Integrative Review

Alves ACG, Oliveira SCM, Arruda FS
Impact Of Screening And Early Diagnosis On Breast Cancer Treatment: Integrative Review

Impact of Screening and Early Diagnosis on Breast Cancer Treatment: Integrative Review

Impacto do Rastreamento e Diagnóstico Precoce no Tratamento do Câncer de Mama: Revisão Integrativa

Impacto de los Exámenes de Detección y el Diagnóstico Temprano en el Tratamiento del Cáncer de Mama: Revisión Integrativa

RESUMO

Objetivo: analisar, por revisão de literatura, o impacto do diagnóstico precoce e acompanhamento no prognóstico e na sobrevida de mulheres. **Métodos:** a pesquisa utilizou bases como SciELO, PubMed e INCA, focando em estudos com mulheres diagnosticadas nos últimos cinco anos. Para definir o tema, foi usada a estratégia PICo. Os idiomas incluídos foram português e inglês. **Resultados:** mostram aumento nos casos de câncer de mama no Nordeste e Norte do Brasil, enquanto no Sul e Sudeste houve redução na mortalidade. Contudo, desigualdades regionais limitam o acesso ao diagnóstico e tratamento, prejudicando principalmente grupos vulneráveis. **Conclusão:** o estudo evidencia a relevância de ações de rastreamento e acompanhamento para ampliar a cobertura e reduzir o intervalo entre diagnóstico e tratamento, aspectos cruciais para melhorar a sobrevida e qualidade de vida das pacientes.

DESCRITORES: Câncer de mama; Diagnóstico precoce; Tratamento.

ABSTRACT

Objective: To analyze, through a literature review, the impact of early diagnosis and follow-up on prognosis and survival in women. **Methods:** The research utilized databases such as SciELO, PubMed, and INCA, focusing on studies involving women diagnosed in the last five years. The PICo strategy was used to define the topic. The languages included were Portuguese and English. **Results:** The findings show an increase in breast cancer cases in the Northeast and North of Brazil, while in the South and Southeast, mortality has decreased. However, regional inequalities limit access to diagnosis and treatment, particularly affecting vulnerable groups. **Conclusion:** The study highlights the importance of screening and follow-up actions to expand coverage and reduce the gap between diagnosis and treatment, which are crucial factors for improving survival and the quality of life of patients.

KEYWORDS: Breast Cancer; Early Diagnosis; Treatment.

RESUMEN

Objetivo: Analizar, a través de una revisión de literatura, el impacto del diagnóstico precoz y el seguimiento en el pronóstico y la supervivencia de las mujeres. **Métodos:** La investigación utilizó bases de datos como SciELO, PubMed e INCA, enfocándose en estudios con mujeres diagnosticadas en los últimos cinco años. Se utilizó la estrategia PICo para definir el tema. Los idiomas incluidos fueron portugués e inglés. **Resultados:** Los resultados muestran un aumento en los casos de cáncer de mama en el noreste y norte de Brasil, mientras que en el sur y sureste ha habido una reducción en la mortalidad. Sin embargo, las desigualdades regionales limitan el acceso al diagnóstico y tratamiento, afectando principalmente a los grupos vulnerables. **Conclusión:** El estudio destaca la relevancia de las acciones de cribado y seguimiento para ampliar la cobertura y reducir el intervalo entre el diagnóstico y el tratamiento, aspectos cruciales para mejorar la supervivencia y la calidad de vida de las pacientes.

DESCRIPTORES: Cáncer de mama; Diagnóstico precoz; Tratamiento.

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INTRODUCTION

Cancer is one of the most complex and challenging diseases faced by modern medicine. It represents a heterogeneous set of illnesses characterized by the uncontrolled growth of abnormal cells, capable of invading and spreading to other tissues in the body. These cells multiply rapidly and aggressively, becoming difficult to control, resulting in the formation of tumors. In the context of this vast category of diseases, breast cancer stands out as one of the most common and worrying types, predominantly affecting women, but also affecting men with an incidence of 1% in all cases of the disease. [1]

The different types of cancer are related to the different types of cells in the body. When they originate in epithelial tissues, such as skin or mucous membranes, they are called carcinomas. If they originate in connective tissues, such as bone, muscle or cartilage, they are called sarcomas. Breast cancer is a neoplasm that develops in breast cells, with multiple subtypes and clinical manifestations. The complexity of this disease ranges from its etiology to the physical, emotional and social impacts it imposes on those affected. [1]

There are several types of breast cancer, some of which grow quickly, while others develop more slowly. The main types of breast cancer include: Classic Invasive Ductal Carcinoma; Invasive Lobular Carcinoma; Tubular Carcinoma; Medullary Carcinoma; Mucinous Carcinoma; Paget's Disease; Inflammatory Breast Carcinoma. [2]

