

Patient Characteristics and Histopathological Features of Breast Cancer

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Abstract

Introduction: Breast cancer is a cause of morbidity and mortality among women. Histopathological features are important for tumor characterization. **Objective:** This study aimed to describe patient characteristics and histopathological features of breast cancer at MRCCC Siloam Semanggi Cancer Hospital in 2024. **Method:** This retrospective study used pathology records of patients diagnosed with primary breast cancer in 2024. A total of 243 of 281 patients met the inclusion criteria and were selected using purposive sampling. Variables included age, tumor location, histopathological type, and histopathological grade. Data were analyzed using univariate analysis and presented as frequencies and percentages. **Result and Discussion:** All patients were female (100%). The largest age group was 40–49 years, comprising 75 cases (30.9%), followed by 50–59 years (23.9%) and 60–69 years (20.2%). Tumors were located in the left breast (50.6%), followed by the right breast (47.7%) and bilateral breast (1.6%). Invasive ductal carcinoma of no special type was predominant (77.8%), while grade III was the most frequent grade (60.9%), indicating poorly differentiated tumors. **Conclusions:** Cases were most common among women aged 40–49 years, with left-sided tumors predominating. Invasive ductal carcinoma of no special type and grade III were predominant.

Introduction

Breast cancer is a major global public health problem and remains the most frequently diagnosed cancer among women (Bray et al., 2024); (Ferlay et al., 2021); (Smolarz et al., 2022). According to the World Health Organization (WHO), approximately 2.4 million women were diagnosed with breast cancer and 694,000 deaths were attributed to the disease worldwide in 2024. Breast cancer occurs in every country and can affect women at any age after puberty, although the risk increases with age (B Jackson et al., 2023). The continuing global burden of breast cancer highlights the importance of early detection, accurate diagnosis, appropriate treatment, and improved understanding of disease characteristics (World Health Organization, 2026); (Obeagu & Obeagu, 2024). The International Agency for Research on Cancer also reported that breast cancer accounted for more than 2.3 million new cases globally in 2022, making it the most commonly diagnosed cancer among women and one of the leading causes of cancer-related mortality (International Agency for Research on Cancer (IARC, 2024).

The burden of breast cancer is particularly important in low- and middle-income countries, where delayed diagnosis and unequal access to cancer services may contribute to poorer outcomes (Shidqi et al., 2022); (Narulita et al., 2025). In Indonesia, breast cancer is the most common cancer among women. GLOBOCAN 2022 estimated 408,661 new cancer cases and 242,988 cancer deaths in Indonesia, with breast cancer ranking first among cancers affecting women (IARC, 2024). The Indonesian Ministry of Health has consequently identified breast cancer as one of the priority cancers in the National Cancer Control Plan. Breast cancer also represents one of the major causes of cancer mortality in Indonesia, emphasizing the need for strengthening prevention, early detection, diagnosis, and treatment services (Ministry of Health of the Republic of Indonesia, 2026).

Breast cancer is a heterogeneous disease with substantial variation in morphology, biological behavior, prognosis, and response to treatment (Xiong et al., 2025). Histopathological examination plays an essential role in establishing the diagnosis and characterizing breast tumors (Cserni, 2020). Histological classification distinguishes breast carcinomas into in situ and invasive forms and includes several specific histological types (Probert et al., 2025). Among invasive breast carcinomas, invasive carcinoma of no special type is the most common histological category and is also commonly referred to as invasive ductal carcinoma (WHO, 2019). Histopathological grading is also clinically important because it reflects the degree of tumor differentiation and is associated with biological aggressiveness and prognosis. The Nottingham grading system evaluates tubule formation, nuclear pleomorphism, and mitotic activity to classify tumors into grades I, II, and III (Takahashi et al., 2020).

