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Epidemiological profile of women with breast cancer treated at an oncology specialty clinic in southern Brazil

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ABSTRACT

Introduction: Breast cancer is the most common cancer in women, with increasing incidence and proportionally higher mortality in low- and middle-income countries. Delays in diagnosis and treatment are associated with worse outcomes. **Objective:** To analyze the epidemiological profile of women with breast cancer treated at an oncology clinic in the southern region of the state of Santa Catarina, in 2022. **Methods:** This is a cross-sectional study with 422 patients ≥18 years old, diagnosed with malignant breast neoplasm. Medical record data included age, laterality, histological type, time between diagnosis and surgery, lymph node involvement, metastasis, and treatment. Statistical analyses were performed using SPSS 20.0, with the significance level set at 5% ($p<0.05$). **Results:** The mean age was 51.5 years, with a predominance of the 40–59 age group (56.6%) and incidence in the left breast (52.1%). Invasive breast carcinoma and subtypes accounted for 98.8% of cases, with emphasis on those unspecified (47.4%) and human epidermal growth factor receptor 2–positive (HER2+; 25.8%). The median time between diagnosis and surgery was 5.2 months (interquartile range: 2.3–8.1). Affected lymph nodes were associated with longer time to surgery and increased risk of metastasis (odds ratio: 42.30; 95% confidence interval: 10.05–178.02). All patients underwent surgery, with 363 (86.0%) receiving chemotherapy, radiotherapy, and surgery associated with new therapies (CT + RT + surgery + novel therapies). Other treatments included CT + surgery (10.2%), RT + surgery (1.7%), and surgery alone (2.1%). **Conclusion:** A predominance of invasive carcinomas was observed, with diagnosis occurring during productive age, and significant delays in access to surgical treatment. A strong association between positive lymph nodes and metastasis was identified. The significant proportion of patients with access to new therapies reflects the incorporation of oncological advances in the regional public health service, although the observed delays highlight the need to optimize care flows.

KEYWORDS: breast neoplasms; breast cancer; delayed diagnosis; lymph nodes; neoplasm metastasis.

INTRODUCTION

Breast cancer is the most common malignant tumor in women worldwide, with over 2 million new cases annually and increasing incidence in virtually all regions, although mortality is proportionally higher in low- and middle-income countries, where diagnosis is later and access to treatment is limited. In 2020, there were approximately 2.3 million new cases of breast cancer and 685,000 deaths worldwide. Projections indicate 2.64 million cases and up to 1.7 million deaths in 2030 if the current trend continues[1]. The standardized incidence reaches 66.4/100,000 women in developed countries and 27.3/100,000 in developing countries, but mortality is proportionally higher in the latter, due to late diagnosis and limited access to treatment[1]. In 2023, breast cancer was already the most common cancer in 157 of 185 countries and responsible for approximately 670,000 deaths, according to recent estimates from the World Health Organization[2]. In Brazil, reviews show a continuous increase in cases over the last decade, with breast cancer as the leading malignant neoplasm and the main cause of cancer death in women[3,4].

Globally, less than 10% of cases are attributable to high-penetrance germline mutations, especially BRCA1 and BRCA2, while most result from a combination of hormonal, reproductive, environmental, and lifestyle factors[5,6,7]. Advanced age, early menarche, late menopause, nulliparity or late first pregnancy, family history, and high mammographic density are well-established risk factors[5,6,7,8]. Among modifiable factors, the evidence is consistent for obesity/

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overweight (especially post-menopause), alcohol consumption, physical inactivity, smoking, unhealthy diet, and prolonged use of menopausal hormone therapy; regular physical activity, adequate weight, reduced alcohol consumption, and prolonged breastfeeding reduce the risk[4,5,6,7,9]. In Brazil, clinical profile reviews highlight that most diagnosed women are aged 50–69 years, many of whom are overweight and have a low socioeconomic status[4,10].