When cancer is suspected, either through early detection methods or during the physical examination that is performed to identify possible affected areas, including analysis of the armpits, cervical region and supraclavicular fossae, when the presence of a breast nodule that is usually single, hard and often attached to the surrounding tissue, it is important to perform a biopsy to confirm the diagnosis through histopathological analysis, always preferring less invasive procedures to avoid unnecessary surgeries in benign lesions. [3]

The survival rate for breast cancer varies depending on the stage at which the disease is diagnosed. Generally, survival rates are around 80% for cases identified in the early stages, between 30% and 50% for intermediate stages and only 5% for advanced stages. These figures highlight that the chance of surviving the disease decreases considerably as the stage of the cancer advances. [4]

Therefore, treatment varies according to the stage of the disease, its biological characteristics and the patient's conditions, such as age, menopause and comorbidities. When identified early, the disease is more likely to be cured. If there are signs of spread (metastases), the goal is to prolong life and improve its quality. The approaches to breast cancer are divided into two main types: local, involving surgery, radiotherapy and breast reconstruction, and systemic, with chemotherapy, hormone therapy and biological therapy. [5]

According to the National Cancer Institute (2023), in stages I and II breast cancer, the usual treatment involves conservative surgery or mastectomy, with evaluation of the axillary lymph nodes for prognosis. Radiation therapy may be indicated after surgery, and breast reconstruction may be considered after mastectomy. Systemic treatment is based on the risk of recurrence, taking into account factors such as age, lymph node involvement, tumor size and type, as well as hormone receptors (estrogen, progesterone) and HER-2 (proteins on the surface of cells), which influence the choice of therapy. [6-7]

In stage III, systemic therapy, often chemotherapy, is the initial approach, followed by local treatment (surgery, radiotherapy) after an adequate response. In stage IV, systemic therapy is the priority, with local treatment restricted to specific situations, aiming to balance the response to the tumor and the extension of survival, considering possible side effects. [5]

Breast cancer prevention involves managing risk factors and promoting healthy habits, such as a balanced diet, regular exercise, controlling body weight, and reducing or eliminating alcohol consumption. Breastfeeding is also considered a protective factor. In Brazil, breast cancer control is a priority for the Unified Health System, which seeks to organize regional care networks to ensure early detection, diagnosis, and rapid treatment, contributing to the reduction of advanced cases and mortality. In addition, it is essential to promote prevention through the dissemination of information and encouragement of healthy practices. [8] In this

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context, the present study aims to carry out an integrative review of the literature to assess the impact of screening and early diagnosis of breast cancer on the treatment and prognosis of women diagnosed with the disease.

METHOD

Delimitation of the type of study

The present study consisted of an integrative literature review, as a method that encompasses the analysis of literature related to a given topic over time. This method allowed a detailed analysis of the phenomenon, taking advantage of accumulated knowledge and identifying gaps that require further investigation. [9]

The PICo strategy was used to define the theme and research question, with P representing the population, I

the phenomenon of interest and Co the context of the study. This approach structured the search in databases, resulting in the guiding question: what are the impacts of early treatment and diagnosis on the survival of women with breast cancer?

Search Engine, Databases and Inclusion Criteria

The integrative review was developed through research in national and international databases, including DECS, SciELO, PubMed and INCA. Excel software was used to create graphs, aiding in the interpretation of data. The search strategy combined specific descriptors and free terms to expand the identification and retrieval of articles, increasing the sensitivity of the search.

The analysis included articles in Portuguese and English, published between 2019 and 2023. The Rayyan software was used to manage and select studies, considering female patients with breast cancer as inclusion. Exclusions included benign neoplasms, breast cancer in men and pregnant women. The selection was carried out in a double-blind manner by two researchers, with conflicts resolved by a third researcher following the same criteria.

