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Epidemiological Study of Mammography Examinations Conducted in the State of São Paulo Between 2018 and 2022

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ABSTRACT

Among all types of neoplasms, breast cancer is the most common in women worldwide, and there may be numerous causes for its development and progression. In Brazil, the state of São Paulo is the first breast cancer case; for early diagnosis, mammography is the screening test for the greatest contributor. The objective is to evaluate the epidemiological aspect of people who underwent mammography in the state of São Paulo in the years 2018 to 2022, through the SISCAN data. A descriptive epidemiological study was conducted using data obtained from the SISCAN system, made available by DATASUS. consisting of people who underwent mammography in the Southeast Region of Brazil, specifically in the state of São Paulo, between 2018 and 2022. A total of 2,130,819 mammogram examinations were performed, with female sex being the most affected. The age range searched was 50 to 54 years, and many people who performed the procedure did not present the presence of nodules, most of which presented with benign findings. It is concluded that it is necessary to invest in the primary prevention of breast cancer, with the idea that health should be aligned with society to improve the quality of screening programs for breast neoplasms.

Keywords: Breast Neoplasms; Mammography; São Paulo; SISCAN

Introduction

Cancer is one of the most significant diseases worldwide and is considered the second leading cause of death [1]. Recent data show that cancer resulted in 10 million deaths and an incidence of 19.3 million new cases in 2020 [1,2]. Among all types of cancer studied and published in health databases, breast cancer is the most prevalent among women globally, with approximately 2.3 million new cases, representing 11.7% of all cancers in 2020 [1]. In Brazil, it is estimated that for each year in the 2023–2025 triennium, there will be 73,610 new diagnoses of breast cancer, with an estimated risk of 66.54 cases per 100,000 women [3]. This marks an increase compared to previous years (2020–2022), during which the estimates were 66,280 new cases [4]. However, it is important to understand that breast neoplasia is characterized by the rapid and irregular proliferation of cells that form tumors in breast tissue. Affected cells usually originate in the ducts and lobules of the breast and gradually evolve into benign tumors or metastatic carcinomas [5,6]. Numerous factors contribute to the development or progression of breast and increase its risk. These include aging, family history, hormonal factors related to estrogen (late menopause, early menarche), and behavioral factors such as alcohol consumption, obesity, and physical inactivity [7,8]. Understanding these risk factors and preventive methods is essential for treatment, as the timing of diagnosis is crucial. Delays may lead to disease progression, making the treatment more challenging [9,10].

Treatment options vary according to the stage of the disease and are generally divided into two groups: local treatment, which includes surgery and radiotherapy; and systemic treatment, which encompasses chemotherapy, hormone therapy, and immunotherapy [9]. Routine screening ensures early detection, which is a key factor for treatment. Therefore, different types of diagnostic tests are available for breast cancer, including mammography, ultrasound, biopsy, breast MRI, and self-examination [11]. Among these tests, mammography is the primary screening tool for healthy individuals as there is insufficient evidence to suggest that other imaging tests significantly contribute to reducing breast cancer mortality [11]. Thus, this study aimed to evaluate the epidemiological aspects of individuals who underwent mammography in the State of São Paulo between 2018 and 2022. The specific objectives were to analyze the age groups most likely to undergo mammography, classify the types of mammography and breast cytopathology results, and identify the number of individuals who underwent mammography and breast cytopathology.

Materials & Methods

This was a descriptive epidemiological study, with data obtained through consultation with the SISCAN database, made available by DATASUS, accessed in March and April 2023. The study population consisted of individuals who underwent mammography in the Southeast Region of Brazil, specifically in the state of São Paulo, from 2018 to 2022. The collected data were organized into tables and graphs using Microsoft Excel for information consolidation. Since the data used were publicly available and did not include the identification of participants, there was no need to submit the study for review by the Research Ethics Committee (REC).

Results

From 2018 to 2022, in the state of São Paulo, which consists of 645 municipalities, 2,130,819 mammograms were performed (Table 1). Among the five regions (North, Northeast, Central-West, Southeast, and South), the Southeast ranks first in terms of mammography screenings. However, a decline in the number of mammograms was observed during the pandemic (2020), with 304, 581 examinations being performed. In January, there were 37,784 exams, and in February, there were 39, 710 exams, resulting in an approximate 63% decrease compared to 2019. An analysis of the data collected from the SISCAN platform showed that the highest number of mammograms was performed in 2022, an increase of 31.1% compared to the previous four years (Table 1).