Mammography is the main screening method, with evidence of a 15%–40% reduction in mortality in organized programs[8]. Recent reviews describe an increasing global incidence, but a decrease in mortality in high-income countries, attributed to the combination of mammography and modern treatment[5,6]. In Brazil, between 2014 and 2023, an increase in breast cancer prevalence was observed, and mammography coverage remains insufficient, with significant regional inequalities[3]. A national study (2015–2022) showed a worsening of delays between mammography requests and report release: a 2.89% reduction in exams released in less than 30 days and a 3.05% increase in reports exceeding 60 days, especially in 2020[11].

The BI-RADS system is standard for mammography reports and guides management:

- categories 1–2 return to routine screening;
- 3 requires follow-up in 6 months;
- 4–5 indicate the need for biopsy;
- 0 requires complementary imaging.

A Brazilian review of clinical-epidemiological profiles shows a high frequency of BI-RADS 5 among diagnosed women, indicating often late presentation with locally advanced tumors[10]. During the COVID-19 pandemic, the number of screening mammograms in Brazilian women aged 50–69 years fell significantly, with distinct impacts across regions; the Southeast concentrated more exams and cases, while the North presented the lowest volumes in all years evaluated[12,13].

Delays between diagnosis and the start of treatment worsen outcomes: international analyses show a progressive increase in mortality with just a few additional weeks of waiting[6]. In Brazil, studies using data from the Cancer Information System (SISCAN) and the ONCOLOGY PANEL reveal a trend of increasing staging at the time of diagnosis and a higher proportion of cases starting treatment after the legal deadline of 60 days, especially in regions with less access to services[3,11,13].

Treatment is multidisciplinary and depends on the stage and molecular subtype (Luminal A/B, human epidermal growth factor receptor 2 [HER2] enriched, triple negative)[5,14]. The combination of surgery (conservative or mastectomy), radiotherapy, and systemic therapies (chemotherapy, hormone therapy, anti-HER2, immunotherapy) has allowed for a significant increase in survival, including in metastatic disease, but access to modern targeted therapies is still unequal in middle-income countries like Brazil[3,5,14]. The South and Southeast regions have the highest recorded incidence, greater use of mammography, and a higher concentration of specialized centers, but maintain high mortality rates; the North and Northeast combine low screening coverage, greater delays, and less infrastructure, resulting in more advanced diagnoses and a worse prognosis[3,4,11,12,13].

Based on this perspective, the objective of this study was to analyze the epidemiological profile of women with breast cancer followed up at a specialized oncology clinic in southern Santa Catarina in 2022.

METHODS

This study was epidemiological in nature, with a cross-sectional design. The study was conducted based on the analysis of medical record data from female patients, aged over 18 years, who underwent treatment for breast cancer and completed treatment. The data were collected from the oncology outpatient clinic database of Hospital Nossa Senhora da Conceição (HNSC), located in Tubarão, Santa Catarina, during the period of 2022. The institution receives patients from the AMUREL region (Association of Municipalities of the Laguna Region), which comprises 18 municipalities in Santa Catarina and 386,545 inhabitants, according to the 2022 census.

Patients seen at the oncology specialty outpatient clinic between January and December 2022, diagnosed with malignant breast neoplasm (International Classification of Diseases [ICD] C50) and over 18 years of age, were selected for this study. Patients with incomplete medical records or who were undergoing treatment were excluded.

For the sample size calculation, a 95% confidence interval ($Z_{\alpha/2}$=1.96), unknown prevalence (p=q=0.5), and a sampling error of 5% (E=0.05) were considered. The sample size was calculated using Equation 1, resulting in a total of 390 individuals.

$$n = \frac{Z^2_{\alpha/2} \cdot p \cdot q}{E^2} \quad (1)$$

At the end of the data collection, 422 patients were included, exceeding the calculated minimum number by approximately 8%, which helps to compensate for any potential losses or exclusions and reinforces the statistical power of the study.