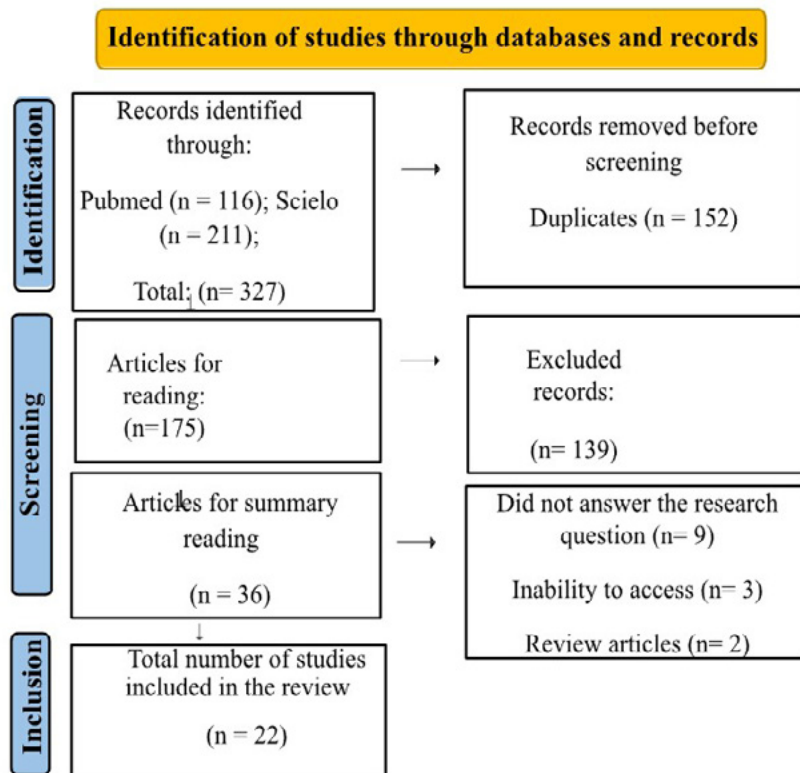| Table 1. Articles included in the integrative review according to the inclusion criteria. |
|---|
| SCIELO and PUBMED |
| Breast Cancer AND Early Diagnosis |
| Breast Cancer AND Treatment |
| Breast Cancer AND Prevention |
| Breast Cancer AND Diagnosis |
| Breast Cancer AND NOT Men |
| Breast Cancer AND NOT Pregnancy |

Source: From the authors, adapted to English 2023.

RESULTS

The table below presents the results of the articles selected based on the previously defined inclusion criteria, ensuring the relevance and quality of the studies. Each article meets the established parameters, such as year of publication, language, type of study, population investigated and relevance to the research question.

Flowchart for new systematic reviews that include searches of databases, protocols and other sources

Source: Adapted from Prisma, 2024.

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Table 2. Articles included in the integrative review according to inclusion criteria

	Title	Author	Public. Data	Objectives	Methodology	Main findings
EPIDEMIOLOGICAL STUDIE	Epidemiological and clinical characteristics of young patients with breast cancer in Brazil: a retrospective study [10]	Correa, B. D et al.	Dec 2023	To provide information on the epidemiological and genetic profile of young patients with breast cancer (BC) in Brazil.	The analysis of medical records assessed variables such as sociodemographic profile, tumor characteristics, mutational status, follow-up time, and interval between diagnosis and death	High rates of genetic mutations, more aggressive tumor characteristics, and the need for more radical surgical interventions in patients with mutations.
	Interurban spatial variability of mortality from breast and cervical cancer in the city of São Paulo: analysis of associated factors [11]	Aguiar, B. S. et al.	2023	To identify the spatial variability of mortality from breast and cervical cancer and evaluate factors associated with mortality from these cancers in the city of São Paulo.	Between 2009 and 2016, there were 10,124 deaths from breast cancer and 2,116 from cervical cancer in women aged 20 or over. The data were geocoded and aggregated by territory. Spatial regression models, with a Bayesian approach, analyzed the association between deaths and selected indicators..	Breast and cervical cancer mortality rates showed inverse patterns. Factors associated with breast cancer include commuting time to work (1-2h) and deaths in private hospitals, while cervical cancer mortality was influenced by shorter commuting time (half-1h), low household income, and a higher proportion of children under one year old.
	Trend in the mortality rate from breast cancer in women aged 20 years or older in Brazil, 2005-2019 [12]	Silva, G. R. P. et al.	Mar 2024	The objective is to analyze the trend in the mortality rate from breast cancer and its correlation with the socioeconomic development status in Brazil.	The ecological time-series study examined mortality data and the sociodemographic index (SDI) in the regions of Brazil, including 26 states and the Federal District, between 2005 and 2019, using data from the Mortality Information System, IBGE, and the Global Burden of Disease study.	The analysis revealed a positive correlation between the breast cancer mortality rate and the sociodemographic index (SDI). Between 2005 and 2019, there were 207,683 deaths, with an average mortality rate of 19.95 per 100,000 women in Brazil. The country, all regions, and 22 states showed an increasing trend in mortality, which was more pronounced in more developed regions.
	Title	Author	Public. Data	Objectives	Methodology	Main findings
DIAGNOSIS AND TRACKING	Breast Cancer Care Network Coordination: analysis in light of the lean philosophy for early diagnosis [13]	Gurgel, A. G. S. R. et al.	Aug 2023	Effects of educational intervention on knowledge and attitudes about early detection of breast cancerThe aim of this study was to analyze the application of lean philosophy in the Health Care Network (RAS) for the early diagnosis of breast cancer.	his case study, conducted between June and July 2019, used interviews, document analysis and observation for data collection. Developed in the city of the Northern Metropolitan Region, CE, Brazil, it involved three points of the RAS: Basic Health Unit, Medical Specialties Center and Polyclinic.	The main findings in this sector point towards improving the organization of work processes and reducing user waiting times. This inference corroborates a study on user waiting times in a health unit for routine consultations, in which they applied the lean value stream mapping tool
	Delays in breast cancer diagnosis among young women: emphasis on health professionals [14]	Costa, L. et al.	Dec 2023	To discuss the challenges and consequences associated with late diagnosis of breast cancer in young women (BCYW). It seeks to understand how these delays can lead to worse outcomes for these patients and proposes strategies to minimize such delays.	The article examines factors that lead to late diagnosis of breast cancer in young women, addressing the role of health professionals and the causes of delays. It discusses the consequences of this delay and proposes strategies to increase awareness, train professionals and establish clear guidelines.	Late diagnosis of breast cancer in young women results in more advanced stages and worse prognoses. Differences in health systems between countries affect the consequences. Delays are caused by lack of awareness and failures in early detection. The study proposes increased awareness, education of professionals and improved screening strategies for young people.