Table 1: Distribution of mammograms performed between 2018-2022.

Variables	Frequency (N)	Percentage (%)
2018	419.531	19,7%
2019	486.026	22,8%
2020	304.581	14,3%
2021	415.758	19,5%
2022	504.923	23,7%

Note: Source: Cancer Information System. SISCAN, 2023.

The data presented in Table 2 provide an analysis of epidemiological variables regarding the performance of mammography in the state of São Paulo. The female sex was the most affected (n = 2,127,096, 99.8%). The highest number of cases was recorded in the 50–54 years age group (n = 92,111–18.2%), followed by the 55–59 years age group (17.5 %; n = 88, 509). The main clinical indication used as a diagnostic parameter was screening, accounting for 96.7% (n = 2,093,263) of the cases. Screening showed that 88.4% (n = 1,972,252) of the patients did not have breast nodules, while 11.6% (n = 259,940) had nodules. Mammography results are presented according to the BI-RADS classification, with most patients falling into category 2, indicating a benign finding. In addition to mammography, data from breast cytopathology were evaluated and obtained from the same database. Breast cytopathology analyses the morphological patterns of cells, observing alterations in the nucleus and cytoplasm, relating them to the patient's clinical history, and producing a report for diagnostic determination.

Table 2: Epidemiological and clinical variables of mammography performed in São Paulo, 2018-2022.

Variables	Number of cases				
Year	2018	2019	2020	2021	2022
Sex					
Female	418.832	485.254	304.03	415.036	503.944
Male	699	771	551	721	978
Age Group					
< 19 years	214	249	163	172	182
20 - 29 years	866	1.085	668	739	846
30 - 34 years	1.844	2.267	1.354	1.586	1.712
35 - 39 years	11.586	11.763	7.888	9.485	10.197
40 - 44 years	59.04	69.73	42.162	57.394	66.847
45 - 49 years	68.808	80.245	49.507	68.146	80.099
50 - 54 years	79.191	90.202	57.098	78.085	92.111
55 - 59 years	71.383	82.556	52.391	72.286	88.509
60 - 64 years	58.718	69.219	43.547	60.191	76.285
65 - 69 years	38.999	46.911	29.808	41.153	53.11
> 70 years	28.882	32.11	20.683	27.232	34.928
Unknown	0	4	1	100	97
Clinical Indication					
Diagnostic	6.949	10.251	6.926	7.615	7.093
Screening	412.582	476.068	298.102	408.681	497.83
Already Treated Breast Cancer	5.334	7.076	6.015	6.953	6.21
Nodule Presence					
Yes, right breast	10.864	14.29	10.617	12.828	13.918
Yes, left breast	11.907	15.545	11.028	13.979	14.994
Yes, both	5.312	7.116	4.982	6.553	7.099
No	391.448	449.466	278.8	383.626	468.912
Report					
Category 0	42.446	47.074	32.584	46.198	52.941
Category 1	126.285	138.858	79.618	103.278	123.12
Category 2	239.297	288.076	184.554	256.57	315.433
Category 3	7.743	8.319	5.854	7.137	8.03
Category 4	3.139	3.621	2.499	3.406	4.234
Category 5	539	731	586	831	851
Category 6	82	95	213	282	314

Note: Source: Cancer Information System. SISCAN, 2023.

