How Much Do You Know about Breast Cancer? Assessing the Level of Knowledge of the Brazilian Population

Quanto Você Sabe sobre Câncer de Mama? Avaliação do Nível de Conhecimento da População Brasileira

¿Cuánto Sabes sobre el Cáncer de Mama? Evaluación del Nivel de Conocimiento de la Población Brasileña

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ABSTRACT

Introduction: Despite efforts to raise awareness of the population, the incidence and mortality due to breast cancer in Brazilian women remain high. **Objective:** To assess the level of knowledge of the Brazilian population about the risk factors that lead to the development of this disease. **Method:** A structured online questionnaire was sent through social networks and e-mail from September to December 2021. Participants were divided into subgroups (education, profession, gender, proximity to individuals affected by the disease and age groups) and the chi-square test was performed to verify significant differences between them. **Results:** Analyzing the 200 valid responses from the sample as a whole, the hit rate was high, reaching over 70%. By comparing subgroups, significant results were identified for the analyzes related to education ($p = 0.016$), profession ($p = 0.004$), gender ($p = 0.045$) and proximity to the disease ($p = 0.004$), where it was found that the lowest rates of correct answers were from individuals with lowest level of education, not working in health-related activities, males and who had no contact with someone with the disease. **Conclusion:** It was possible to evaluate the knowledge of the participants on the subject. The current actions taken by scientific dissemination groups and institutions to combat breast cancer are valid for some subgroups, however, they need to improve outreaching to individuals with less education, who are not working in health-related activities and males.

Key words: breast neoplasms; surveys and questionnaires; publications for science diffusion; risk factors.

RESUMO

Introdução: Apesar dos esforços de conscientização da população, permanecem altas a incidência e a mortalidade decorrente de câncer de mama em mulheres brasileiras. **Objetivo:** Avaliar o nível de conhecimento da população brasileira sobre os fatores de risco que levam ao desenvolvimento dessa doença. **Método:** Foi utilizado um questionário estruturado on-line, enviado de setembro a dezembro de 2021, por meio das redes sociais e e-mail. Os participantes foram divididos em subgrupos (escolaridade, área de formação profissional, gênero, contato com indivíduos afetados pela doença e faixas de idade), e o teste de qui-quadrado foi realizado para verificar diferenças significativas entre eles. **Resultados:** Analisando as 200 respostas válidas da amostra como um todo, a taxa de acertos foi alta, ficando acima dos 70%. Ao contrapor os subgrupos, foram identificados resultados significativos para as análises relativas a escolaridade ($p = 0,016$), área de formação ($p = 0,004$), gênero ($p = 0,045$) e proximidade com a doença ($p = 0,004$), em que foi observado que as menores taxas de acertos foram de pessoas com o nível de escolaridade mais baixa, que não fazem parte da área de saúde, do sexo masculino e que não tiveram contato com pessoas próximas portadoras da doença. **Conclusão:** Foi possível avaliar o conhecimento dos participantes sobre o tema, entretanto, as ações atuais tomadas por grupos de extensão e divulgação científica e instituições de combate ao câncer de mama são válidas para alguns subgrupos, mas precisam atingir com mais qualidade pessoas de menor escolaridade, pessoas que não possuem formação na área da saúde e pessoas do sexo masculino.

Palavras-chave: neoplasias da mama; inquéritos e questionários; publicações de divulgação científica; fatores de risco.