The data collection procedure was carried out using information obtained from the analysis of electronic medical records from the Philips Tasy system. Initially, the HNSC Information Technology team was asked for a report with the medical records that met the inclusion criteria. Subsequently, the cases were randomized and selected to compose the sample. The variables collected were age, lymph node and breast involvement (right/left), presence of metastasis, time between diagnosis and surgery, histopathological report, methods used in diagnosis, and treatment employed. The research was approved by the Research Ethics Committee under opinion number 6.572.209, on 04/12/2023.

The data were organized using Microsoft Excel and analyzed using the Statistical Package for the Social Sciences (SPSS) software, version 20.0 (IBM Corp., Armonk, NY, USA). Quantitative variables were described using measures of central tendency and data dispersion, and categorical variables using absolute and percentage frequencies. The analysis of numerical data was primarily performed using the Kolmogorov-Smirnov normality test. For comparison between groups, variables were tested using Pearson's chi-square test. The level of statistical significance adopted was 5% (p-value <0.05).

RESULTS

The study sample consisted of 422 female patients over 18 years of age, as detailed in Figure 1. The sample profile indicated a mean age of 51.5 years (standard deviation ±12.9). The majority (56.6%) were in the 40–59 age range, while 24.6% were ≥60 years old, and 18.7% were <40 years old. Regarding the affected breast, 52.1% of cases occurred in the left breast, 45.5% in the right breast, and 2.4% of patients presented with bilateral involvement.

Regarding histological types, only 5 (1.2%) corresponded to cases not classified as invasive breast carcinoma (IBC). This small group included 2 cases of adenocarcinoma (0.5%) and 3 cases of malignant phyllodes tumor (MPT) (0.7%).

The remaining 417 patients (98.8%) were classified as IBC or one of its subtypes. IBC without subtype specification was the most frequent, with 200 cases, representing 47.4% of the total sample and 48.0% of IBC cases. Following this, the IBC-HER2+ subtype (with HER2 overexpression) stood out, present in 109 patients (25.8% of the total; 26.1% of IBC).

Invasive ductal carcinoma (IDC) was identified in 62 cases (14.7% of the total; 14.9% of breast cancer), while Invasive Carcinoma of no Special Type (NST) occurred in 32 patients (7.6% of the total; 7.7% of breast cancer). Less frequently, 7 cases of invasive papillary carcinoma (IPC; 1.7%), 4 cases of poorly differentiated breast carcinoma (PDBC; 0.9%), and 3 cases of invasive lobular carcinoma (ILC; 0.7%) were observed.

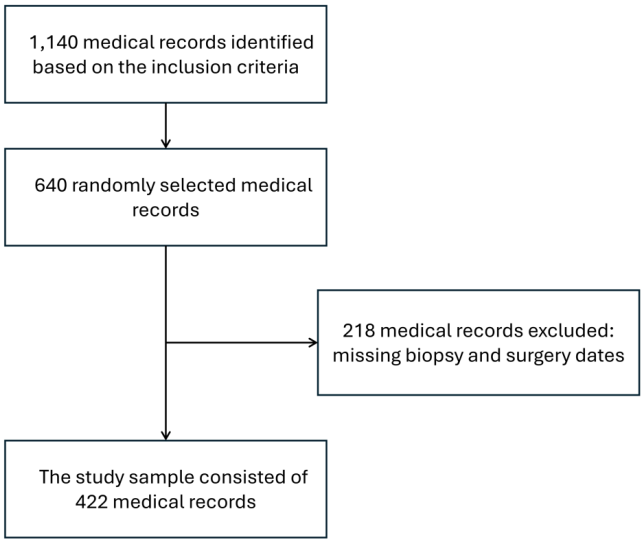

Figure 1. Flowchart of the sample selection of patients diagnosed with malignant breast neoplasm in an oncology specialty outpatient clinic in southern Santa Catarina in the year 2022.