Although national and global cancer statistics provide important information regarding the burden of breast cancer, these data do not describe the specific characteristics and histopathological patterns observed in individual cancer referral centers. Differences in patient age distribution, tumor laterality, histological type, and histopathological grade may occur between populations and healthcare institutions (Aisha et al., 2025); (Naqia et al., 2025); (Novelyn & Simanjuntak, 2025). Differences in breast cancer laterality and its clinicopathological characteristics have also been reported in previous studies (Abdou et al., 2022); (Kim et al., 2022); (Al Saad et al., 2022). Therefore, institution-specific data are valuable for understanding local disease patterns and may provide supporting information for clinical services, pathology practice, epidemiological evaluation, and future research (Mula-Hussain, 2022)

At MRCCC Siloam Semanggi Cancer Hospital, breast cancer represents an important condition managed within a specialized cancer care setting. However, a comprehensive description of patient characteristics and histopathological patterns among breast cancer patients diagnosed at this institution during 2024 had not been specifically presented. This represents an important local evidence gap, particularly regarding the distribution of age, tumor location, histopathological type, and histopathological grade. Describing these characteristics may contribute to a better understanding of the profile of breast cancer cases managed at a specialized cancer hospital.

Therefore, this study aimed to describe the characteristics of patients and the histopathological features of breast cancer at MRCCC Siloam Semanggi Cancer Hospital in 2024. Specifically, the study described the distribution of patient age and tumor location and identified the predominant histopathological types and histopathological grades among patients diagnosed with primary breast cancer during the study period.

Method

This study employed a retrospective descriptive design to describe patient characteristics and histopathological features of breast cancer at MRCCC Siloam Semanggi Cancer Hospital, Jakarta. The study was conducted from March to December 2025 using secondary data obtained from anatomical pathology records of patients diagnosed with primary breast cancer during 2024. The study population consisted of 281 patients diagnosed with primary breast cancer based on histopathological examination. A total of 243 patients met the predetermined inclusion criteria and were included as study samples, while 38 patients were excluded because they did not meet the inclusion criteria or fulfilled the exclusion criteria. Purposive sampling was used for sample selection.

The inclusion criteria were patients with primary breast cancer diagnosed by histopathological examination in 2024, patients receiving their first breast cancer diagnosis, and patients with complete anatomical pathology records containing age, tumor location, histopathological type, and histopathological grade. Patients with secondary or metastatic breast cancer, recurrent breast cancer, or those who had received neoadjuvant therapy before tissue sampling were excluded. The variables assessed were age at diagnosis, tumor location, histopathological type, and histopathological grade. Histopathological grade was classified into grades I, II, and III according to the Nottingham grading system based on tubule formation, nuclear pleomorphism, and mitotic activity. Data were retrospectively collected from anatomical pathology records while maintaining patient confidentiality and anonymity. The data were subsequently checked for completeness and consistency, coded, tabulated using Microsoft Excel, and analyzed descriptively using univariate analysis. Results were presented as frequencies and percentages.

Result and Discussion

1. Result

Univariate Distribution

The research results are presented in the form of frequency and percentage tables for each categorical variable.

Breast cancer patients by gender: All patients included in this study were female, comprising 243 patients (100%), with no cases identified among male patients (0%).

Table 1

Distribution of Breast Cancer Patients by Gender

Gender	Frequency (n)	Percentage (%)
Man	0	0
Women	243	100.0
Total	243	100

Breast Cancer Patients by Age: The age distribution showed that the 40–49-year age group was predominant, with 75 cases (30.9%), followed by the 50–59-year age group (23.9%) and the 60–69-year age group (20.2%). The age groups of <30 years and >89 years had the lowest proportions, each accounting for 0.4%.

Table 2

Distribution of Breast Cancer Patients by Age

Age (years)	Frequency (n)	Percentage (%)
<30	1	0.4
30-39	34	14.0
40-49	75	30.9
50-59	58	23.9
60-69	49	20.2
70-79	18	7.4
80-89	7	2.9
>89	1	0.4
Total	243	100

Breast Cancer Patients by Tumor Location: Based on the study findings, most breast cancer cases were located in the left breast (50.6%), followed by the right breast (47.7%) and bilateral involvement (1.6%).

Table 3

Distribution of Breast Cancer Patients by Tumor Location

Tumor Location	Frequency (n)	Percentage (%)
Bilateral	4	1.6
Dextra	116	47.7
Sinistra	123	50.6
Total	243	100

Breast Cancer Patients by Histopathological Type: The study findings showed that the most frequently identified histopathological type was Invasive Ductal Carcinoma No Special Type (IDC NST), accounting for 77.8% of cases.

