

# IMPACT OF THE PINK OCTOBER IN THE MAMMOGRAPHIC SCREENING ADHERENCE IN A REFERENCE CENTER IN ONCOLOGY

Impacto do outubro rosa na adesão ao rastreamento mamográfico em um centro de referência em oncologia

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## ABSTRACT

**Objective:** To analyze the impact of Pink October in the mammographic screening adherence in a reference center in oncology. **Methods:** This is a cross-sectional, descriptive and retrospective study of a population of women who underwent mammographic screening in the years 2014, 2015 and 2016. Mammography reports were used for data collection. Comparing the months of October with the other months of the studied years, we observed if there were changes in the number of mammograms and in the proportion of mammograms Breast Imaging Reporting and Data System (BI-RADS) 3, 4 and 5. To verify statistical significance, the Z-score (95% confidence interval — CI95%) and the  $\chi^2$  test ( $p < 0.05$ ) were used. **Results:** 105,698 mammograms were performed. There was a significant difference in the number of mammograms performed in October compared to the other months of the study. In addition, there was an absolute increase in the number of mammograms BI-RADS 3, 4 and 5; however, their proportion in the months of October did not presented difference in comparison to the other months. **Conclusion:** Population-based campaigns to prevent breast cancer appear to be effective in increase of demand for mammographic screening, possibly leading to an increase in the number of cancers discovered, allowing more women to receive timely treatment.

**KEYWORDS:** Mammography; breast neoplasms; health promotion; mass screening; early diagnosis.

## RESUMO

**Objetivo:** Analisar o impacto do Outubro Rosa na adesão ao rastreamento mamográfico para câncer de mama em um serviço de referência em oncologia. **Métodos:** Trata-se de um estudo transversal, descritivo e retrospectivo em uma população de mulheres que realizaram rastreamento mamográfico nos anos de 2014, 2015 e 2016. Foram utilizados laudos de mamografia para coleta de dados. Foram comparados os meses de outubro com os demais meses dos anos estudados, observando se houve alterações no número total de mamografias e no número de mamografias *Breast Imaging Reporting and Data System* (BI-RADS) 3, 4 e 5. Para verificar significância estatística foram utilizados o escore Z (intervalo de confiança de 95% – IC95%) e o teste do  $\chi^2$  ( $p < 0,05$ ). **Resultados:** Realizaram-se 105.698 mamografias. Houve diferença significativa na quantidade de mamografias efetuadas nos meses de outubro em comparação aos outros meses do estudo. Além disso, ocorreu aumento absoluto de mamografias BI-RADS 3, 4 e 5; porém, sua proporção nos meses de outubro não apresentou diferença significativa em relação aos outros meses. **Conclusão:** As campanhas populacionais de prevenção de câncer de mama parecem ser efetivas no aumento da procura por serviços de rastreamento, de forma a elevar o total de cânceres descobertos e possibilitando, assim, que mais mulheres recebam tratamento adequado.

**PALAVRAS-CHAVE:** Mamografia; neoplasias da mama; campanhas de prevenção de câncer de mama; programas de rastreamento; diagnóstico precoce.

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## INTRODUCTION

Breast cancer is the most common type of carcinoma found among women worldwide, including Brazil, behind only skin non-melanoma ones. It corresponds to about 25% of new cases of cancer each year and is the fifth cause of death by neoplasia among the population in general and the main one among women<sup>1</sup>. In 2016, there was an estimation of 57,960 new cases of the disease, with an incidence of 56.2 cases every 100 thousand women<sup>2</sup>.

Early detection is an important tool for a successful reduction in mortality<sup>3,4</sup>. The method of choice for screening is the mammography. Although the literature discusses the validity of populational mammography screening<sup>5</sup>, institutions such as the Ministry of Health (MoH), the National Institute of Cancer (Instituto Nacional de Câncer — INCA)<sup>6</sup>, the Brazilian Society of Mastology (Sociedade Brasileira de Mastologia — SBM), the Brazilian School of Radiology (Colégio Brasileiro de Radiologia — CBR), the Brazilian Federation of Gynecology and Obstetrics Associations (Federação Brasileira das Associações de Ginecologia e Obstetrícia — FEBRASGO)<sup>7</sup> and the U. S. Preventive Services Task Force (USPSTF)<sup>8</sup> recommend women are submitted to this procedure. Despite the different age range and periodicity recommendations, many test-age patients do not have access to the test or do not look for health care<sup>9,10</sup>.