	Breast cancer care based on suspicion in primary health care in the cities of São Paulo and Campinas, Brazil[15]	Castro, C.P. et al.	Feb 2022	The aim of this study is to identify factors that influence the suspicion of breast cancer (BC) in primary health care (PHC) and that lead to referral to specialized care (SC) in the cities of São Paulo and Campinas.	The study interviewed 664 women with breast cancer, 353 from São Paulo and 311 from Campinas, referred to specialized care by primary care. A multilevel logistic regression analysis was performed to identify associations between the suspicion of breast cancer in primary care, socioeconomic variables, and cancer care.	A higher level of education and payment for medical consultations reduced the chance of suspected breast cancer (BC), while clinical breast examination and request for the first mammogram in primary care increased this chance.
	Profile of Hereditary Breast and Ovarian Cancer Screening Syndrome in Women Diagnosed with Breast Cancer in the Southwest of the State of Paraná[16]	Moura, J. B. et al.	2021	This study assessed the risk of hereditary breast and ovarian cancer syndrome (HBOC) in breast cancer patients using the Family History Screening 7 (FHS-7) instrument, a validated, low-cost, high-sensitivity questionnaire capable of screening the risk of HBOC in the population.	The study analyzed responses to the ESF-7 from 101 women with breast cancer treated by the Unified Health System in the 8th Health Region of Paraná. Data were processed using IBM SPSS Statistics, version 25.0.	The risk of HBOC was 19.80%, with patients presenting aggressive tumor characteristics, such as high-grade tumors (30%), angiolymphatic emboli (35%), and premenopausal diagnosis (50%). There was a significant association between high-grade tumors and diagnosis before age 50 (p=0.003). The findings suggest a possible familial inheritance linked to worse clinical characteristics, highlighting the usefulness of low-cost instruments, such as the ESF-7, in the investigation of HBOC..
DIAGNOSIS AND TRACKING	Breast cancer screening: model for improving access through the use of mobile mammograms[17]	Cunha, G. N. et al.	2019	To investigate the impact of the combined use of fixed and mobile mammograms to streamline the management of breast cancer screening programs in order to expand coverage to the population.	A study using an agent-based computational model simulated breast cancer screening coverage in the mountainous region of Rio de Janeiro. The number of mammograms and daily exams needed to cover 100% and 60% of the population in the 2015-2016 biennium was estimated, using 22 fixed mammograms.	To achieve 60% mammogram coverage in the mountainous region in two years, eight mammograms would be needed (five fixed and three mobile). For 100% coverage, seven fixed and four mobile mammograms would be needed. In the 2015-2016 biennium, actual coverage was 36.4%, with 22 mammograms performing four exams per day.
	Recommendations from the Brazilian College of Radiology and Diagnostic Imaging, the Brazilian Society of Mastology and the Brazilian Federation of Gynecology and Obstetrics Associations for breast cancer screening in Brazil[18]	Urban, L. A. B. D. et al.	Jul/Aug 2023	To present the updated recommendations of the Brazilian College of Radiology and Diagnostic Imaging, the Brazilian Society of Mastology, and the Brazilian Federation of Gynecology and Obstetrics Associations for breast cancer screening in Brazil.	Searches for scientific evidence were conducted in the Medline (PubMed), Excerpta Medica (Embase), Cochrane Library, Ebsco, Cinahl, and Lilacs databases between January 2012 and July 2022. The recommendations were formulated based on this evidence, by consensus of a committee of experts from three entities.	Annual mammographic screening is recommended for women at normal risk between the ages of 40 and 74, and after the age of 75, only for those with a life expectancy of more than seven years. Women at higher risk, such as those with dense breasts, a history of atypical breast conditions, previous treatment for breast cancer, or genetic mutations, should receive individualized complementary screening. Tomosynthesis, an evolution of mammography, is recommended when available.
	Procrastination in early detection of breast cancer[19]	Pinheiro, C. P. et al.	May 2019	To analyze the meaning of postponing breast cancer detection, based on interviews with 26 women who underwent mastectomy.	Qualitative study based on symbolic interaction, with Content Analysis in the thematic modality, carried out in a public service outpatient clinic, in a capital city in the Brazilian Northeast.	Before the participants' reports, the theme 'meanings attributed to procrastination of breast health care' emerged. The meaning given by women to the reasons for postponing breast care permeates the interfaces between personal reasons and difficulties encountered in the Health Care Network. It is considered that early detection is delayed by fear of diagnosis, personal and cultural barriers and difficulties in health services.