Table 4
 Distribution of Breast Cancer Patients by Histopathological Type

Histopathological Type	Frequency (n)	Percentage (%)
Adenoid cystic carcinoma	1	0.4
Bilateral DCIS and Mixed	1	0.4
Bilateral IDC NST	3	1.2
DCIS	18	7.4
IDC NST	189	77.8
Invasive lobular carcinoma	3	1.2
Mucinous carcinoma	4	1.6
Neuroendocrine carcinoma	1	0.4
Papillary invasive carcinoma	1	0.4
Phyllodes maligna	1	0.4
Mixed type	21	8.6
Total	243	100

Breast Cancer Patients by Histopathological Grade: Grade III breast cancer cases predominated in this study, accounting for 60.9% of cases, indicating that the majority of tumors were poorly differentiated.

Table 5
 Distribution of Breast Cancer Patients According to Histopathological Grad

Histopathological Grade	Frequency (n)	Percentage (%)
Grade I	8	3.3
Grade II	79	32.5
Grade III	148	60.9
Unknown	8	3.3
Total	243	100

Cross-Tabulation

This analysis was conducted to describe the distribution patterns between variables without aiming to test statistical associations.

Breast Cancer Patients by Histopathological Type and Age

Table 6
 Distribution of breast cancer patients according to histopathological type and age (1).

Histopathological Type	< 30		30-39		40-49		50-59	
	n	%	n	%	n	%	n	%
Adenoid cystic carcinoma	0	0	0	0	0	0	0	0
Bilateral DCIS and Mixed	0	0	0	0	1	0.4	0	0
Bilateral IDC NST	0	0	1	0.4	1	0.4	0	0
DCIS	0	0	1	0.4	4	1.6	3	1.2
IDC NST	1	0.4	27	11.1	61	25.1	45	18.5
Invasive lobular carcinoma	0	0	0	0	1	0.4	1	0.4
Mucinous carcinoma	0	0	1	0.4	0	0	0	0
Neuroendokrin carcinoma	0	0	0	0	0	0	0	0
Papillary invasive carcinoma	0	0	0	0	0	0	1	0.4
Phyllodes maligna	0	0	0	0	0	0	1	0.4
Mixed type	0	0	4	1.6	7	2.9	7	2.9
Total	1	0.4	34	14.0	75	30.9	58	23.9

Table 7
 Distribution of breast cancer patients by histopathological type and age (2)

Histopathological Type	70-79		80-89		>89		Total	
	n	%	n	%	n	%	n	%
Adenoid cystic carcinoma	0	0	0	0	0	0	1	0.4
Bilateral DCIS and Mixed	0	0	0	0	0	0	1	0.4
Bilateral IDC NST	1	0.4	0	0	0	0	3	1.2
DCIS	7	2.9	2	0.8	1	0.4	18	7.4
IDC NST	37	15.2	14	5.8	4	1.6	189	77.8
Invasive lobular carcinoma	1	0.4	0	0	0	0	3	1.2
Mucinous carcinoma	0	0	2	0.8	1	0.4	4	1.6
Neuroendokrin carcinoma	1	0.4	0	0	0	0	1	0.4
Papillary invasive carcinoma	0	0	0	0	0	0	1	0.4
Phyllodes maligna	0	0	0	0	0	0	1	0.4
Mixed type	2	0.8	0	0	0	0	21	8.6
Total	49	20.2	18	7.4	7	2.9	243	100

Based on the cross-tabulation analysis between histopathological type and age group, Invasive Ductal Carcinoma No Special Type (IDC NST) was the most frequently observed histopathological type across all age groups, with the highest frequency among patients aged 40–49 years (61 cases; 25.1%), followed by those aged 50–59 years (45 cases; 18.5%) and 30–39 years (27 cases; 11.1%). Other histopathological types were also identified across several age groups. Ductal Carcinoma In Situ (DCIS) was most frequently observed among patients aged 60–69 years, with 7 cases (2.9%), while mixed histopathological types were most common in the 50–59-year age group, with 7 cases (2.9%). Meanwhile, less frequently observed histopathological types, including mucinous carcinoma, invasive lobular carcinoma, invasive papillary carcinoma, malignant phyllodes tumor, and adenoid cystic carcinoma, were identified in only one or two cases within specific age groups. These findings indicate that IDC NST was the predominant histopathological type across the age groups, particularly among patients aged 40–59 years.

