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Comparative analysis between screening mammography performed in patients at usual risk and at high risk for breast cancer

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ABSTRACT

Introduction: Breast cancer is currently considered as a public health issue. To avoid late diagnosis, there is an attempt to use appropriate screening programs addressed to the early detection by testing the asymptomatic population in order to identify preclinical stage lesions. **Methods:** This is a retrospective, analytical, cross-sectional study of the notifications available in the cancer information system. The incidence of notifications from the reports of the BI-RADS™ notification system (Breast Imaging Reporting Data System) was compared between women at high and usual risk for breast cancer. **Results:** In the analyzed period, from 2013 to 2021, 16,065,383 screening mammographies were performed and notified in Brazil. Of these, 13,167,259 were performed in usual-risk women, whereas 2,898,124 were performed in high-risk women. To analyze the difference between reports of women at usual and high risk, the relative risk between them was calculated, as well as the necessary number to causa damage; the relative risk we found was of 0.5412 (95%CI 0.5341–0.5483) in B4 and relative risk of 0,433 (95%CI 0.4203–0.4462). As to the necessary number to cause damage, we observed 203 (95%CI 198–209) for B4 and 788 (95%CI 754–825) for B5. Despite the well-established need for breast cancer screening programs to reduce mortality, some aspects of screening do not have such a consensus. In this study, the incidence of reports that are suggestive of malignant breast lesions was higher among women at high risk. **Conclusions:** The study showed an increased prevalence of reports suggestive of malignancy in high-risk patients when compared to those at usual risk.

KEYWORDS: mammography; breast cancer; screening.

INTRODUCTION

Breast cancer is currently considered as a public health issue. Apart from non-melanoma skin cancer, it is the most common cancer among women in Brazil, in the South, Southeast, Midwest and Northeast regions. Besides, it represents the highest incidence and mortality rates among women all over the world, both in developing and developed countries[1-3].

Despite being the most common cancer affecting women (except for non-melanoma skin cancer), it is the fifth cause of death by cancer in general, reaching about 500 thousand deaths per year[4,5].

Breast cancer screening allows the early diagnosis and enables a more conservative and curative treatment. In Brazil, the death risk ratio is 17.1 times higher among patients diagnosed at advanced stages when compared to those who were diagnosed early, so that early diagnosis reduces mortality rates and increases survival rates, reaching 83.1% in 10 years[6,7].

Tumor size and lymph node involvement are currently considered the main prognostic factors in the analysis of breast cancer. That is, the larger the tumor, the higher the chances of lymph node metastasis and distant metastasis, as well as the lower survival and chances of healing for the patient[7-9].

To prevent the late diagnosis, there is an attempt to execute a strategy of appropriate screening programs, which can lead to the early detection by examining the asymptomatic population and identifying preclinical stage lesions[10]. The Ministry of Health recommends screening mammography in women aged from 50–69 years old every two years[11].

As to high-risk patients, individualized clinical follow-up is recommended and there is not a well-established consensus that is accepted by experts as to what should be done about them[9,10].

Nowadays, the breast self-exam is not recommended as a screening technique due to its low effectiveness and possible damage associated to this practice, since the studies did not

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show reduction in mortality rates and seem to cause a false sensation of safety among patients, which leads them to not look for screening[10,11].

In this context, it is necessary to analyze the impact of screening in the usual and high-risk population by assessing the incidence of suspicious mammography (BI-RADS™ 4 and 5) in patients submitted to screening mammography between 2013 and 2021 in Brazil. Only after understanding the magnitude of the problem can there be actions to mitigate the damage that this disease represents in female public health.

METHODS

An ecological, observational and cross-sectional study was performed based on retrospective data about the mammography screening program in Brazil. The data source was a National Screening Database (Cancer Information System – Siscan/Datasus), which is publicly available for download[12]. The selected interval of analysis was from 2013–2012, period when all the necessary variables for analysis are available.