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	Title	Author	Public. Data	Objectives	Methodology	Main findings
DIAGNOSIS AND TRACKING	Early detection and prevention of breast cancer: knowledge, attitudes and practices of professionals from the Family Health Strategy in a medium-sized city in Minas Gerais, Brazil [20]	Ferreira, M. C. M. et al.	Oct 2023	To investigate the knowledge, attitudes, and practices (KAP) of ESF professionals regarding the control of BC recommended by the Ministry of Health and its association with sociodemographic and educational characteristics.	The cross-sectional study, conducted in 2019 with doctors and nurses from the ESF in Juiz de Fora (MG), used a structured self-administered questionnaire. The data were analyzed using descriptive statistics, the chi-square test, and Fisher's exact test.	The study identified important gaps in the continuing education process of ESF professionals, resulting in limits for the control of BC. This assessment enables more targeted health actions and better planning to address BC.
	Breast cancer control in the state of São Paulo: an evaluation of mammographic screening [21]	Fayer, V. A. et al.	Jan - Mar 2020	To estimate mammogram coverage and analyze the quality and compliance with national technical guidelines for mammography screening in women living in the Metropolitan Region or State Interior of São Paulo, between 2010 and 2012.	A descriptive study was conducted using data from SIS-MAMA and SIA-SUS for the period 2010 to 2012.	The results highlight the need to adjust breast cancer screening in São Paulo, focusing on implementing organized screening and improving the health information system to monitor and evaluate actions, strengthening the National Policy for Breast Cancer Prevention and Control.
	Effects of educational intervention on knowledge and attitude towards early detection of breast cancer [22]	Alves, P. C. et al.	April 2019	To compare women's knowledge and attitudes regarding early detection of breast cancer, before and after the application of an educational intervention.	The quasi-experimental study involved 91 women divided into four groups for health education. The intervention consisted of a brochure on early detection of breast cancer, accompanied by a brief motivational interview.	The educational intervention associated with the brief motivational interview promoted an increase in the adequacy of knowledge (p=0.001) and attitude (p=0.007). The educational intervention was able to increase the percentage of adequacy of women's knowledge and attitudes regarding early detection of breast cancer.
	Title	Author	Public. Data	Objectives	Methodology	Main findings
TREATMENT	Factors associated with the time of initiation of the first breast cancer treatment [23]	Jomar, R. T et al.	July 2023	To investigate factors associated with the time to undergo the first treatment for breast cancer in healthcare facilities authorized for high complexity oncology within the scope of the Unified Health System (SUS) in Rio de Janeiro.	This retrospective study investigated the factors associated with the time until the first treatment for breast cancer in 12,100 cases treated in high complexity oncology healthcare units of the SUS in Rio de Janeiro, between 2013 and 2019.	Women without a previous diagnosis, with a high level of education and stage III/IV were less likely to receive treatment after 60 days. Those with a history of diagnosis, age ≥50 years, non-white race/color and stage I were more likely to be delayed, while high level of education and treatment outside the capital reduced this time.
	Factors associated with the time to breast cancer treatment during the pandemic: observational study [24]	Silva, D. M et al.	Aug 2023	To analyze the factors associated with the time to surgical treatment of breast cancer in patients treated at a reference mastology outpatient clinic in the state of Ceará.	Analytical, longitudinal study conducted with medical records from the Mastology Outpatient Clinic of the Assis Chateaubriand Maternity School.	The study showed associations between education level and shorter time to treatment in patients who underwent biopsy before the first outpatient consultation. Lower educational level, type of tumor and use of neoadjuvant therapy were factors associated with time to treatment during the pandemic period.