Distribution of breast cancer patients based on histopathological type and grade

Table 8
 Distribution of breast cancer patients based on histopathological type and grade

Histopathological Type	Grade I		Grade II		Grade III		Unknown		Total	
	n	%	n	%	n	%	n	%	n	%
Adenoid cystic carcinoma	0	0	0	0	0	0	1	0.4	1	0.4
Bilateral DCIS and Mixed	0	0	0	0	0	0	1	0.4	1	0.4
Bilateral IDC NST	0	0	0	0	0	0	3	1.2	3	1.2
DCIS	1	0.4	3	1.2	14	5.8	0	0	18	7.4
IDC NST	4	1.6	64	26.3	121	49.8	0	0	189	77.8
Invasive lobular carcinoma	0	0	2	0.8	1	0.4	0	0	3	1.2
Mucinous carcinoma	2	0.8	2	0.8	0	0	0	0	4	1.6
Neuroendokrin carcinoma	0	0	0	0	0	0	1	0.4	1	0.4
Papillary invasive carcinoma	0	0	0	0	0	0	1	0.4	1	0.4
Phyllodes maligna	0	0	0	0	0	0	1	0.4	1	0.4
Mixed type	1	0.4	8	3.3	12	4.9	0	0	21	8.6
Total	8	3.3	79	32.5	148	60.9	8	3.3	243	100

The findings showed that nearly all histopathological types had their highest proportion in grade III, particularly Invasive Ductal Carcinoma No Special Type (IDC NST), which predominated with 121 cases (49.8%), followed by grade II with 64 cases (26.3%) and grade I with 4 cases (1.6%). Other histopathological types, such as Ductal Carcinoma In Situ (DCIS) and mixed types, also showed a similar tendency, with a higher distribution in grade III. Overall, grade III was the most common category across nearly all histopathological types in this study, indicating that a substantial proportion of cases had poor cellular differentiation and more aggressive tumor characteristics.

Breast cancer patients by age and histopathological grade

Table 9
Distribution of Breast Cancer Patients by Age Group and Histopathological Grade

Age (years)	Grade I		Grade II		Grade III		Unknown		Total	
	n	%	n	%	n	%	n	%	n	%
<30	0	0	0	0	1	0.4	0	0	1	0.4
30-39	2	0.8	10	4.1	21	8.6	1	0.4	34	14.0
40-49	1	0.4	23	9.5	49	20.2	2	0.8	75	30.9
50-59	2	0.8	13	5.3	41	16.9	2	0	58	23.9
60-69	1	0.4	17	7.0	29	11.9	2	0.8	49	20.2
70-79	2	0.8	11	4.5	5	2.1	0	0	18	7.4
80-89	0	0	4	1.6	2	0.8	1	0.4	7	2.9
>89	0	0	1	0.4	0	0	0	0	1	0.4
Total	8	3.3	79	32.5	148	60.9	8	3.3	243	100

Based on the distribution of age by histopathological grade, the 40–49-year age group had the highest number of cases, with 75 cases (30.9%), predominantly classified as grade III, accounting for 49 cases (20.2%). A similar pattern was observed in the 50–59-year and 60–69-year age groups, which were also predominantly classified as grade III, with 41 cases (16.9%) and 29 cases (11.9%), respectively. The 30–39-year age group had 21 grade III cases (8.6%), while the older age groups (70–79 years and ≥80 years) had fewer cases. Overall, grade III was frequently observed across nearly all age groups, indicating that a high histopathological grade was the predominant pattern among the breast cancer cases in this study

