37.1)	69 (50.7)	
Have any of your immediate or extended family members ever had breast cancer?					
Yes	53 (11.1)	17 (11.2)	23 (13.1)	12 (8.8)	0.476
No	425 (88.9)	135 (88.8)	152 (86.9)	125 (91.2)	
Would you say your chance of getting breast cancer is low. moderate or high?					
Low	298 (65.6)	95 (64.2)	107 (65.6)	89 (69.0)	0.066
Moderate	113 (24.9)	32 (21.6)	40 (24.5)	35 (27.1)	
High	43 (9.5)	21 (14.2)	16 (9.8)	5 (3.9)	
If you had breast cancer would you want to know?					
Yes	439 (92.4)	144 (96)	160 (91.4)	123 (90.4)	0.148
No	36 (7.6)	6 (4)	15 (8.6)	13 (9.6)	

Table 3. Continued

Variables	*N (%)	**Knowledge			
		*Good N(%)	*Fair N(%)	*Poor N(%)	P value
Do you think that a woman who has never had any family members with breast cancer can get breast cancer?					
Yes	427 (90.5)	137 (90.7)	159 (92.4)	117 (86.7)	0.232
No	45 (9.5)	14 (9.3)	13 (7.6)	18 (13.3)	
How likely do you think it is that someone will die if they get breast cancer?					
Fatal disease	114 (24.2)	46 (30.7)	39 (22.5)	25 (18.7)	0.015
Probably	200 (42.5)	62 (41.3)	81 (46.8)	50 (37.3)	
Low probability	157 (33.3)	42 (28.0)	53 (30.6)	59 (44)	
What extent do you think that early detection of breast cancer will influence a person´s chance of surviving the breast cancer?					
A lot	398 (84.0)	120 (80.0)	151 (86.6)	119 (86.9)	0.165
Not much/nothing; a little/none	76 (16.0)	30 (20.0)	23 (13.2)	18 (13.1)	
Do you think you can have breast cancer without having a lump or nodule?					
Yes	232 (50.9)	87 (60.8)	84 (50.6)	55 (41.4)	0.005
No	224 (49.1)	56 (39.2)	82 (49.4)	78 (58.6)	
If a woman finds a lump or nodule in her breast. would you say the chances of it being breast cancer are low. moderate or high?					
High	151 (32.1)	65 (43.0)	53 (30.8)	26 (19.4)	<0.001
Moderate	259 (55.0)	67 (44.4)	95 (55.2)	91 (67.9)	
Low	61 (13.0)	19 (12.6)	24 (14.0)	17 (12.7)	
Belief					
High	150 (32.3)	70 (50.0)	52 (31.7)	15 (10.0)	<0.001
Moderate	194 (41.7)	62(44.3)	84 (51.2)	48 (32.0)	
Low	121 (26.0)	8 (5.7)	28 (17.1)	87 (58.0)	

*Total may change due to missing values; **Cutoff for good knowledge (> 22 points); fair (from 16 to 22); poor (<16 points).

(β=1.03; 95%CI:0.22-1.85), "believing that one can have cancer even without a breast lump" (β=2.12; 95%CI:0.87-3.37), "believing that women with a breast lump are at high risk of breast cancer" (β=1.88; 95%CI:0.95-2.81), and beliefs score (β=0.85; 95%CI:0.74-0.96) were still statistically associated with breast cancer knowledge.

When categorizing breast cancer risk factors and signs knowledge scores into good, fair and poor, we observed that 32.8% of women showed good knowledge, 37.7% had fair knowledge, and 29.5% showed poor knowledge. Table 3 shows the breast cancer risk factors and signs/symptoms knowledge according to the independent variables.