	Title	Author	Public. Data	Objectives	Methodology	Main findings
TREATMENT	Frequency and factors associated with delay in breast cancer treatment in Brazil, according to data from Oncology, 2019-2020 [25]	Nogueira, M. C et al.	Mar. 2023	To analyze the delay in treatment and the flow of care for women with breast cancer in Brazil in 2019 and 2020.	The follow-up study of breast cancer cases analyzed the variables associated with delay (>60 days) in the start of treatment, using the chi-square test and multilevel logistic regression	In 2019, 54.5% of breast cancer cases presented delay in treatment, reducing to 48.7% in 2020. The Southeast region had the highest proportion of delays, especially when treatment occurred outside the municipality of residence. Most external flows were directed to capitals of the same Federation Unit.
DIAGNOSIS AND TREATMENT	Title	Author	Public. Data	Objectives	Methodology	Main findings
	Social vulnerability and breast cancer: differences in the interval between diagnosis and treatment in women with different sociodemographic profiles [26]	Cabral, A et al.	Feb 2019	The objective of the study was to identify sociodemographic profiles of women with breast cancer in Belo Horizonte and to verify the association with the interval between diagnosis and treatment.	A cross-sectional study was conducted using data from hospital cancer records of 715 women undergoing treatment from 2010 to 2013. The profiles were outlined based on the variables: age, race/skin color, education, and cost of treatment using the Two-Step cluster method. The independent association between the profiles and the diagnosis/treatment interval was estimated by multinomial logistic regression.	Profiles B, C, D, and E were associated with longer diagnosis/treatment intervals regardless of the stage of cancer at diagnosis, with E (black race/skin color, education <8 years, SUS treatment) showing a 37 times greater chance of an interval. Even after overcoming the barriers to accessing the oncology unit, socially vulnerable profiles presented a longer wait for treatment.
	Indications for breast magnetic resonance imaging at a reference center for breast cancer diagnosis and treatment in Brazil [27]	Ferreira, S. S et al.	April 2020	This study aims to describe the profile of indications for breast magnetic resonance imaging (MRI) in a referral hospital for breast cancer.	Retrospective descriptive study of medical requests for exams and questionnaires from women who underwent breast MRI at a referral center for the diagnosis and treatment of breast cancer between 2014 and 2018.	The most frequent indication was to complement mammography/ultrasound (43.6%), followed by breast cancer staging (25.1%), screening of high-risk patients (17.4%), evaluation of implants (10.1%) and evaluation of response to neoadjuvant chemotherapy treatment (3.8%).
	Time for diagnosis and treatment of breast cancer in public and private healthcare [28]	Campos, A. A. L et al.	May 2022	To analyze the time for diagnosis and treatment of breast cancer and associated factors, according to the type of care (public vs. private).	Retrospective cohort study with 477 women diagnosed with breast cancer between 2014-2016. Data were collected in an oncology service in a city in Minas Gerais, between 2018-2019. The analyses were performed using the Kaplan-Meier method and the Cox regression model.	The median time for diagnosis was 70 days, being shorter for those who discovered the disease through screening tests and diagnosed in the early stages. The median time for treatment was 32 days, being shorter for women assisted by the private network, with a high level of education and diagnosed in the early stages.
MOLECULAR	Title	Author	Public. Data	Objectives	Methodology	Main findings
	Germline molecular data in hereditary breast cancer in Brazil: lessons from a large single-center analysis [29]	Sandoval, R, L et al.	Feb 2021	The aim of this study was to determine the prevalence of germline pathogenic variants (PVs) in Brazilian patients with breast cancer (BC) undergoing genetic counseling and genetic testing at a Tertiary Oncology Center.	The retrospective study analyzed medical records of Brazilian patients with breast cancer referred for genetic counseling and genetic testing at a Tertiary Oncology Center between August 2017 and August 2019.	Pathogenic variants (PVs) were identified in 13 different genes in 20.5% of patients (46/224). Of these, 61% presented PVs in high-penetrance genes, such as BRCA1/2, TP53, and PALB2. In addition, 15.2% of PVs were in moderate-penetrance genes, such as ATM and CHEK2. The study suggests the use of a multigene panel as a diagnostic approach due to the high prevalence of PVs. Enviar feedback

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MOLECULAR	A novel lncRNA derived from an ultraconserved region: lnc-uc.147, a potential biomarker in luminal A breast cancer[30]	Zambalde, E. P et al.	Aug 2021	To investigate transcriptionally active ultraconserved regions (T-UCRs) and their association with clinical features in breast cancer (BC), to understand their potential role as biomarkers and their impact on cancer progression.	Identification of T-UCRs related to clinical features in breast cancer using TCGA data. 0b.	A total of 302 T-UCRs related to clinical features in breast cancer were found. A total of 19 proteins that interact with lnc-uc.147 were identified, and a high correlation was observed between lnc-uc.147 and the expression of neighboring genes, as well as with the microRNAs miR-18 and miR-190b.
	Dietary intake of advanced glycation end products and bioactive compounds in cancer prediagnosis[31]	Brasil, M. L. C et al.	Oct 2022	The aim of this study was to evaluate the association between pre-diagnostic dietary intake of advanced glycation end products (AGEs) and bioactive compounds and their relationship with the primary location of cancer.	This was an observational cross-sectional study with a sample of 80 individuals undergoing cancer treatment at the Hospital Nossa Senhora das Dores in Ponte Nova, Minas Gerais.	The breast and colon/rectum were the most prevalent primary locations. Meat, eggs, oils, and fats contributed to the intake of AGEs. The sample had a low intake of polyphenols and carotenoids, and a higher intake of flavonoids among women. A negative correlation was observed between the consumption of AGEs and total polyphenols/phenolic acids.