All 422 patients underwent surgery as part of their cancer treatment. Of these, 363 underwent a regimen that included a combination of chemotherapy, radiotherapy, and surgery, associated with new therapies (CT + RT + surgery + novel therapies) — such as immunotherapy, targeted therapy, or hormone therapy. The remaining cases were distributed as follows:

- 43 patients underwent CT + surgery;
- 7 were treated with RT + surgery; and
- 9 underwent surgery only, without any adjuvant therapy.

The median time between diagnosis and surgery was 5.2 months, with an interquartile range of 2.3–8.1 months. When relating the time between diagnosis and surgical treatment, a significant association was observed between the presence of affected lymph nodes and a longer time to surgery, but, when compared with the presence of metastases, there was no statistical significance (Figure 2)

Risk analysis demonstrated a strong and significant association between lymph node involvement and the occurrence of metastasis. Patients with positive lymph nodes had approximately a 42 times greater chance of presenting with metastatic disease compared to patients without lymph node involvement (OR 42.30; 95%CI 10.05–178.02) (Figure 3).

DISCUSSION

The results demonstrated that most patients were in the 40–59 age range, with a slight predominance of left breast involvement. From a histological point of view, a clear predominance of CMI (Carcinoma Mamário Invasivo) and its subtypes was observed, representing 98.8% of the sample, with unspecified IBC and the HER2+ subtype being the most frequent. The median time between diagnosis and surgery was 5.2 months, longer than recommended in the literature, and was significantly associated with lymph node involvement. Risk analysis revealed that patients with positive lymph nodes had approximately a 42 times greater chance of developing metastasis. Regarding treatment, most patients underwent multimodal regimens, with a predominance of the triple combination of surgery + CT + RT, although access to novel therapies is still limited.

The average age found was 51.5 years (standard deviation ±12.9), with 56.6% of patients in the 40–59 age range. This data is consistent with the literature, which places the peak incidence of breast cancer between 50–60 years of age[14,15]. The high incidence among women still of reproductive age