Discussion

Knowledge about breast cancer risk factors and signs/symptoms has been described as one of the factors related to screening mammography compliance, which direct affect tumor size at diagnosis in a population (Blamey et al., 2000; Independent UK, 2012; Gøtzsche and Jørgensen, 2013). In this sense, our survey indicated that western Amazon women tend to be highly aware of some common breast cancer symptoms such as a lump in the breast, nipple discharge, and local discomfort in the breast. However, they generally had poor awareness of other breast cancer-related some atypical symptoms such as nipple retraction, redness of breast skin and/ or breast shedding. In this regard, there was an increased prevalence of fair and poor knowledge of breast cancer risk factor and symptoms (67.2%).

Those results align with other studies, which also showed poor awareness of breast cancer symptoms. A recent population-based survey of four counties in China by Liu et al (2014) also showed poor awareness of early warning signs of breast cancer and risk factors among Chinese women from 25 to 70 years old. Liu et al., (2014) showed that only 21.3% of women recognized that nipple retraction was a sign of breast cancer, and awareness of risk factors for breast cancer was even lower. Similar results were found in another population-based survey among women in the United Kingdom, where poor awareness of early breast cancer symptoms and risk factors were found (Grunfeld et al., 2002). Although most of women in the UK recognized a family history of breast cancer as a risk factor (90%) only a few were aware of established or likely risk factors such as oral contraceptive use (35%), a high fat diet (22%), and excess weight (12%), and alcohol consumption (8%). Similar results were found in our study because although 61.1% of women in Rio Branco were aware that a family history of breast cancer highly

increases the risk of breast cancer, a few recognized oral contraceptive use (35.7%), a high fat diet (47.7%), excess weight (26.5%), and alcohol consumption (44.6%) as risk factors for breast cancer. Although the percentages found in western Amazon women were higher than those found in women in the UK concerning those risk factors, such findings might be a result of the length of time between the studies and the consolidation and worldwide distribution of information over the years.

The present study reveals that few women recognized advancing age as a risk factor for breast cancer (28%). Similar results were found among women in the UK, where approximately 13% knew that women over age 70 are at higher risk of breast cancer than younger women (Forbes et al., 2011). Although health education campaigns have included information about the lifelong risk of breast cancer, it is apparent that the majority of women either have not accessed this information or have not interpreted it correctly. As has been observed in other epidemiological studies around the world, the lesser-known risk factors are those related to endogenous and exogenous exposures to estrogens such as childlessness, not breastfeeding, obesity, oral contraceptive use, and hormone therapy. Similar results were found in Dourados and Botucatu (Brazil), where not breastfeeding was recognized as a breast cancer risk factors by only 16.4% and 10%, respectively (Batiston et al., 2011; Omoboni et al., 2011). The same results were found in Malaysia, where only 26.7% of women with a family history of breast cancer recognized childlessness as a risk factor. A US community-based survey of women attending churches and community centers found that only 26% recognized obesity as a risk factor (Lee-Lin et al., 2007). Similar results were found in Egypt (28.9%) and Trinidad (29.3%) (El-Shinawi et al., 2013; Gosein et al., 2014).

The results also indicate that breast cancer knowledge may vary according to age, as the mean score of knowledge was high from 40 to 69 years and decreased drastically among women > 70 years (p= 0.026). Strong evidence suggests that older women are more likely to have delayed presentation of breast cancer signs, although the strength of evidence for other risk factors for delayed presentation is inadequate to inform any intervention (Ramirez et al., 1999; Grunfeld et al., 2002; Liu et al., 2014). Furthermore, it has been observed in the US and in Brazil that approximately 44% of breast cancers occur in women within the screening age range; 21% of cases occur in women under 50 years old, and 35% occur in women over 70 (Soares et al., 2012; Office for National Statistics, 2013). Therefore, women outside of the routine screening age group will still need to be informed of the risk factors and symptoms of breast cancer because it is possible that older women might attribute such symptoms to the aging process (Leventhal and Prohaska, 1986).