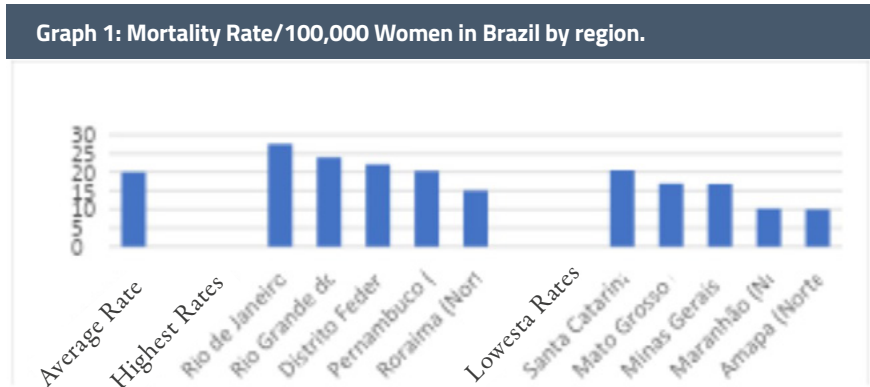Source: Prepared by the authors.

EPIDEMIOLOGY:

Although the trend was upward in all regions, the greatest growth was observed in the Northeast and North regions. Results from other studies show that the Northeast is characterized by increasing rates of breast cancer mortality, while the South and Southeast regions show decreasing trends in rates. [12]

Graph 1: Mortality Rate/100,000 Women in Brazil by region.

SOURCE: Prepared by the authors, based on the findings of the review carried out.

The study reveals that, in the case of breast cancer (BC) mortality, areas with lower socioeconomic levels have a lower risk of mortality, while areas with higher socioeconomic levels are associated with a higher risk. A previous study by Pereira and Schwanen indicated that, in Brazil, the poorest population spends more time commuting, and the present study found that commutes of one to two hours are inversely associated with BC mortality. In addition, the proportion of women responsible for the household also showed a negative relationship with mortality. Analysis of the demographic census indicated that, in households with women responsible, many of them lived without a partner and with low income, a situation that has improved over time, but still impacts health. [11]

Diagnosis and Tracking

According to the Ministry of Health protocol, there is no recommendation for mammographic screening in women under 50 years of age, since, in this age group, the greater breast density and lower sensitivity of mammography can result in false positives, generating unnecessary interventions and increased costs, with no proven impact on reducing mortality. Increased frequency also has no benefits, only exposing women to greater risks and creating unnecessary burdens for the SUS. [20]

Regarding the use of ultrasound in breast cancer screening, the Ministry of Health issues a strong recommendation against its use, whether alone or in conjunction with mammography, due to the lack of evidence regarding its effectiveness. Despite this, 58.3% of the professionals interviewed recommend ultrasound, generating additional costs to the SUS without any benefits in reducing mortality. Regarding the clinical breast exam, more than 90% of professionals perform it during the preventive exam, but there is no official recommendation for the use of the exam as a screening test, since there is no evidence regarding its effectiveness in reducing mortality from breast cancer. [20]

Clinical breast examination, however, is an important diagnostic tool in

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cases where the disease is already symptomatic. [12] Cases with a history of previous stage I BC diagnosis were more likely to undergo first treatment within >60 days, while those in stage IV were less likely. [23]

The definition of the age group, considering the coverage of the target population, is a critical factor for early detection actions of BC, and deserves to be discussed by policy makers, managers and health professionals working at all levels of care, as well as by scholars and the medical community. Therefore, there are weaknesses in this process, especially in the organization of a line of care that ensures the user comprehensive care with timely diagnosis and treatment. The request for mammography as a screening exam is identified as a key procedure for the entry of women into the oncology care network by the PHC. [15]

Early treatment

Breast cancer is one of the leading causes of death among women in Brazil, and early treatment is crucial to increase the chances of a cure and quality of life. Law 12.732/2012 requires that treatment begin within 60 days of diagnosis, but there are difficulties in meeting this goal, and factors that cause delays are common. Studies highlight the need for rapid diagnosis and treatment, and for interventions to reduce inequalities in access, especially benefiting vulnerable groups. It is essential to strengthen public policies to ensure adequate and equitable treatment, taking into account sociodemographic factors. [23-24-25]