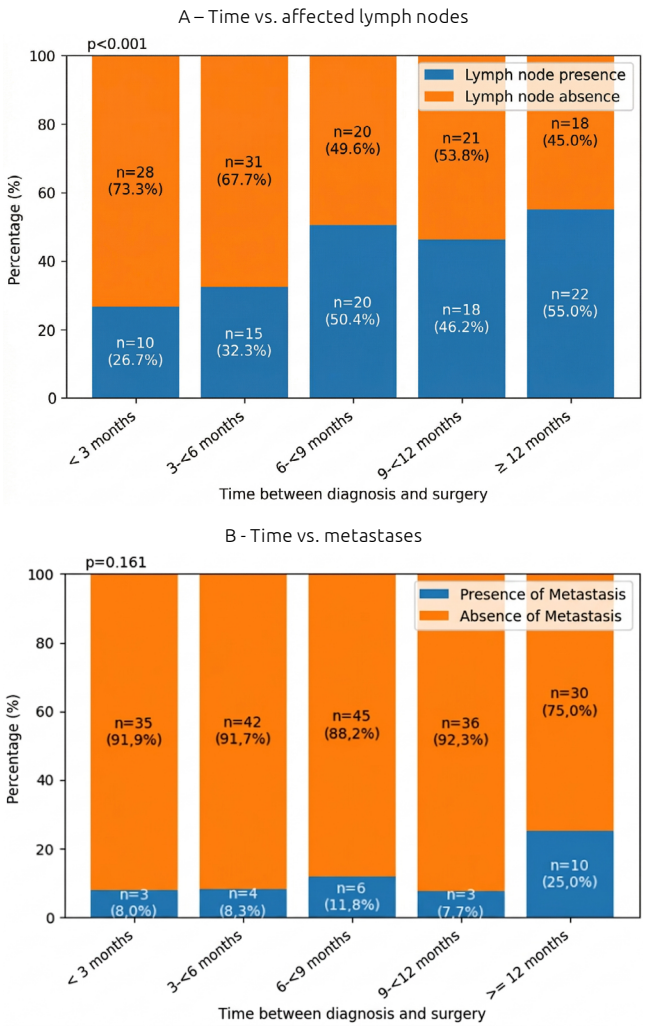

Figure 2. Time between diagnosis and surgical treatment in patients with malignant breast neoplasm in an oncology specialty outpatient clinic in southern Santa Catarina in 2022.

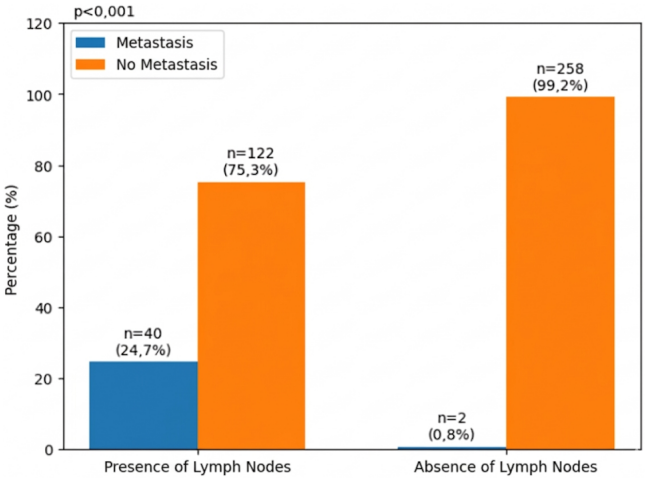

Figure 3. Association between lymph nodes and metastasis in patients diagnosed with malignant breast neoplasm in an oncology specialty outpatient clinic in southern Santa Catarina in 2022.

reinforces the need for public policies focused on organized screening and rapid access to diagnosis in this population. Regarding the affected breast, the left breast was predominantly affected (52.1%), a finding consistent with previous studies[16] that associate left breast cancer with a more aggressive genomic profile and poorer therapeutic response. Although the difference is small, its recurrence in different populations suggests that biological or anatomical factors may influence the laterality of the disease.

Histological analysis revealed that only 5 patients (1.2%) presented types not classified as IBC, with 2 cases of adenocarcinoma and 3 cases of malignant phyllodes tumor (MPT). The remaining 417 cases (98.8%) were classified as IBC or its subtypes. Population studies, such as that of Moreira et al.[17] have identified invasive ductal carcinoma (IDC) as the predominant type, accounting for approximately 66.8% of cases. In the present study, isolated IDC represented only 14.7%, suggesting that a significant portion of ductal cases may have been recorded under the heading "unspecified CMI". If we consider the sum of unspecified IBC, IDC, and HER2+ IBC — all variants of ductal carcinomas in practice — the percentage rises to 88.0%, approaching the patterns described in the literature. This hypothesis is reinforced by the very organization of the data, in which the subtypes appear hierarchically linked to IBC. The presence of less common subtypes, such as invasive papillary invasive lobular carcinoma (ILC), papillary breast carcinoma (PBC) and invasive papillary carcinoma (IPC), even in small numbers, highlights the heterogeneity of the disease and the importance of precise anatomopathological characterization for prognostic and therapeutic definition.

The median time between diagnosis and surgery was 5.2 months, with an interquartile range of 2.3 to 8.1 months. This interval is substantially longer than that recommended by national and international guidelines. A recent meta-analysis quantified that each four-week delay in starting treatment increases the risk of death from breast cancer by more than 10.0%[18]. A Brazilian study using national data demonstrated that delays exceeding 60 days are associated with worse outcomes, especially in regions with a lower Human Development Index[19]. In multicenter cohorts, 80.5% of women started treatment within 60 days, with a median of 32 days[20].