Differences in breast cancer knowledge could also be observed among variables related with access to the health care system. Thus, after adjusting for age and education, having a Pap-test (β=2.45; 95%CI:0.28-4.62) and having a gynecological assessment in the past 2 years (β=1.88; 95%CI:0.57-3.20) were statistically associated with the breast cancer knowledge score. Although in developed countries little evidence indicates that access issues contribute to a delay in seeking treatment among black and African-descent women with cancer (Jones et al., 2014), in developing countries variables such as access to health services could contribute to a delay in receiving timely and accurate information about breast cancer risk factors and early symptoms (Harirchi et al., 2005). Additionally, breast cancer comprehension variables such as "believing that someone who has breast cancer is at high risk of death", "believing that one can have cancer even without a breast lump", and "believing that a woman with a breast lump is at high risk of breast cancer" were positively associated with the scores of breast cancer knowledge (Table 2). Controversially, although a hospital-based cross-sectional study developed among 441 women 40 years of age and above who underwent mammography in Trinidad revealed poor breast cancer risk factors knowledge, it also showed that believing that "women`s chance of surviving breast cancer is low" decreased with the level of education. The study found that those with more education were more likely to recognize that abnormal results did not necessarily indicate cancer and that early detection improved survival (Gosein et al., 2014). However, two main differences must be noted. First, our study was population-based while Gosein`s study (2014) was developed among women attending a mammography center, where they probably have access to accurate information. Second, our population presented a direct association between belief score and breast cancer knowledge score (Table 2), suggesting that both are closely influencing the women`s comprehension of breast cancer risk.

"Being willing to be informed if they had cancer" was also positively associated with the score of breast cancer knowledge (Table 2). These findings suggest that a good level of breast cancer knowledge is related to a good attitude toward the disease.

Interestingly, we found that the scores of belief were positively associated with the scores of breast cancer knowledge. In other words, the scores of breast cancer belief increased according to the scores of breast cancer knowledge. It has been described that one's culture is a system of shared beliefs, values, customs, behaviors, and artifacts that members of a society use in relating to one another and to their world and that are transmitted from generation to generation through learning (Leininger, 1971). This learned culture guides action and beliefs as the individual faces both familiar and new situations (Plog, 1976). Thus, the direct relationship between breast cancer beliefs and knowledge observed among Rio Branco women may be explained by the mixed culture of this population, which has been influenced by the beliefs and experience of Amerindians, and beliefs and scientific knowledge brought by people from Portugal, Turkey and Lebanon since the beginning of colonization. Although scientific knowledge is widespread in the area, the beliefs passed down over the years through the families remain important as well. Thus, future studies on understanding the culture of western Amazon women is of special importance in health-related situations because it influences whether an individual will use or avoid available health care services

(Bailey, 1987). There has been disagreement in the literature regarding the best ways to measure awareness of cancer, making it difficult to reliably determine levels of awareness. Additionally, differences in scales used, classification criteria of knowledge, cut-off points, and populations studied may be barriers to comparisons among the studies. However, although the scale used in the present study was developed especially for this purpose, the findings corroborate with studies developed in different locations in Brazil and in other countries. Even though the ACS scale suffered a cultural validation to Brazilian Portuguese (translation, back-translation, compatibility and consolidation versions), the absence of published data may be considered an important limitation.

In this study, there is a low probability of occurrence of selection bias, since a representative sample of all women 40 years and more living in the city of Rio Branco/Acre were included, there was a low percentage loss once interviews were also conducted on weekends and at nights, covering women who worked outside home. Similarly, there is a low probability of having occurred reporting bias, once all interviewers were trained by the research coordinator; followed by field supervision. Also, 10% of the questionnaires were reviewed to assess inconsistency of responses, bias of collection and completeness response.

Findings of present study indicate that women with access to the health care system and considering herself at high risk of developing breast cancer are statistically associated to a good breast cancer risk factors, signs and symptoms knowledge even adjusted by age and education. These findings can contribute towards implementation of women`s health promotion and prevention polices, that include the screening and early diagnosis of the breast cancer.

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