RESUMEN

Introducción: A pesar de los esfuerzos de sensibilización de la población, la incidencia y la mortalidad por cáncer de mama en mujeres brasileñas siguen siendo elevadas. **Objetivo:** Evaluar el nivel de conocimiento de la población brasileña sobre los factores de riesgo que conducen al desarrollo de esta enfermedad. **Método:** Se utilizó un cuestionario online estructurado, enviado de septiembre a diciembre de 2021, a través de redes sociales y correo electrónico. Los participantes se dividieron en subgrupos (educación, área de formación profesional, género, proximidad a los afectados por la enfermedad y grupos de edad) y se realizó la prueba de chi-cuadrado para verificar diferencias significativas entre ellos. **Resultados:** Analizando las 200 respuestas válidas de la muestra en su conjunto, la tasa de acierto fue alta, superando el 70%. Al contrastar subgrupos, se identificaron resultados significativos para los análisis relacionados con escolaridad ($p = 0,016$), área de formación ($p = 0,004$), género ($p = 0,045$) y proximidad a la enfermedad ($p = 0,004$), donde se observó que las tasas más bajas de aciertos fueron de las personas con menor nivel de instrucción, que no forman parte del área de salud, son del sexo masculino y no han tenido contacto con alguien con la enfermedad. **Conclusión:** Fue posible evaluar el conocimiento de los participantes sobre el tema. Las acciones actuales de los grupos de divulgación científica e instituciones para combatir el cáncer de mama son válidas para algunos subgrupos, pero necesitan llegar con más calidad a las personas con menor educación, a las personas que no tienen formación en el área de la salud y personas del sexo masculino.

Palabras clave: neoplasias de la mama; encuestas y cuestionarios; publicaciones de divulgación científica; factores de riesgo.

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INTRODUCTION

The term "breast cancer" encompasses malignant tumors that develop from mammary tissue[1]. The estimates of 2020 indicated 2.3 million new cases of breast cancer worldwide[2]. In Brazil, the estimates for 2021 were 66.280 new cases, excluding those of non-melanoma skin cancer[3].

Breast cancer is a multifactorial disease, influenced by genetic, environmental, hormonal and behavioral risk factors, divided in modifiable and non-modifiable[4]. The modifiable factors refer to the lifestyle of each individual, such as alcohol consumption, obesity, physical inactivity and environmental factors[5]. The non-modifiable are those that cannot be controlled, such as age, hormone factors and genetic background.

With ageing, the chances of developing breast cancer increase 5 to 10% of all cases of breast cancer are closely related to hereditary conditions[6] mostly due to pathogenic variants of the genes *BRCA1* and *BRCA2,* two important genes for the DNA repair system[7]. Hormonal factors are related to the time of exposure to estrogen. The earlier the menarche occurs, and the later the menopause occurs, the greater the time of exposure to female sex hormones and, consequently, greater the risks of developing breast cancer[5].

Despite the efforts to raise public awareness through approaches such as *Outubro Rosa,* and investments in research and scientific dissemination, the incidence and mortality of breast cancer in Brazilian women remain high, with the South and Southeast regions presenting the highest death rates in the country. It is known that a well-informed population is more likely to be diagnosed earlier and cure breast cancer[8]. The hypothesis was established that, despite all the specific campaigns that are carried out, there are still certain knowledge gaps in the population regarding breast cancer. Therefore, the objective of this article is to evaluate the level of knowledge about risk factors for the development of breast cancer in a sample of the Brazilian population.

METHOD

An online questionnaire was structured and applied in order to understand the level of knowledge of the sample about breast cancer and the risk factors for its development. The current questionnaire used the research by Sambanje and Mafuvadze as a model[9] adjusted to the Brazilian reality. The questionnaire was structured in Google Forms and disseminated via social networks of the *Laboratório de Polimorfismos Genéticos (Lapoge)*, using the Snowball methodology[10].

The questionnaire was divided in five sections: 1. Confirmation of legal age; 2. Signing of the Informed Consent Form; 3. Information about the participant; 4. General questions about breast cancer with three options of response ("true", "false" or "don't know"); 5. Questions about risk factors for the development of breast cancer with the aforementioned response options. Sections 3, 4 and 5 were not mandatory. In this research there were no limitations regarding education, age, gender or region where the participant lived.

Data was collected from mid-September to the end of December 2021. Of the 205 responses, 200 were valid (participants older than 18 years of age who signed the Informed Consent Form). According to the norms of the National Commission of Ethics in Research, from section 3 onward the responses were not mandatory, and consequently some questions had a different number of responses.

After the responses were collected, the respondents were evaluated according to: 1 – Characterization of the sample; 2 – Level of knowledge about breast cancer from a quanti-qualitative perspective.