The finding of 5.2 months in the present study is concerning and suggests barriers to access, fragmentation of the care pathway, or inefficiency in the regulation of surgical slots in the regional public health system. When relating surgical time to clinical variables, a significant association was observed between the presence of affected lymph nodes and a longer time to surgery, indicating that patients with more advanced disease may be facing even slower waiting times. When compared to the presence of metastases, there

was no statistical significance, possibly due to the smaller number of events or the severity of these cases, which may have different course.

Risk analysis demonstrated a strong and significant association between lymph node involvement and the occurrence of metastasis. Patients with positive lymph nodes had approximately a 42 times greater chance of presenting with metastatic disease compared to patients without lymph node involvement (OR 42.30; 95%CI 10.05–178.02). This finding is biologically plausible and consistent with the literature: lymph node involvement is one of the main predictors of systemic dissemination in breast cancer[21,22]. As tumors progress, they use the lymphatic system as a route of dissemination, resulting in multiple tumor foci and a worse prognosis[21]. The magnitude of the association found reinforces the importance of early lymph node staging and the adoption of aggressive therapeutic strategies in this at-risk subgroup.

All 422 patients underwent surgery as part of their cancer treatment. The vast majority (363 cases; 86.0%) received a combination of chemotherapy + radiotherapy + surgery + neurotransmitter — such as immunotherapy, targeted therapy, or hormone therapy — indicating locally advanced or high-risk disease requiring a contemporary multimodal approach. The remaining cases were distributed as follows: chemotherapy + surgery in 43 patients (10.2%), radiotherapy + surgery in 7 patients (1.7%), and surgery alone in 9 patients (2.1%).

The significant number of patients with access to novel therapies reflects the progressive incorporation of modern therapeutic modalities into the service, in line with recent advances in the literature[23,24]. Clinical studies with immunotherapy and targeted therapies have shown promising results, although access to them is still unequal in middle-income countries[24]. The diversity of therapeutic regimens observed — from isolated CX to quadruple combinations — highlights the individualization of treatment, considering factors such as stage, molecular subtype, age, clinical conditions, and patient preference[25].

This study has limitations that should be considered when interpreting the findings. It is a cross-sectional study, which does not allow for establishing causal relationships, only associations. The use of secondary data (electronic medical records) is subject to incompleteness, data entry errors, and lack of standardization, which may have affected the accuracy of some variables, especially in the classification of histological types, where a possible overlap was observed between the unspecified CMI category and its subtypes. Furthermore, the study was conducted at a single reference center in southern Santa Catarina, which limits the generalizability of the results to other regions of the country. 9+

CONCLUSIONS

In summary, the profile of women with breast cancer in southern Santa Catarina reveals a predominance of invasive carcinomas, diagnosis during productive age, significant delays in access to surgical treatment, and a strong association between lymph node involvement and metastasis. The longer-than-recommended time to surgery raises an alert regarding the need to optimize care flows and reduce regional inequalities in access to cancer treatment. Despite the observed delays, the significant proportion of patients with access to new therapies (363 cases; 86.0%) points to a significant incorporation of oncological advances in the regional public service, reflecting therapeutic updates and alignment with contemporary practices in breast cancer management.

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AUTHORS' CONTRIBUTION

ISMC: Formal Analysis, Methodology, Project administration, Visualization, Writing – review & editing. MALML: Conceptualization, Formal Analysis, Methodology, Project administration, Visualization, Writing – review & editing. KSK: Data curation, Formal Analysis, Methodology, Project administration, Supervision, Visualization, Writing – review & editing.

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Artificial Intelligence usage: Artificial Intelligence was used solely for linguistic editing and proofreading to improve the clarity of the text. The final content was fully reviewed and approved by the authors, who remain responsible for the integrity of the research.

Data availability statement: The data that support the findings of this study are available from the corresponding author, MALM, upon reasonable request.

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