The examinations performed from 2013–2021 with a screening purpose were selected. While usual-risk women were those without family history of personal history of breast neoplasm, high-risk women were those with family history of at least one first-degree relative diagnosed with breast cancer before the age of 50 years, bilateral breast cancer or ovarian cancer at any age; women with family history of male breast cancer; women with histopathological diagnosis of proliferative breast lesion with atypia or lobular carcinoma in situ; or women with personal history of breast cancer.

We excluded diagnostic examinations, those that did not present all of the information and those that were not in the stipulated age group.

Besides the information about the BI-RADS™ report, we analyzed the examinations comparing the epidemiological data between high-risk and usual-risk women. Other analyzed variables were the age group of the screened population and tumor size according to BI-RADS™.

The statistical analysis of the data was conducted using the SPSS software (Statistical Package for the Social Sciences), version 18.0, which calculated the mean and the confidence interval of the main variables.

RESULTS

In the analyzed period, from 2013–2021, 16.065.383 screening mammographies were performed and notified in Brazil. Of these, 13.167.259 mammographies were carried out in the target-population, while 2,898,124 mammographies were conducted in women classified as high risk. The report of each mammography performed in the target population and high-risk women can be observed in Table 1, which compared the relative risk of such populations using the SPSS software. To analyze the difference between reports in usual-risk and high-risk women, the relative risk between them and the necessary number to cause damage were calculated; we found relative risk of 0,5412 (95%CI 0,5341–0,5483) in B4 and relative risk of 0,433 (95%CI 0,4203–0,4462). As to the necessary number to cause damage, we observed (95%CI 198 – 209) for B4 and 788 (95%CI 754–825) for B5.

The age group of patients who underwent mammography can be observed in Table 2.

Finally, we calculated the comparison of proportion of tumor size found in the mammography and its relationship with the BI-RADS™ report between high-risk and usual-risk patients, according to the observations in Table 3. BI-RADS™ reports 1 and 2 were excluded from the analysis for not containing tumors[13].

Table 1. Mammography reports of examinations carried out in the target population and among high-risk women between 2013 and 2021 in Brazil.

	Usual-risk women (%)	High-risk women (%)	Relative risk (p-value)
B0	1,439,841–11	373,683–13	0,8481 (p<0.05)
B1	4,906,097–37	1,009,350–35	1,0698 (p<0.05)
B2	6,452,900–49	1,409,596–49	1,0076 (p<0.05)
B3	279,335–2.1	67,966–2.3	0,9046 (p<0.05)
B4	76,329–0.6	31,045–1.1	0,5412 (p<0.05)
B5	12,757–0.1	6,484–0.2	0,4330 (p<0.05)
Total	13,167,259–100	2,898,124–100	

Source: adapted by the authors of Siscan/Datasus. B: Breast Imaging Reporting Data System.

Table 2. Age group of the patients who underwent mammography from 2013 to 2021 in Brazil.

	Usual risk (%)	High risk (%)
Aged up to 14 years	2,901 (0.02)	529 (0.02)
Between 15 and 19 years old	2,230 (0.01)	801 (0.03)
Between 20 and 24 years old	5,378 (0.04)	2,733 (0.09)
Between 25 and 29 years old	10,533 (0.08)	7,407 (0.26)
Between 30 and 34 years old	32,058 (0.24)	25,243 (0.48)
Between 35 and 39 years old	267,999 (2.03)	141,936 (4.89)
Between 40 and 44 years old	1,612,354 (12.2)	392,689 (13.5)
Between 45 and 49 years old	2,010,696 (15.2)	443,187 (15.3)
Between 50 and 54 years old	2,869,991 (21.8)	514,746 (17.8)
Between 55 and 59 years old	2,490,346 (18.9)	458,261 (15.8)
Between 60 and 64 years old	1,934,049 (14.7)	364,576 (12.6)
Between 65 and 69 years old	1,241,975 (9.43)	244,425 (8.43)
Between 70 and 74 years old	439,439 (3.33)	119,015 (4.11)
Between 75 and 79 years old	179,337 (1.36)	53,946 (1.86)
Aged more than 79 years	67,973 (0.52)	26,456 (0.91)
Total	13,167,259 (100)	2,898,124 (100)

Source: adapted by the authors of Siscan/Datasus.