The cytopathology exam analysis (Table 3) revealed a total of 6,321 exams performed, with 2022 showing the lowest activity compared to previous years, representing a decrease of 36.2% compared to 2019, which had the highest number of exams. In Table 4, it can be observed that 1% (n = 65) were male and 99% (n = 6,256) were female, with the highest number of examinations performed. The 40–49-year age group had the highest number of examinations, followed by individuals aged 50–54 years. The analysis of nipple discharge shows whether there is secretion from the breast. This evaluation revealed that the most prevalent aspect was unspecified (unknown),

followed by crystalline appearance. The material sent for analysis came from the left breast (n = 3,365, 53.2%) and 46.8% (n = 2,961) from the right breast. Clinical examination of the breasts showed that most nodule characteristics were unspecified (n = 2,745–36.4%), followed by cystic characteristics (n = 2,396–31.8%). The cytopathology results indicated that most of the findings were benign. Cancer results from the failure of normal cells to proliferate and differentiate, caused by various genetic alterations that lead to malignant transformation. Therefore, the diagnosis and staging of breast neoplasia involve imaging modalities, with mammography being the primary method for screening and diagnosis. It consists of a two-dimensional imaging set based on identifying suspicious morphological findings, such as the size and location of the lesion [12].

Table 3: Distribution of cytopathology exam performed between 2018-2022.

Variables	Frequency (N)	Percentage (%)
2018	1.422	22,5%
2019	1.609	25,5%
2020	1.112	17,6%
2021	1.152	18,2%
2022	1.026	16,2%

Note: Source: Cancer Information System. SISCAN, 2023.

Table 4: Variáveis epidemiológicas e clínicas da realização da citopatologia da mama em São Paulo, 2018-2022.

Variables	Number of cases				
Year	2018	2019	2020	2021	2022
Sex					
Female	1.407	1.593	1.103	1.139	1.014
Male	15	16	9	13	12
Age Group					
< 19 years	46	74	36	35	24
20 - 29 years	156	168	124	108	100
30 - 34 years	120	158	89	87	65
35 - 39 years	169	166	125	122	117
40 - 44 years	198	236	134	164	157
45 - 49 years	226	261	150	186	146
50 - 54 years	172	181	150	153	131
55 - 59 years	111	124	78	102	84
60 - 64 years	76	83	92	78	96
65 - 69 years	70	60	69	58	50
> 70 years	78	93	65	60	56
Sample					
Right breast	681	740	502	534	504
Left breast	741	869	611	622	522
Nipple Discharge					
Clear	480	557	393	356	311
Hemorrhagic	125	176	132	103	119
Unknown	817	876	588	693	596
Nodule Type					
Solid	461	485	270	238	200
Solid-cystic	96	145	183	183	135
Cystic	294	349	183	200	164
Unknown	571	630	484	533	527

Cytopathological Report					
Positive for malignancy	56	61	61	60	51
Suspicious for malignancy	38	80	82	92	80
Indeterminate for malignancy	9	9	5	20	18
Benign	665	675	439	533	441
No abnormalities	592	704	475	395	394
Unsatisfactory	62	80	52	55	42

Note: Source : Sistema de Informação do Câncer. SISCAN, 2023.

In 2022, mammography saw a significant increase compared to the previous four years. One of the main reasons for this increase was the COVID-19 pandemic that occurred in March 2020, during which many clinics and hospitals canceled examinations due to the overburdened healthcare system and concerns about virus transmission during examinations. Previous studies have shown that the number of new neoplasms decreased during the pandemic; however, this decline was primarily due to patients not presenting for screening, resulting in a misleading drop and diagnostic delays that could affect prognosis [3,4]. Even after the reopening of screening centers in 2021, the numbers remained lower than those in the years prior to the pandemic [5]. The largest age group seeking mammography in our study was 50–59 years old, consistent across all analyzed years, reflecting the target population recommended by the Ministry of Health [6]. The Ministry's age recommendation aligns with studies indicating that many women aged 40-49 may experience more false positives and face additional harm, including the need for imaging examinations and biopsies to detect additional cases of invasive breast cancer [6,7]. Therefore, although mammography is not indicated for screening women under 50 years of age, it is recommended at younger ages for high-risk women [8]. In our study, the mammography results recorded in the reports showed BI-RADS classification, indicating a high likelihood or confirmation of cancer. Most cases were diagnosed in categories 1 or 2, which have remained unchanged in recent years, especially during the pandemic.