Information campaigns stand out among the motivations to seek for screening. In the United States of America, several states which would develop isolated actions for the screening of breast cancer got together for a unified awareness campaign on the disease. The pink ribbon became the symbol of the campaign called Pink October. The campaign was also adopted in Brazil with national relevance<sup>11</sup>.

The objective of this study was to analyze the impact of Pink October in the adherence to mammographic screening for breast cancer in a reference oncology service in 2014, 2015 and 2016, observing changes in the total amount of mammograms performed and their impact on the proportion of mammograms diagnosed as classes 3, 4 and 5 Breast Imaging Reporting and Data System (BI-RADS) in October, when compared to other months of the year.

## METHODS

It is a cross-sectional, descriptive and retrospective study in a population of women who underwent mammography in 2014, 2015 and 2016 at the mammography service of a hospital that is reference in oncology.

This study included all patients submitted to mammography in 2014, 2015 and 2016, according to a systematic verification of mammographic reports in electronic databases. The classification of the reports was given by the BI-RADS system<sup>12</sup>. Patients who couldn't have their BI-RADS determined were excluded from the study.

All mammograms were made in two mammography devices by MAMMOMAT 3000 Modular (Siemens), in standard incidences (craniocaudal and mid-lateral-oblique) and in complementary ones, when necessary<sup>13</sup>. The results were evaluated by the same radiologist.

Data collection was performed electronically with an Excel (Microsoft Office 2007, Brazil) spreadsheet, and elements were analyzed with QuickCalcs software (GraphPad Software Inc, La Jolla, CA, United States). The data selected were reported using a descriptive analysis. In order to evaluate whether the number of mammograms in the months of October was higher than the mean for other months in their respective years, we used the Z score, considering 95%CI (95% confidence interval) — values differing more than two standard deviation from the mean. The  $\chi^2$  test was used in order to evaluate whether the ratio for BI-RADS 3, 4 and 5 tests differed between October and other months of the year, considering statistical significance of  $p < 0.05$ .

This work complied with the determinations from Resolution No. 196/1996 of the National Health Council (Conselho Nacional de Saúde — CNS), and was approved by the Research Ethics Committee of Centro Universitário Fundação Assis Gurgacz (CEP-FAG), No. CAAE 61718516.6.6.0000.5219.

## RESULTS

The total of 105,698 mammograms were performed from 2014 to 2016: 33,197, in 2014, 36,392, in 2015 and 36,109, in 2016. The number of mammograms remained relatively stable, ranging from two to three thousand tests a month, except October, when peaks were observed. The amount of tests carried out in October was significantly higher ( $Z > +2$ ) than in other months in their respective years. Moreover, the number of mammograms in November 2016 was also higher than the monthly mean of the same year ( $Z > +2$ ) (Graphic 1).

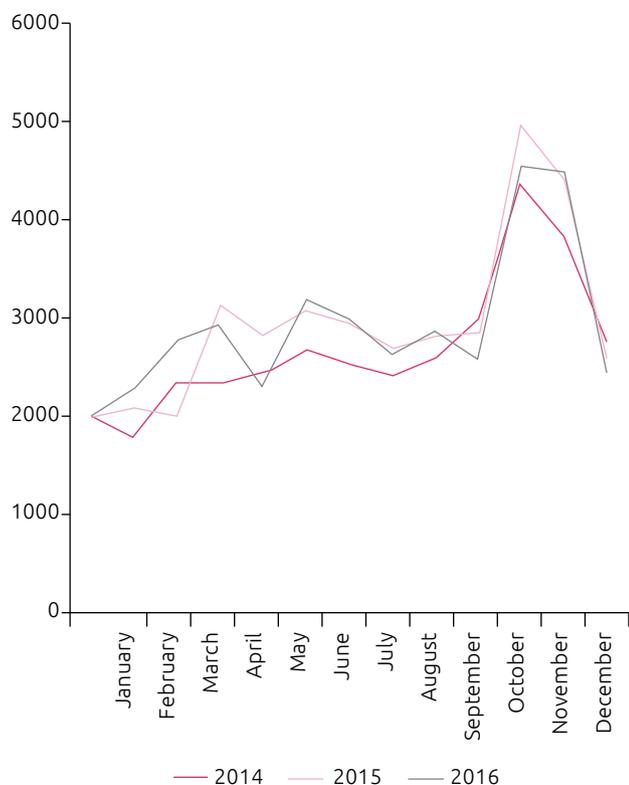
As for the tests classified as BI-RADS 3 (B3), it was observed that, in October 2014, there were 58 reports (11.95%), although the monthly mean of this year was of 40.4 B3 reports. In October of the following year, 65 tests (16%) were classified as such, with values higher than the monthly mean of 33.6 reports. In October 2016, 21 mammograms (8.82%) were B3, with a monthly mean of 19.8 tests in this category for the year.