Table 3. Relative risk depending on tumor size and BI-RADS™ report between women at high and usual risk.

	<=10mm	11–20mm	21–50mm	>50mm
BI-RADS™ 0	0,8806 (95%CI 0,8562–0,9056)	0,8725 (95%CI 0,8423–0,9037)	0,8315 (95%CI 0,7729–0,8946)	1,0341 (95%CI 0,8816–1,2129)
BI-RADS™ 3	1,4464 (95%CI 1,2925–1,6186)	1,7870 (95%CI 1,5040–2,123)	1,2183 (95%CI 0,6933–2,1408)	0 usual risk patients>50mm and B3
BI-RADS™ 4	2,281 (95%CI 1,8479–2,8156)	1,9252 (95%CI 1,5848–2,3387)	1,5548 (95%CI 1,2454–1,9409)	1,1081 (95%CI 0,6290–1,9521)
BI-RADS™ 5	2,9962 (95%CI 1,9727–4,5506)	1,4758 (95%CI 1,0655–2,0442)	1,7349 (95%CI 1,3405–2,2453)	0 usual risk patients>50mm and B5

Source: adaptaed by the authors of Siscan/Datasus. BI-RADS™: Breast Imaging Reporting Data System.

DISCUSSION

Despite the fact that the need for breast cancer screening programs is well-established, some aspects of screening do not present such a consensus, such as the beginning and end of screening[14,15].

As established by the main societies specialized in mastology, patients with high risk for breast cancer were women with family history of at least one first-degree relative diagnosed with breast cancer before the age of 50 years, bilateral breast cancer or ovarian cancer at any age; women with family history of male breast cancer; women with histopathological diagnosis of proliferative breast lesion with atypia or lobular carcinoma in situ; or women with personal history of breast cancer[16-18].

In this study, as well as the findings in the literature, the incidence of suspicious reports for malignant breast lesions was higher among high-risk women. This finding can be compatible with the fact that women with risk factors have higher chances of developing breast cancer than those with usual risk[17,19].

In spite of that, it is important to be careful when analyzing this factor. Some studies show that examinations of high-risk patients tend to be analyzed in detail, so they present higher rates of false positive results than those of patients with low risk. Besides, examinations of low-risk patients present higher rates of false negative results[20].

Another aspect to be considered in the effectiveness of screening is the age group[21]. In this case, even though the Ministry of Health proposes the screening in patients aged between 50 and 64 years, it was observed that 44% of the mammographies carried out in low-risk patients were outside this age group[22]. Since this is a retrospective study including a database analysis, it is important to consider the possibility that the age group was filled out incorrectly.

The screening between the ages of 40 and 49 years and 64 and 69 years, despite not being recommended by the Ministry of Health, is recommended by the main mastology societies and by the Brazilian Federation of Gynecology and Obstetrics Associations, which can explain the lower incidence of mammography in these age groups, such as the fact that they were requested[23-25].

In this study, unlike another national study published in 2022, the higher incidence of tumors was found in high-risk patients, and, analyzing relative risk, we observed that the mere presence of a tumor in high-risk women, being the reports B3, B4 or B5, already meant a higher risk than that for usual-risk women, regardless of tumor size; that is because, in all sizes, the risk was higher among high-risk patients. On the other hand, when the report is B0, there seems to be higher incidence of tumors in usual-risk patients, which can be owed to the clinical influence at the time of classifying the patient's tumor[26].

CONCLUSION

The study showed an increased prevalence of reports suggestive of malignancy in high-risk patients when compared to those at usual risk. Such findings can mean that high-risk patients have higher prevalence of malignancy, but also that physicians analyze the examinations of high-risk patients more carefully, thus increasing the rates of reports that suggest malignancy among these patients.

Besides, further studies, with well-defined methodology and a sample that is representative of the population, are necessary to describe the main necessary characteristics for the screening program to succeed are.

AUTHORS' CONTRIBUTION

GDP: Investigation, Methodology, Writing – original draft. JMR: Supervision. MA: Conceptualization, Data curation, Methodology, Writing – review & editing. OF: Validation, Visualization. RGC: Supervision.

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