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Epidemiological Trends of Breast Cancer: A Five-Year Analysis in a Tertiary Care Centre

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Abstract:

Background: Breast cancer remains a significant global health concern, necessitating ongoing epidemiological investigations to understand its patterns and guide effective prevention and treatment strategies. This study aims to provide a comprehensive analysis of the epidemiology of breast cancer over a five-year period in a tertiary care center.

Methods: A 3 year prospective and 2 year retrospective study was conducted, involving a thorough examination of medical records from a tertiary care centre spanning five years (2014-2019). Demographic information, clinical characteristics, and histopathological details of breast cancer patients were collected and analyzed. Descriptive statistics, including frequencies and percentages, were used to summarize the data.

Results: The research encompassed a cohort of 277 individuals diagnosed with breast carcinoma. Surgical interventions revealed that 47.4% underwent modified radical mastectomy, 16.7% lumpectomy. Predominantly in females were affected (99.2%). The highest incidence of cases (29.6%) occurred in the 6th decade, postmenopausal status was noted in 58.8% of females, and the most prevalent clinical manifestation was an enlarging breast lump/mass (83.8%). Left breast involvement prevailed (58.8%), with 53.1% affecting the upper outer quadrant. Infiltrating ductal carcinoma (No special type) constituted the major histopathological subgroup (93.9%). Grade II tumors comprised the largest subgroup. According to TNM staging system most patients presented in stage 3 , followed by stage 2. Immunohistochemical staining for ER, PR and Her2/neu was available in 228 cases of infiltrating ductal carcinoma (NST). Maximum cases were triple negative for all the 3 markers followed by ER positive luminal A breast cancer and Her2 enriched breast cancer.

Conclusions: This study sheds light on the epidemiological landscape of breast cancer in the context of a tertiary care centre, revealing key demographic and clinical characteristics of the patient population. The findings underscore the need for targeted interventions, including awareness campaigns for early detection, screening programs, and personalized treatment strategies. The data generated from this study contribute to the broader understanding of breast cancer epidemiology and may inform healthcare policies aimed at improving outcomes for individuals affected by this prevalent malignancy. Further research is

warranted to explore evolving trends and evaluate the impact of interventions on breast cancer incidence and survival rates in the population served by the tertiary care centre.

Keywords: Breast cancer, epidemiology, retrospective analysis, tertiary care centre, clinical characteristics, histopathology.

Introduction:

Breast cancer is one of the major causes of morbidity and mortality in females worldwide. Globally breast cancer mortality rates are very high, standing at approximately 15% **(Globocan 2018)**. The clinical outcome in breast cancer patients is influenced by tumour stage, grade and expression of hormonal receptors (Estrogen receptor/ER, progesterone receptor/PR, and Her2-neu receptors) (**Anand and Kumar, 2014**). Despite advancements in diagnostic and therapeutic modalities, understanding the nuances of its epidemiology within specific healthcare settings remains paramount.

Breast cancer is a pervasive health challenge worldwide, necessitating continuous epidemiological investigations to delineate its patterns and guide effective public health interventions. This paper presents a detailed analysis of the epidemiology of breast cancer over a five-year period within a tertiary care centre. The study aims to provide a comprehensive understanding of the demographic, clinical, and histopathological characteristics of breast cancer patients, emphasizing the importance of this information in shaping targeted prevention and treatment strategies.

Methods:

The present study comprised 432 patients diagnosed with malignant breast tumors over a period of 5 years (3 years retrospective and 2 years prospective) from 2014 to 2019, attending the out patient and in patient services of the Department of General Surgery, Jawaharlal Nehru Medical College Hospital, AMU, Aligarh.

For the purpose of this study those cases in which only core biopsies were received, were excluded and only specimens of modified radical mastectomies and lumpectomies were included, in order to ensure optimal tissue adequacy for further analysis. This resulted in a final study population of 277 patients. A detailed clinical history and examination, along with available records of investigations were obtained in each case.

The histopathological specimens from these patients were received in the histopathology section of the Department of Pathology, J. N. Medical College, AMU. After a detailed gross examination, careful sampling was done and sections from the relevant areas were submitted for further processing as per routine lab protocol.

The archival slides were also retrieved from the histopathological records of the Department of Pathology. These slides were also reviewed. A retrospective cohort study was conducted, involving the thorough examination of medical records from the tertiary care centre spanning from 20XX to 20XX. Demographic data, clinical characteristics, and histopathological details of breast cancer patients were systematically collected and subjected to rigorous analysis. Descriptive statistics, including frequencies and percentages, were utilized to summarize the findings.