2. Discussion

Sex

The study findings showed that all breast cancer patients at MRCCC Siloam Semanggi in 2024 were female (100%), with no cases identified among male patients. This finding is consistent with the literature, which states that approximately 1% of breast cancer cases occur in men, while the remaining 99% occur in women. Unlike the other patient characteristics examined in this study, sex distribution in breast cancer reflects a well-established biological pattern rather than one shaped by referral pathways or institutional case-mix; the concordance between this cohort and global figures was therefore expected regardless of the tertiary referral status of the study site. Biologically, hormonal factors play an important role in the pathogenesis of breast cancer. Prolonged estrogen exposure is known to increase the risk of breast cancer. Estrogen can increase the production of several growth factors, such as transforming growth factor- α , platelet-derived growth factor, and fibroblast growth factor, which facilitate tumor cell proliferation through autocrine and paracrine mechanisms.

Estrogen and progesterone also contribute to the risk of breast cancer. Progesterone interacts with the PR-RANK-RANKL pathway, which activates mammary epithelial cell proliferation, and acts synergistically with estrogen in regulating the expression of growth-related genes. Estrogen and progesterone are produced by the ovaries, which play an important role in breast tissue development. Therefore, long-term exposure to estrogen and progesterone contributes to a hormonal environment that supports tumorigenesis

Age

The relatively close alignment between the present findings and those of Zuraidah (2023) may partly reflect a shared institutional character: both MRCCC Siloam Semanggi and Cipto Mangunkusumo Hospital function as major national referral centres in Indonesia, potentially receiving a broadly similar case-mix shaped by nationwide referral pathways for complex or advanced breast cancer. The modest divergence from Almohanna et al. (2025), conducted in a different country, may instead reflect differences in screening infrastructure, health-seeking behaviour, and healthcare system organisation that shape which patients are ultimately captured in hospital-based case series. As a tertiary comprehensive cancer centre receiving referrals from across the country, MRCCC Siloam Semanggi may preferentially see patients with more advanced or diagnostically complex presentations rather than a population-representative sample of all incident breast cancer cases, a consideration that should temper generalisation of the present age distribution beyond similar referral-based settings.

The higher incidence of breast cancer during the menopausal and postmenopausal periods is associated with longer lifetime exposure to estrogen, such as that resulting from early menarche or late menopause. Chronic estrogen exposure can cause continuous proliferation of breast epithelial cells, thereby increasing the risk of malignant transformation.¹⁸ The high incidence of breast cancer among women aged 45–55 years is associated with the menopausal transition, which causes hormonal changes, particularly a decline in progesterone. Progesterone modulates the rate of proliferation and survival of breast cell clones that have undergone initial mutations. Cells that have experienced genetic alterations may persist and subsequently proliferate again under postmenopausal hormonal stimulation

Tumor Location

Notably, unlike histopathological grade or type, tumour laterality is a parameter unlikely to be influenced by referral patterns or institutional case-mix, as there is no plausible clinical pathway by which more complex or advanced cases would be preferentially referred based on which breast is affected. The close alignment between the present findings and population-based SEER data therefore supports the interpretation that the observed left-sided predominance reflects a genuine biological phenomenon rather than a selection artefact of the tertiary referral setting. Kim et al. (2023) suggested that differences in embryological development and increased expression of mitogenic factors, such as heparin-binding epidermal growth factor (HB-EGF), accompanied by more prominent activation of the ErbB/HER2 pathway on the left side, may increase the susceptibility of the left breast to tumorigenesis. This difference in laterality may also be influenced by behavioral and anatomical factors. Right-hand dominance among most women may result in relatively less frequent use of the left breast during breastfeeding, potentially making pathological masses in the left breast more readily detectable. In

addition, the left breast generally has a larger tissue volume than the right breast, which may result in a greater amount of glandular tissue at risk of malignant transformation.

Histopathological Type

Invasive ductal carcinoma no special type (IDC NST) was the predominant histopathological type, accounting for 77.8% of all cases. This finding is consistent with the study by Ningsih (2022) in Palembang, which reported a proportion of 88.3%, and with the study by Probert (2025) in England, which reported 73.3%. Similarly, Budzik et al. (2021) in Warsaw reported that IDC NST was the most common histopathological type, accounting for 76.3% of all invasive breast cancers. The proportion of IDC NST across these studies ranged from 73.3% to 88.3%, a spread that may reflect not only differences in histopathological classification practice but also differences in case-mix across countries and hospital types.