Molecular Aspects

Breast cancer is a complex and heterogeneous disease characterized by a variety of molecular alterations that influence its development, progression and response to treatment. Understanding the molecular aspects of breast cancer is essential for diagnosis, prognosis and choice of the most effective treatment. Breast cancer is marked by a diversity of molecular alterations that influence its biology and clinical behavior. Understanding these molecular aspects has allowed personalized treatment, with targeted therapies that specifically address the alterations present in each tumor, improving clinical outcomes and patients' quality of life. [29]

Germline Pathogenic Variants (PVs)

The study reveals that 20.5% of patients with hereditary breast cancer in Brazil have germline pathogenic variants in 13 different genes. The most important include BRCA1/2 (8.5% of patients), which increase the risk of breast cancer and other types, with a prognosis often reserved due to the aggressiveness of the tumors; TP53 (3.5%), associated with aggressive and high-grade tumors; PALB2 (0.5%), linked to an increased risk and unfavorable prognosis; and moderately penetrant genes, such as ATM and CHEK2, which also increase the risk, but to a lesser extent. [29]

Transcriptionally Active Ultraconserved Regions (T-UCRs) and lncRNA uc.147

The lncRNA uc.147, found at high levels in the luminal A subtype, is a biomarker of poor prognosis, associated with cancer progression, shorter survival, and greater tumor aggressiveness. Genes such as BRCA1/2, TP53, and PALB2, together with regulatory molecules such as lncRNA uc.147, are linked to poor prognosis in breast cancer. The inclusion of multiple genes in genetic testing panels is recommended due to the importance of pathogenic variants other than BRCA1/2. [30]

DISCUSSION

Breast cancer is a multifactorial disease associated with environmental factors (exposure to radiation, toxic gases and pathogenic microorganisms), behavioral factors (physical inactivity, inadequate eating habits, smoking and excess weight), reproductive and hormonal history (early menarche, nulliparity, late pregnancy, late menopause, use of hormonal contraceptives and hormone replacement therapy) and genetic factors (family history and mutations in the BRCA1 and BRCA2 genes). In addition, aging is a relevant factor, contributing to the increase in breast cancer, especially in countries such as Brazil. [12]

Since 2012, the concentration of screening mammograms in women aged 50 to 69 has increased, reaching 65.9% in 2022, compared to 52.8% in 2012. This age group is recommended for biennial screening, as it offers the best balance between benefits and risks, according to the Guidelines for Early Detection of Breast Cancer in Brazil. Scientific evidence shows that screening in this age group reduces mortality from breast cancer, which justifies the focus on expanding coverage among women in this age group. [32]

Although access to health services in capital cities is generally better, access data may be overestimated due to biases related to self-reporting and lack of specificity regarding the type of mammogram. The 2019 National Health Survey (PNS) indicates that mammography coverage in Brazil is 58.3%, with regional variations, being higher in urban areas (60.5%) and lower in rural areas (41.6%). Coverage also varies according to level of education and race/color, with uneducated women having significantly lower access, especially in the North Region, and women of mixed race/color having a lower proportion of exams. [32]

The interval between diagnosis and the start of treatment has been a concern in several countries. The Organization for Economic Cooperation and Development (OECD), in a study conducted between 2001 and 2004, recommended reducing this interval to at least seven to 30 days. A review indicated that periods of up to 60 days between diagnosis and the start of treatment, especially in the early stages, do not affect surviv-

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al. In 2014, the Brazilian Ministry of Health established this limit of 60 days. Delays were more common among non-white women, those with less than eight years of schooling, and those in the early stages of cancer. [21]

Biennial mammography screening for women aged 50 to 69 years offers benefits such as better prognosis, more effective treatment and lower associated morbidity, but it also presents risks, such as false-positive results that generate anxiety, false-negative results that cause a false sense of security, overdiagnosis and overtreatment. The success of these actions depends on essential pillars, such as informing and mobilizing the population, achieving coverage of the target population, guaranteeing access to timely diagnosis and treatment, ensuring the quality of the actions and continuously monitoring the results. [34]

CONCLUSION

The proposed study focuses on the relevance of early diagnosis and ongoing monitoring in the treatment of breast cancer, emphasizing how early detection, through exams such as mammography and self-examination, can increase the chances of effective treatment and improve the survival and quality of life of diagnosed women. However, limitations, such as the difficulty in standardizing the practice of self-examination due to constant changes in guidelines on how to perform it, must be considered. Understanding these factors is crucial for the implementation of more effective public health strategies aimed at preventing and combating breast cancer.

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