The sample was divided in subgroups: education (high: university and post-graduation *versus* low: elementary and high-school), occupation (health related profession *versus* others), sex (men *versus* women), previous cases (former contact with anyone who had breast cancer *versus* no contact) and age range (18-24 *versus* 25-30 *versus* 31-40 *versus* 40 or more). Statistical analyzes were performed comparing the different subgroups, using the chi-square test or Fisher's exact test with a significance level of 5%, using SPSS v. 25 software.

The study was approved by the Human Research Ethics Committee of "*Universidade Federal de Santa Catarina* (*CEPSH/UFSC*)" report number 4,943,777 (CAAE: 50628021.6.0000.0121).

RESULTS

Table 1 portrays the characterization of the study sample, where 74.5% were younger than 40 years or less indicating the predominance of young adults and 96.3% of the respondents lived in the South, however, individuals living in the Southeast (2.2%), Midwest (0.5%) and North (1%) regions have also participated.

In all, about 30% of the participants who had at least incomplete higher education were from biological sciences or health, areas that include professionals and students of physiotherapy, medicine, nutrition, nursing, pharmacy, speech therapy and odontology.

Section 4 consisted in either true or false affirmatives on breast cancer. The lower number of hits (37.5%) was to the affirmative: "sustain an injury on the breast may cause breast cancer" and the highest number of hits (98%)

Tablea 1. Characterization of the study participants

Characteristics	Frequency (n=200)	%
Which gender do you identify with?		
Female	166	83.4
Male	32	16.1
Other	1	0.5
What is your age range?		
18 and 24 years	64	32.0
25 and 30 years	44	22.0
31 and 40 years	41	20.5
41 and 50 years	25	12.5
51 years or more	26	13.0
What is your marital status?		
Single	124	62.0
Married	66	33.0
Divorced	7	3.5
Widow(er)	3	1.5
What is your education level?		
Incomplete elementary school	3	1.5
Complete elementary school	1	0.5
Incomplete high school	4	2.0
Complete high school	26	13.0
Incomplete university	58	29.0
Complete university	55	27.5
Post-graduation	53	26.5
Division by great areas		
Biological and Health Sciences	50	30.1
Law	14	8.4
Communication and Arts	8	4.8
Socioeconomic	30	18.1
Education	24	14.5
Engineering	12	7.2
Unspecified	28	16.9
How did this questionnaire come to your knowledge?		
Lapoge* social network	3	3.4
Social network of friends/family	14	15.7
Outubro Rosa Talks	51	57.3
Other media	21	23.6
Do you know or knew any person who were ill with breast cancer?		
Yes	159	79.5
No	41	20.5

(*) Lapoge = *Laboratório de Polimorfismos Genéticos*.

was: "early diagnosis of breast cancer increases the odds of the patient". Overall, the rate of hits for this section was 82.5%.

The results of section 5 with the responses about whether the participants believed the alternative in question is a risk factor of breast cancer are shown in Table 3. The question "Stress and/or sorrows" had the lowest hits (17.6%) and the highest (98.9%) was "breast cancer family history". The rate of hits was high in this section, 65.14%.

The comparisons among different subgroups of the questionnaire are shown in Table 4, where the question "Self-exam is effective to diagnose breast cancer and other exams are not required" had significant associations in three categories: (I) comparison in relation to different education levels; (II) comparison among men and women; (III) comparison among persons who lived with or know someone with breast cancer *versus* those who had not.

Two significant associations were found regarding the question about the risk of men developing breast cancer (Table 4). A significant percentage (29.4%) of the respondents of the elementary and high-school found this information erroneously true, higher than for the university and post-graduation (9.0%). When the sample was stratified in areas of formation or profession (biological and health *versus* others), a significantly higher percentage of responses to the true alternative by individuals who work in other than health areas (15.4%) was found. Therefore, health professionals responded to this question more correctly compared to professionals of other areas.

Table 5 portrays the results of some significant comparisons for section 5 of the questionnaire. The participants classified as elementary/high-school had a higher rate of hits (84.4%) in the question "Have children before 30 years of age" than the group university/post (74.5%). Again, health professionals had a higher rate of hits (85.2%) for the question "Frequent exposure to ionizing radiations" than professionals of different areas (67.2%). The male group had less hits in the three questions than the female group.