Results:

The study encompassed a total of 432 breast cancer cases diagnosed and treated at the tertiary care centre

during the stipulated five-year period. Surgical interventions revealed that 47.4% underwent modified radical mastectomy, 16.7% lumpectomy, and 35.9% core biopsies, however core biopsies were excluded. Subsequent analysis focused on 277 cases (MRM and Lumpectomy). The mean age at diagnosis was 55 years (29.6%),. The highest incidence of cases (29.6%) occurred in the 6th decade, with 23.5% above 60 years and 21.3% in the 41-50 age group. Breast cancer is predominantly affecting females (99.2%) with only two cases of carcinoma breast in males (0.8%).

Among females patients 58.8% of females have attained menopause, and the most prevalent clinical manifestation was an enlarging breast lump/mass (83.8%) followed by lymphadenopathy (120 cases, 43.3%). The other associated clinical findings were ulceration/ fungating mass (30 cases, 10.8%), nipple retraction (29 cases, 10.5%), mastalgia (28 cases, 10.1%), and nipple discharge (20 cases, 7.2%).

Left breast involvement prevailed (58.8%), with 53.1% affecting the upper outer quadrant of the breast. Infiltrating ductal carcinoma (No special type) comprised the largest histopathological subgroup in the present study, with 260 cases (93.9%). Invasive lobular carcinoma was diagnosed in 10 cases (2.2%). 2 cases each of medullary carcinoma , metaplastic carcinoma and papillary carcinoma were also observed, along with a single case of mucinous carcinoma during the course of this study.

Histopathological grades were assigned to all 260 cases of infiltrating ductal carcinoma (NST) using the Modified Scarff Bloom Richardson system. Grade II tumors comprised the largest subgroup, with 153 cases (58.8%), followed by grade III (30.8%) and grade I carcinomas (10.4%). All the cases of breast carcinoma in this study were categorized according to the TNM staging system. Most patients presented in stage 3 (163 cases, 58.8%), followed by stage 2 (94 cases, 34%). 20 cases had an early presentation in stage 1. Immunohistochemical staining for ER, PR and Her2/neu was available in 228 cases of infiltrating ductal carcinoma (NST). Maximum cases were triple negative for all the 3 markers (ER, PR, Her2/neu), (98 cases, 42.9%), followed by ER positive luminal A breast cancer in 67 cases (29.4%), and Her2 enriched breast cancer(43 cases, 18.9%). Only 20 cases were positive for all markers (ER, PR, Her2/neu) (Luminal B type).

These findings shed light on the demographic distribution, clinical characteristics, and histopathological subtypes and hormone profile of breast carcinoma in the studied population, offering valuable insights for clinical understanding and management.

Conclusions:

The present study evaluated the histopathological spectrum of breast carcinoma diagnosed in the Department of Pathology, Jawaharlal Nehru Medical College, Aligarh Muslim University, Aligarh, over a period of 5 years (3 years retrospective and 2 years prospective), from 2014 to 2019.

This study analysis provides a comprehensive insight into the epidemiological landscape of breast cancer within the confines of a tertiary care centre. The findings illuminate key demographic and clinical characteristics of the patient population, emphasizing the imperative for targeted interventions. Early detection initiatives, screening programs, and personalized treatment strategies must be prioritized to mitigate the impact of breast cancer. The data generated from this study contribute to the broader understanding of breast cancer epidemiology and hold implications for healthcare policies aimed at improving outcomes for affected individuals.

Future Directions:

Further research is warranted to explore evolving trends in breast cancer incidence, survival rates, and the

impact of interventions within the population served by the tertiary care centre. Prospective studies could provide a dynamic perspective on changing epidemiological patterns and offer insights into the efficacy of implemented preventive and therapeutic measures.

Acknowledgments:
We extend our gratitude to [JNMCH / Department of Pathology] for their support in conducting this study.

Conflict of Interest:
The authors declare no conflicts of interest.