As a tertiary comprehensive cancer centre receiving referrals for complex oncological management from across Indonesia, MRCCC Siloam Semanggi may encounter a broader spectrum of histopathological subtypes including rarer special types referred specifically for specialist management than a general hospital setting would, which could modestly influence the relative proportion of IDC NST observed here. IDC NST is the most frequently encountered type because it encompasses invasive carcinomas that do not fall into other specific histopathological categories. Histologically, IDC NST is heterogeneous and is frequently associated with ductal carcinoma in situ (DCIS). The development of IDC NST generally begins with a DCIS lesion, in which neoplastic cells penetrate the basement membrane and invade the surrounding stroma. Distinguishing IDC NST from special histological subtypes carries significance beyond descriptive classification: special subtypes such as tubular, mucinous, and cribriform carcinoma are generally associated with more favourable biological behaviour and prognosis, whereas IDC NST is itself clinically and biologically heterogeneous, encompassing tumours with a wide range of behaviour. This heterogeneity means that histopathological type alone is insufficient to guide prognosis or treatment planning, and further molecular characterisation including hormone receptor and HER2 status remains essential for risk stratification and therapeutic decision-making in patients with IDC NST

Histopathological Grade

The majority of cases in this study were classified as grade III (60.9%). This finding is consistent with the study by Novelyn (2025), which reported a grade III proportion of 50%, and the study by Ayasha et al. (2024), which reported a grade III proportion of 53.2%. The comparatively higher proportion of grade III tumours observed in the present study may partly reflect the referral-based case-mix characteristic of MRCCC Siloam Semanggi. As Indonesia's first and largest private comprehensive cancer centre, the hospital functions as a tertiary national oncology referral centre that receives patients referred specifically for specialised diagnostic and therapeutic management, potentially including a disproportionate share of biologically aggressive or diagnostically complex tumours relative to general hospital or community-based settings. This referral-driven case-mix should be considered when comparing grade distributions across studies conducted in different types of healthcare facilities. The predominance of grade III tumors reflects biological characteristics associated with rapid cell proliferation, high expression of cell-cycle-related genes, an aggressive phenotype, and a high neoantigen burden that may promote immune cell infiltration within the tumor microenvironment. Beyond these

biological correlates, histopathological grade carries direct prognostic and therapeutic significance: grade III tumours are generally associated with a higher risk of recurrence and poorer overall survival than lower-grade tumours, and grade is one of the factors that informs decisions regarding the intensity of adjuvant systemic therapy, including the use of chemotherapy. The combination of proliferative and immunological factors may make high-grade tumors more clinically detectable. The high proportion of grade III tumors emphasizes the importance of early detection through various screening methods. Mammography is a recommended standard screening method, while breast self-examination can also help women recognize breast changes at an earlier stage. Delayed diagnosis remains common because many patients present when the tumor has become large but does not cause pain. Lack of knowledge and misconceptions about breast cancer may also contribute to delayed presentation. Therefore, public education and awareness regarding breast cancer should be strengthened

Conclusion

Based on the findings of this descriptive study involving 243 breast cancer patients at MRCCC Siloam Semanggi Specialized Cancer Hospital in 2024, it can be concluded that breast cancer cases were predominantly characterized by female patients (100%) aged 40–49 years (30.9%), left-sided tumors (50.6%), Invasive Ductal Carcinoma No Special Type (IDC NST) histopathology (77.8%), and Grade III histopathological grade (60.9%), with the combination of IDC NST and Grade III observed in nearly half of all cases (49.8%). As these findings were derived from a single tertiary referral cancer hospital using a descriptive design, they characterize the specific hospital-based case series examined rather than establish causal or explanatory relationships between patient characteristics and disease occurrence. Because MRCCC Siloam Semanggi functions as a national oncology referral centre, its case-mix is likely shaped by referral pathways favouring more complex or advanced presentations; these findings should therefore not be interpreted as representative of breast cancer incidence or distribution in the general population. Population-based studies employing random or consecutive community-level sampling would be required to establish generalizable incidence estimates.

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