In the first year of the study (2014), the month of October had 16 tests (12.9%) BI-RADS 4 (B4), while the monthly mean was of 10.3 reports. In 2015, the month of October had 14 B4 reports (9.27%), above the monthly average of 12.5 B4 mammograms. In the last year of the study, the month of October had 27 tests (17.08%) classified as B4 and had a monthly mean of 13.1 mammograms in this category.

In the case of tests classified as BI-RADS 5 (B5), in 2014, there were eight tests (15.6%) in the month of Pink October campaign and a monthly mean of 4.25 B5 results. In 2015, seven mammograms (11.1%) carried out in the month of October were B5, and

the monthly mean was of 5.25 reports. In 2016, the number of reports in category 5, carried out in October, was equal to the monthly mean for the year: four reports (8.3%).

In the month of October, 13,924 mammograms were carried out, of which 220 (1.58%) were classified as B3, B4 or B5, and 13,704 (98.42%) were classified as normal. In the other months studied, 91,774 mammograms were carried out, of which 1,428 (1.56%) were classified as B3, B4 or B5, and 90,346 (98.44%) were classified as normal. Despite the number of B3, B4 and B5 mammograms being higher in the month of October than in other months, no statistically significant difference was observed in the proportion of B3, B4 and B5 mammograms ( $p=0.43$ ) (Table 1). In total, between 2014 and 2016, there were 1,648 tests classified as BI-RADS 3, 4 and 5 (Graphic 2).



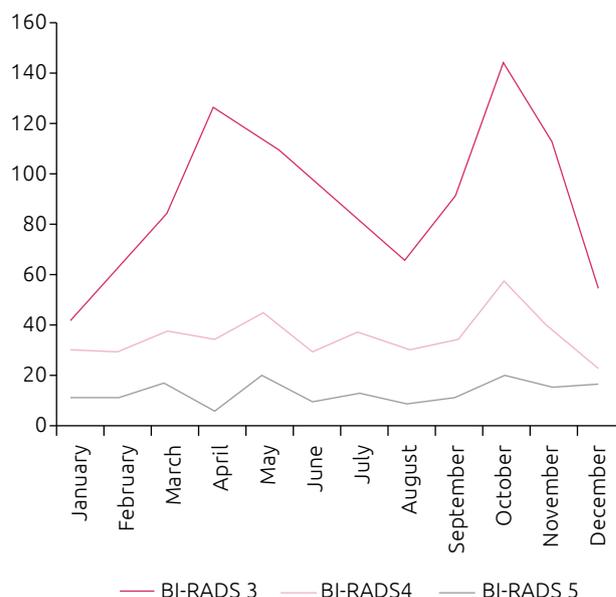
**Graphic 1.** Number of mammograms carried out monthly in a reference center in oncology: 2014, 2015 and 2016.

## DISCUSSION

This study allowed analyzing the impact of Pink October on the adherence to the breast cancer screening in a reference service in oncology in 2014, 2015 and 2016.

A significant increase in the total of tests carried out in the month of October was observed in comparison to other months. This was possibly due to the effect of population awareness campaigns on breast cancer screening. Although results cannot be directly connected to Pink October — which could be done, for example, by using questionnaires on the motivation to join screening —, it is difficult to imagine other factors which lead to a consistent increase in the number of mammograms in October over three consecutive years. Thus, the present study is an indirect way to confirm the positive impact of Pink October in patient’s search for screening.

The effect of the campaigns is estimated to be even greater than that demonstrated. The demand generated by the period of prevention campaigns results in the increased search that exceeds the structural capacity of the analyzed center. Therefore, many tests are scheduled not in October and are diluted in the following



**Graphic 2.** Number of Breast Imaging Reporting and Data System (BI-RADS) 3, 4 and 5 mammograms carried out monthly in years 2014, 2015 and 2016.