Tables:

Table I: Distribution of cases of breast carcinoma according to type of surgical specimens

Category	Number of cases(%)
Modified radical mastectomies (MRM)	205 (47.5%)
Lumpectomies	72 (16.7%)
Core biopsies	155 (35.8%)
Total	**432**

Table II: Distribution of cases of breast carcinoma according to age :

Age group (in years)	No. of cases	Percentage (%)
21-30	26	9.3
31-40	45	16.2
41-50	59	21.3
51-60	**82**	**29.6**
>60	65	23.5
TOTAL	**277**	**100**

Table III: Distribution of cases of breast carcinoma according to Gender:

Gender	No. of cases	Percentage(%)
Female	275	99.2
Male	02	0.8
Total	**277**	**100**

Table IV: Distribution of cases of breast carcinoma according to menopausal status :

Menopausal status	No. of cases	Percentage (%)
Premenopausal	112	41.2
Postmenopausal	163	58.8
Total	**275**	**100**

Table V: Distribution of cases of breast carcinoma according to presenting features:

Presenting features	No. of cases	Percentage(%)
Breast mass/lump	232	83.8
Lymphadenopathy	120	43.3
Ulceration/ fungating mass	30	10.8
Nipple retraction	29	10.5
Pain/mastalgia	28	10.1
Nipple discharge	20	7.2
Total	**277**	--

Table VI : Distribution of cases of breast carcinoma according to side of breast involved

Side involved	No. of cases	Percentage (%)
Left	163	58.8
Right	114	41.2
Total	**277**	**100.0**

Table VII: Distribution of cases of breast carcinoma according to quadrant of breast involved:

Quadrant	No. of cases	Percentage
Upper outer	147	53.1
Central / subareolar	45	16.2
Lower inner	41	14.8
Lower outer	25	9.0
Upper inner	19	6.9
Total	**277**	**100.0**

Table VIII: Distribution of cases of breast carcinoma according to histopathological type

Histopathological diagnosis	No. of cases	Percentage (%)
Invasive Ductal Carcinoma (No special type)(IDC-NST)	260	93.9
Invasive Lobular Carcinoma	10	3.6
Medullary carcinoma	02	0.7
Metaplastic Carcinoma	02	0.7
Invasive papillary carcinoma	02	0.7

Mucinous carcinoma	01	0.4
TOTAL	**277**	**100.0**

Table IX : Distribution of cases of Infiltrating ductal carcinoma (NST) according to histopathological grade :

Histopathological Grade	No. of cases	Percentage(%)
Well differentiated carcinoma (Grade I)	27	10.4
Moderately differentiated carcinoma (Grade II)	153	58.8
Poorly differentiated carcinoma (Grade III)	80	30.8
Total	**260**	**100.0**

Table X: Distribution of cases of breast carcinoma according to tumor stage (pTNM classification):

Tumor Stage	No. of cases	Percentage(%)
Stage I	20	7.2
Stage II	94	34.0
Stage III	163	58.8
Stage IV	-	-
Total	**277**	**100**

Table XI: Distribution of cases of infiltrating ductal carcinoma (NST) according to immunohistochemical expression of ER, PR and Her2/neu (Molecular classification):

Immunohistochemical profile (Molecular classification)	Positive (%)
ER+ and/or PR+, Her2/neu – **(Luminal A)**	67 (29.4%)
ER+ and/or PR+, Her2/neu + **(Luminal B)**	20 (8.8%)
ER -/PR-, Her2/neu – **(Basal cell like/Triple negative)(TNBC)**	98 (42.9%)
ER-/PR-, Her2/neu + **(HER2 enriched)**	43 (18.9%)
Total	**228 (100%)**

Legends

Figure 1a: Tissue section showing nests of malignant ductal epithelial cells with infiltrating and inflammed desmoplastic stroma (H and E, 10x)

Figure 1b: Tissue section showing sheets of pleomorphic tumor cells surrounded by heavy inflammation. Atypical mitosis is present (→) (H and E, 40x).

Figure 2a: Tissue section showing small discohesive tumor cells dispersed in fibrotic stroma. An Indian file pattern is evident in several areas (H&E,10x)