A study conducted in the public health system of Campinas from 2019 to 2020 reported that staging characteristics did not differ between periods, and rates of early breast neoplasia were slightly higher during COVID, but not significantly [9]. In a study in Italy conducted in 2020, it was estimated that in six months, around 6,000 individuals progressed from stage 1 to stage 2, and approximately 600 progressed from stage 2 to stage 3 [10]. We investigated the distribution and variables of breast cytopathology, with cytological diagnosis primarily made through fine-needle aspiration (FNA). The procedure involves preparing a thin smear of aspirated material and contributes significantly to the diagnosis of superficial and deep lesions as well as neoplastic and non-neoplastic lesions [11]. Breast cytopathology procedures showed the highest frequency in 2019, with a decline in subsequent years. This decrease is attributable to the COVID-19 pandemic that began in March 2020, which consequently reduced the number of procedures, favoring symptomatic patients [12]. In our study, there was a numerically higher proportion of material sent from the left side than from the right side. This is consistent with another study conducted in Afghanistan, which also found a higher prevalence on the left side, suggesting that the likely reason for breast nodules occurring more often on the left side is that the left breast is larger and has denser tissue, especially in the upper outer quadrant [13]. Currently, patients with nipple discharge undergo triple assessment (clinical evaluation, imaging, and pathology), which may include cytopathology, prepared as a sample from the nipple [14].

In our study, nipple discharge examinations and nodule types were classified as non- specific. Cytopathology reports showed that most of the results were positive for benign lesions. This is consistent with a study in Afghanistan that demonstrated that most breast lesions were benign tumors and cystic changes [13]. One limitation of our study was the variable number across each category, as SISCAN has not yet been fully implemented in all states and municipalities [14-25]. Therefore, the analysis of the presented results should be performed critically, as the values may not correspond to the totality of exams and users examined in the public health system, given the lack of information from services that have not yet adopted SISCAN.

Conclusion

The results of this study indicate that less than half of the population in the state of São Paulo is undergoing mammography, which is one of the recommended methods for diagnosing breast cancer but has not been widely discussed. The low rate of examinations highlights a lack of campaigns and health sector guidance regarding the disease, even though mammography is available free of charge to the population through the Ministry of Health. In this context, it can be said that despite breast cancer being a significant concern in both national and global scenarios and having annual campaigns for visibility and dissemination of information regarding the disease, the health sector must also align more closely with society to improve the quality of breast cancer screening programs. Thus, in addition to free access, annual follow-ups, information, and encouragement from responsible sectors should be increasingly emphasized, promoting better quality of life and control over breast cancer, avoiding late diagnoses, and higher mortality rates.

Conflict of Interest

No conflict of interest was declared by the authors.