**Table 1.** Comparison between the proportion of Breast Imaging Reporting and Data System (BI-RADS) 3, 4 and 5 mammograms carried out in the month of October and in other months of years 2014, 2015 and 2016.

	October (2014–2016)		Other months (2014–2016)		Statistical significance
	n	%	n	%	
BI-RADS 3, 4 and 5	220	1.58	1,428	1.56	p=0.43
Other categories	13,704	98.42	90,346	98.44	
Total	13,924	100.00	91,774	100.00	

**Table 2.** Comparison of the proportion of Breast Imaging Reporting and Data System (BI-RADS) 3, 4 and 5 mammograms between several studies.

Classification	BI-RADS 3		BI-RADS 4		BI-RADS 5		Total	
	n	%	n	%	n	%	n	%
2013 – Rodrigues et al. <sup>16</sup>	761	2.44	376	1.21	33	0.11	31,196	100.00
2014 – Badan et al. <sup>15</sup>	605	8.35	106	1.46	11	0.15	7,249	100.00
2017 – Tomazelli et al. <sup>14</sup>	152,971	2.70	73,396	1.30	9,653	0.20	5,759,503	100.00
2017 – Present article	1,084	1.02	402	0.38	162	0.15	105,698	100.00

months. This fact explains the demand observed in the month of November, which is higher than other months (except October).

Although the absolute number of BI-RADS 3, 4 and 5 tests has increased in the month of October, there were no changes in the proportion of these tests in relation to the total. It was expected that women with mammary symptoms would be more affected by media campaigns and, thus, led to seek for mammograms in greater proportion, increasing the volume of BI-RADS 3, 4 and 5 mammograms. However, if this factor existed, it was not enough to significantly change the data.

It was not possible to find articles in the national literature indexed within the last five years which would describe the impact of mediatic campaigns in the search for mammographic screening. However, other national articles reported data on the classification of mammograms into BI-RADS categories (Table 2).

When compared to other studies<sup>14-16</sup>, the present study observed a greater proportion of mammograms classified as BI-RADS 3 and 4 and a similar number of BI-RADS 5 mammograms. Some factors may be considered to explain this result. The BI-RADS classification is an international system for the evaluation of breast findings, which consider breast abnormalities estimating the risk of breast cancer. This classification does not apply solely to mammography, but also to other image tests. Little interobservational variability is expected in the evaluation of BI-RADS categories. However, it is observed that results of different centers are not the same<sup>16</sup>. Thus, studies that use data from several services<sup>14,16</sup> may be subject to greater heterogeneity than those evaluating a single center<sup>15</sup>.

Moreover, the different socioeconomic realities found in our country may contribute so that the screening is offered in an unequal way in different locations, influencing the rate of tumor detection<sup>10,17</sup>.

Nevertheless, the BI-RADS 5 category presented good agreement between studies. This classification offers rather typical findings with high positive predictive value<sup>15</sup>, while categories 3 and 4 may point toward some findings of lower predictive value. This could contribute to a higher interobservational agreement in tests categorized as BI-RADS 5<sup>18</sup>. This reasoning also seems to be sustained for the BI-RADS classification through magnetic nuclear resonance<sup>19,20</sup>.

Even though the study has suffered with limitations — such as the lack of histopathological confirmation for BI-RADS 3, 4 and 5 mammograms —, it offered important results. Media campaigns require high spending of public money, in addition to a mobilization by health professionals and the society. Understanding whether there really is a change in populational behavior confirms the effectiveness of these projects and may guide future decisions. Furthermore, to the authors' knowledge, this is the first Brazilian study to address Pink October in the adherence to mammographic screening. Future studies could contribute to the theme, evaluating the cost-effectiveness and the direct impact of campaigns such as this one in different social groups.

## CONCLUSION

The Pink October campaign, through propaganda in the most varied media, basic health units, schools and commerce, results in a popular mobilization in the search for breast cancer screening. The increased search for mammography increases the total number of mammograms with findings which may suggest malignancy, even though it does not change the ratio of BI-RADS 3, 4 and 5 tests. This result may contribute to increase early diagnosis, allowing for the chance of improved chances of cure and decreased adoption of aggressive treatments.

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