DISCUSSION

This research was the first of its kind carried out in Brazil, with data mainly from the southern region, since its main sources of dissemination were social networks and lectures given during the *Outubro Rosa* campaign, carried out in places mainly in the great Florianópolis. Thus, expansion to other regions is necessary in order to understand more accurately the knowledge of the Brazilian population about breast cancer, with the objective of using

Table 2. Results of section 4: General knowledge about breast cancer

Items	True (%)	False (%)	Don't know (%)	Total
Except non-melanoma skin cancer, breast cancer is the most incident type of cancer in Brazilian women	<u>167</u> (83.5)	7 (3.5)	26 (13.0)	200
Men can't have breast cancer	25 (12.5)	<u>156</u> (78.0)	19 (9.5)	200
Women younger than 30 years of age are not affected by breast cancer	5 (2.5)	<u>182</u> (91.0)	13 (6.5)	200
Early diagnosis of breast cancer increases the patient's odds	<u>196</u> (98.0)	2 (1.0)	2 (1.0)	200
Breast cancer survival is very low for women even if early diagnosed	4 (2.0)	<u>190</u> (95.0)	6 (3.0)	200
Self-exam is effective to diagnose breast cancer and no additional exams are required	10 (5.0)	<u>180</u> (90.0)	10 (5.0)	200
Breast cancer is more common in women older than 40 years of age	<u>157</u> (78.5)	14 (7.0)	29 (14.5)	200
Women with small breasts are not affected by breast cancer	0 (0.0)	<u>192</u> (96.4)	7 (3.6)	199
Even without family history, it is possible to develop breast cancer	<u>193</u> (96.5)	0 (0.0)	7 (3.5)	200
Sustain an injury on the breast may cause breast cancer	33 (16.5)	<u>75</u> (37.5)	92 (46)	200
One of the signs of breast cancer is change of format and color of the nipples	<u>127</u> (63.5)	8 (4)	65 (32.5)	200

Note: The alternatives underlined are the correct answers to each item.

Table 3. Results of section 5: Risk factors for the development of breast cancer

Items	Yes (%)	No (%)	Don't know (%)	Total
Obesity	<u>88 (45.1)</u>	39 (20.0)	68 (34.9)	195
Frequent exposure to ionizing radiations	<u>141 (71.2)</u>	12 (6.1)	45 (22.7)	198
Regular physical activities	9 (4.6)	<u>180 (91.8)</u>	7 (3.6)	196
Family history of breast cancer	<u>195 (98.9)</u>	0 (0.0)	2 (1.1)	197
Breastfeeding	13 (6.6)	<u>156 (79.1)</u>	28 (14.3)	197
Alcohol use	<u>108 (55.3)</u>	36 (18.5)	51 (26.2)	195
Tobacco use	<u>132 (67.3)</u>	22 (11.3)	42 (21.4)	196
Stress and/or sorrows	111 (56.1)	<u>35 (17.6)</u>	52 (26.3)	198
Hormone replacement therapy	<u>94 (47.4)</u>	34 (17.2)	70 (35.4)	198
Breast implant	39 (19.8)	<u>85 (43.1)</u>	73 (37.1)	197
Mammograms	18 (9.3)	<u>154 (78.9)</u>	23 (11.8)	195
Oral contraceptives	<u>120 (60.9)</u>	33 (16.8)	44 (22.3)	197
Have children before 30 years of age	4 (2.1)	<u>150 (76.1)</u>	43 (21.8)	197
Eat fruits and vegetables regularly	8 (4.1)	<u>182 (92.8)</u>	6 (3.1)	196
Wear tight brassiere	33 (16.8)	<u>102 (51.7)</u>	62 (31.5)	197

Note: Underlined alternatives are the correct answers to each item.

the information obtained to generate and disseminate quality scientific knowledge to society.

Overall, the rate of hits was high (73.82%) when compared to the questionnaire of Sambanje and Mafuvadze[9], with a rate of 39.21% hits responded by Angolan medical students. A possible explanation for the high rate of hits lies on the respondent's profile. Of the 200 participants, 149 (74.5%) were younger than 40 years of age, 83% were in college and 80% knew someone who already had breast cancer.