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References

1. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, et al. (2021) Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA cancer j Clin 71(3): 209-249.
2. Dib RV, Gomes AMT, Ramos R de S, França LCM, Paes L da S, et al. (2022) Pacientes com Câncer e suas Representações Sociais sobre a Doença: Impactos e Enfrentamentos do Diagnóstico. Rev Bras Cancerol 68: 3.
3. Santos M de O, Lima FC da S de, Martins LFL, Oliveira JFP, Almeida LM de, et al. (2023) Estimativa de Incidência de Câncer no Brasil, 2023-2025. Rev Bras Cancerol 69: 1.
4. BRASIL, Ministério da Saúde (2019) Instituto Nacional de Câncer José Alencar Gomes da Silva. Estimativa 2020: Incidência de câncer no Brasil. INCA 120.
5. Rodrigues JD, Cruz MS, Paixão AN (2015) Uma análise da prevenção do câncer de mama no Brasil [An analysis of breast cancer prevention in Brazil]. Ciênc saúde coletiva 20(10): 3163-3176.
6. Jayanthi VSPKSA, Das AB, Saxena U (2020) Grade-specific diagnostic and prognostic biomarkers in breast cancer. Genomics 112(1): 388-396.
7. Sun YS, Zhao Z, Yang ZN, Xu F, Lu HJ, et al. (2017) Risk Factors and Preventions of Breast Cancer. Int j biol chem sci13(11): 1387-1397.
8. Boaventura LF, Cima BP, Lindenau JDR (2022) Quanto você Sabe sobre Câncer de Mama? Avaliação do Nível de Conhecimento da População Brasileira. Rev Bras Cancerol 68(4): e-233083.
9. Souza NHA de, Falcão LMN, Nour GFA, Brito JO, Castro MM, et al. (2017) Câncer de mama em mulheres jovens: estudo epidemiológico no nordeste brasileiro. Sanare 16: 2.
10. Wöckel A, Albert US, Janni W, Scharl A, Kreienberg R, et al. (2018) The Screening, Diagnosis, Treatment, and Follow-Up of Breast Cancer. Dtsch Ärztebl Int 115(18): 316-323.
11. Shamsi M, Pirayesh Islamian J (2017) Breast cancer: Early diagnosis and effective treatment by drug delivery tracing. Nuclear Medicine Review Central & Eastern Europe 20(1): 45-48.
12. Gilbert FJ, Pinker-Domenig K (2019) Diagnosis and Staging of Breast Cancer: When and How to Use Mammography, Tomosynthesis, Ultrasound, Contrast-Enhanced Mammography, and Magnetic Resonance Imaging. In: Hodler J, Kubik-Huch RA, von Schulthess GK (Eds.)., Diseases of the Chest, Breast, Heart and Vessels 2019-2022: Diagnostic and Interventional Imaging. Cham (CH): Springer, pp. 155-166.
13. Nazário ACP, Facina G, Filassi JR (2015) Breast cancer: News in diagnosis and treatment. Rev Assoc Med Bras 61(6): 543-552.
14. Freer PE (2020) The impact of the COVID-19 pandemic on Breast Imaging. Radiol. clin North America 59(1): 1-11.
15. Tachibana BMT, Ribeiro RL de M, Federicci ÉEF, Feres R, Lupinacci FAS, et al. (2021) The delay of breast cancer diagnosis during the COVID-19 pandemic in São Paulo, Brazil. Einstein 19: eAO6721.
16. Rocha AFBM, Freitas Junior R, Ferreira GLR, Rodrigues DCN, Rahal RMS, et al. (2023) COVID-19 and Breast Cancer in Brazil. Int j public health 68: 1605485.
17. Migowski A, Silva GA e, Dias MBK, Diz MDPE, SantAna DR, et al. (2018) Diretrizes para detecção precoce do câncer de mama no Brasil. II - Novas recomendações nacionais, principais evidências e controvérsias. Cad Saúde Pública 34(6): 2018.
18. Tiensoli SD, Felisbino Mendes MS, Velasquez Melendez G (2020) Health Iniquity, Unhealthy Behavior, and Coverage of Mammography in Brazil. Rev bras enferm 73 :e20200011.
19. BRASIL (2015) Ministério da Saúde. Instituto Nacional de Câncer José Alencar Gomes da Silva. Diretrizes para a detecção precoce do câncer de mama no Brasil. INCA, pp. 168.
20. Negrao EMS, Cabello C, Conz L, Mauad EC, Zeferino LC, et al. (2022) The COVID-19 Pandemic Impact on Breast Cancer Diagnosis: A Retrospective Study. Rev bras ginecol Obstet 44(09): 871-877.
21. Vanni G, Pellicciaro M, Materazzo, Valentina Bruno, Chiara Oldani, et al. (2020) Lockdown of Breast Cancer Screening for COVID- 19: Possible Scenario. *In Vivo* 34(5): 3047-3053.
22. Saha M, Mukherjee R, Chakraborty C (2016) Computer-aided diagnosis of breast cancer using cytological images: A systematic review. Tissue cell 48(5): 461-474.
23. Nicosia L, Bozzini A, Latronico A, Addante F, Mastropasqua MG, et al. (2021) COVID- 19 and breast fine needle aspiration cytology method: What should we change?. Cytopathology 32(3): 312-317.
24. Saadaat R, Abdul Ghafar J, Haidary AM, Rahmani S, Atta N, et al. (2020) Age distribution and types of breast lesions among Afghan women diagnosed by fine needle aspiration cytology (FNAC) at a tertiary care centre in Afghanistan: A descriptive cross-sectional study. BMJ Open10(9): e037513.
25. Jiwa N, Kumar S, Gandhewar R, Rishikesh Gandhewar, Hemali Chauhan, et al. (2022) Diagnostic Accuracy of Nipple Discharge Fluid Cytology: A Meta-Analysis and Systematic Review of the Literature. Ann Surg Oncol 29(3): 1774-1786.

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