The male population who responded to the questionnaire of Sambanje and Mafuvadze[9] was high. Men accounted for 39% of the participants among medical students and 43% of other courses against 16.1% of the current investigation.

In general, the rate of correct answers in the questionnaire was high, with themes related to ageing (91%), early diagnosis (98%) and the heredity of the disease (98.9%) having the highest rates of correct answers.

The affirmatives with greater hits were "Women younger than 30 years of age were not affected by breast cancer" and "Early breast cancer diagnosis increases the patients' odds". The respondents are aware that older women have a higher risk of developing breast cancer, however, the disease in women below 35 years is more aggressive than in older women. Some hypotheses are detection at more advanced stages, more triple-negative tumors and high recurrence at any clinical stage[11].

Another positive point of the questionnaire is that most of the participants (98%) are aware of the importance of early diagnosis, consistent with the responses obtained by Rucinska et al.[12], where 96.5% of the high-school

participants believed early diagnosis increased the odds of cure.

In Table 4, an affirmative that draws attention is the question "family history of breast cancer". Hereditary cancer is well known by the participants in general with a high rate of hits. It represents only 5% to 10% of breast cancer cases[13-15], consistent with the results of a questionnaire applied in Syria when 92% of the participants concurred with the affirmative that family history plays an important role for the development of breast cancer[16]. Nevertheless, values above 90% were not found in a Pakistani study with only 62.4% of hits, a low value considering the sample of 2nd and 3rd year medical female students[17].

Exactly 55.3% correctly answered that alcohol use is one of the multiple risk factors for the development of breast cancer, slightly higher than 46.7% from a study conducted in Cameroon[18]. These two studies had better results than the Pakistani study with medical students whose results dropped to 31%[19]. However, half of the population investigated in the current study was unable to hit the response of alcohol use, which indicates the importance of expanding the awareness and information on the theme.

Despite the high overall accuracy rate, some alternatives showed to stand out negatively, especially those dealing with disease symptoms and obesity.

The highest hits of section 4 was for "Sustain an injury on the breast may cause breast cancer", where 60% believed it was true, revealing poor knowledge of the origin of cancer, since a trauma is unable to cause a mutation/genetic alteration[1]. Another alternative with discrepant responses is "One of the signs of breast cancer is a change

Table 4. Results of section 4: Comparison of the understanding about general knowledge of breast cancer

Comparison	False	Don't know	True	*p* value
Auto exam is effective to diagnose breast cancer and no additional exams are required				
Women	153 (92.2)	6 (3.6)	7 (4.2)	0.036[a]
Men	25 (78.1)	4 (12.5)	3 (9.4)	
University/Graduate	153 (92.2)	5 (3.0)	8 (4.8)	0.022[a]
Elementary/High-school	27 (79.4)	5 (14.7)	2 (5.9)	
Contact with breast cancer	148 (93.1)	7 (4.4)	4 (2.5)	0.006[a]
No contact	32 (78.0)	3 (7.3)	6 (14.6)	
Men can't have breast cancer				
University/Graduate	154 (81.3)	16 (9.6)	15 (9.0)	0.006[a]
Elementary/high-school	21 (61.8)	3 (8.8)	10 (29.4)	
Health Area	51 (94.4)	3 (5.6)	0 (0)	0.001[a]
Other areas	102 (75.0)	13 (9.6)	21 (15.4)	

(a) Fisher exact test.

Table 5. Results of section 5: Comparison of the understanding of risk factors with education, formation and gender

Items		University/ Post (%)	Elementary/ High-school (%)	p value
Have children before 30 years of age	No	123 (74.5)	27 (84.4)	
	Don't know	40 (24.2)	3 (9.4)	0.041[a]
	Yes	2 (1.2)	2 (6.3)	
		Others	**Health Area**	**p value**
Frequent exposure to ionizing radiations	No	9 (6.7)	2 (3.7)	
	Don't know	35 (26.1)	6 (11.1)	0.045[a]
	Yes	90 (67.2)	46 (85.2)	
		Women	**Men**	**p value**
Mammograms	No	133 (82.6)	19 (59.4)	
	Don't know	16 (9.9)	7 (3.8)	0.012[a]
	Yes	12 (7.5)	6 (18.8)	
Oral contraceptives	No	23 (14.1)	10 (31.3)	
	Don't know	32 (19.6)	11 (34.4)	0.003[b]
	Yes	108 (66.3)	11 (34.4)	
Wear tight brassiere	No	93 (57.1)	8 (25.0)	
	Don't know	47 (28.8)	14 (43.8)	0.003[b]
	Yes	23 (14.1)	10	

(a) Fisher exact test.
(b) Chi-square test.

of format and color of the nipples" with many responses 'Don't know' (32.5% of the total). The percentage of the model article for the present study is 45%[9]. This affirmative is correct, one of the signs of breast cancer is the change of format and color of the nipples.

The second affirmative with a high rate of errors was obesity as a risk factor. Only 88 participants (45% of the total) opted for 'Yes', the correct response. This result is better than in a study conducted in Egypt where 40.9% believed overweight might have some influence in the development of breast cancer[20]. A Body Mass Index (BMI) above 30% indicates the individual reached the first degree of obesity[21]. Women with high BMI have low survival rate, because obese women are more propense to develop high degree tumors[22], mainly postmenopausal[23].

Another motive for overweight women to be more susceptible to breast cancer is less adherence to screening tests as mammograms[24,25]. It was noticed low participation of obese women in an investigation with 50-69 years old women and more complaints of pain during the procedure, a possible motive to avoid the exam[26].

To best understand which portion of the population has more affinity to the theme, studies with subgroups as education level, gender, age and occupation were conducted.

For the first category, university *versus* elementary and high school, two significant results were encountered. The first was to compare the responses of the groups to the affirmative "Men can't have breast cancer". The group with low education opted more for 'True' than the high education group, similar to what occurred with the alternative "Self-exam is effective to diagnose breast cancer and no additional exams are required". For both alternatives, the correct response was 'False'. This result shows it is necessary to improve campaigns targeted to men with risk to develop breast cancer and the importance of self-exam for individuals with lower than university education. As men are the majority in Brazil, it is mandatory to review the approaches to this population for better efficacy and to raise awareness and provide correct information.

Comparing women *versus* men, it is possible to notice that women had higher hits possibly due to breast cancer campaigns focused on women as men account for only 1% of the cases[27]. However, they can act as disseminators of quality information to their mothers, sisters, wives, daughters etc.

The last comparison is of people who had contact with friends/relatives with breast cancer with those who ever had. The main difference is about the affirmative

"Self-exam is effective to diagnose breast cancer and no additional exams are required". The group who had no contact with breast cancer had a low percentage of hits, in this case, the correct option is 'False'. This happens because, until recently, self-exam was widely divulged and in this case, it is important that scientific disclosure encompassing breast cancer does not encourage the individual to be "its own doctor" but to make the person aware of its health and seek a doctor regularly.

Comparing health professionals *versus* professionals of other areas, it is evident that health professionals understand best the negative effects of radiation, 85.2% responded 'Yes' against only 67.2% of the other group.

It was already expected what was noticed in the responses of women and men: men's responses have a low rate of hits because the topics mammogram, oral contraceptives and tight brassiere belong to the female universe and many female participants consult gynecologists regularly and have more knowledge[28].

CONCLUSION

The participants showed they have good knowledge of breast cancer. The overall hits of sections 4 and 5 was above 70%, a relatively high performance, if considering the questionnaire was open to any population, different from other questionnaires aforementioned exclusively for university medical students, mostly.

Less than half of the participants chose the right option for the topics "Obesity" and "Replacement Therapy" at section 5, which requires revaluation of how these issues are addressed in scientific texts.

The groups with higher percentage of errors were men with low education and who are not acquainted with people with breast cancer; efforts are necessary to direct to this population information, such as lectures in places where males are predominant. Though not a risk group, they can be important sources of information for the people with whom they are acquainted.

It is important to collect new data post-pandemic and in-person mostly for older adults who were not included in the online methodology applied in the present study. As this is the first study with a population living in Brazil's southern regions, other country regions need to be investigated as well.

CONTRIBUTIONS

All the authors contributed substantially to the study design, acquisition, analysis and interpretation of the data, wording and critical review. They approved the final version to be published.

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interests to declare.

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