Figure 2b: Tissue section showing small to moderate size tumor cells with mild atypia, infiltrating the fibrous stroma in a discohesive manner (H&E,40)
Figure 3a: Tissue section showing sheets of pleomorphic undifferentiated cells, infiltrating the fibrous stroma (H and E, 10x)
Figure 3b: Tissue section showing atypical cells with indistinct cytoplasm, irregular round to oval vesicular nuclei, coarse chromatin and prominent nucleoli (H and E, 40x)
Figure 4a: Tissue section showing extensive papillary arrangement of ductal epithelial cells with adjacent fibrotic stroma within which foci of invasion are seen (H and E,10x)
Figure 4b : Tissue section showing extensive papillary arrangement of ductal epithelial cells with delicate fibrovascular core (H and E, 40x)
Figure 5a : Tissue section showing nests of malignant tumor cells surrounded by pools of extracellular mucin (H and E, 10x)
Figure 5b : Tissue section showing small islands of mildly pleomorphic malignant epithelial cells within extensive extracellular mucin (H and E, 40x)
Figure 6a: Tissue section showing Grade I IDC (NST) with >75% tubule formation, lined by small hyperchromatic malignant ductal cells within abundant fibro collagenous stroma (H and E, 10x)
Figure 6b: Tissue section showing small irregular tubules lined by malignant ductal epithelial cells and absence of myoepithelial cell layer (H and E, 40x)
Figure 7a: Tissue section showing grade II IDC (NST) with tubular arrangement as well as small sheets of malignant cells with moderate nuclear pleomorphism and few mitotic figures. (H and E,10x)
Figure 7b : Tissue section showing atypical ductal epithelial cells with moderate nuclear pleomorphism and desmoplastic reaction in surrounding stroma (H and E,40x)
Figure 8a : Tissue section showing sheets of malignant ductal epithelial cells in an inflamed stroma, tubule formation is minimal (H and E, 10x)
Figure 8b : Tissue section showing irregular islands of pleomorphic cells intermixed with inflammation with mitotic figures (H and E, 40x)
Figure 9a, b and c : IHC for Estrogen receptors (ER) (a) and Progesterone receptors (PR) (b) showing positive expression (c) negative expression of Her2neu receptors in Luminal A type of IDC (NST)
Figure 10 a, b and c : IHC for Estrogen receptors (ER) (a) showing positive expression and Progesterone receptors (PR) (b) showing negative expression (c) Her2neu receptor is showing strong expression in Luminal B type of IDC (NST)
Figure 11 a, b and c : IHC for Estrogen receptors (ER) (a) and Progesterone receptors (PR) (b) showing negative expression, (c) strong expression of Her2neu receptor in HER2 enriched type of IDC (NST)

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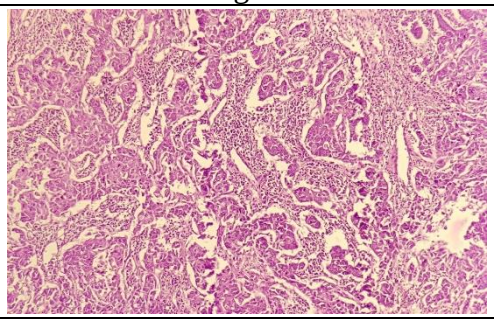	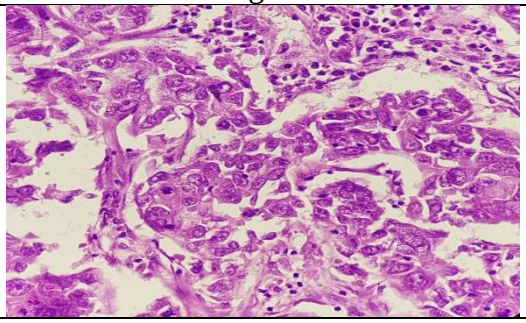

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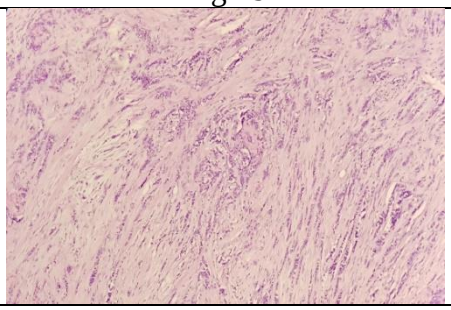	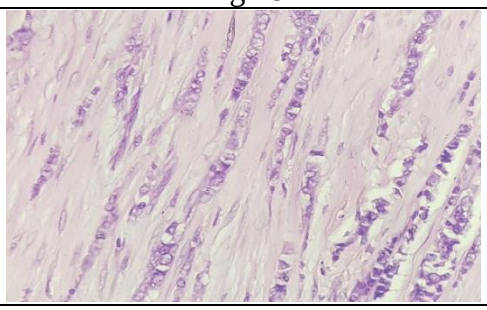
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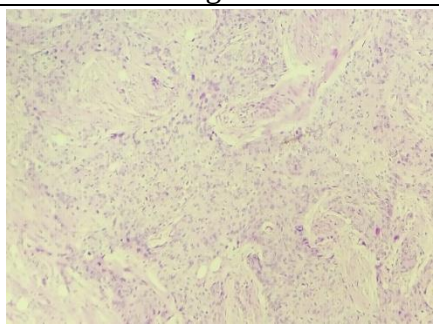	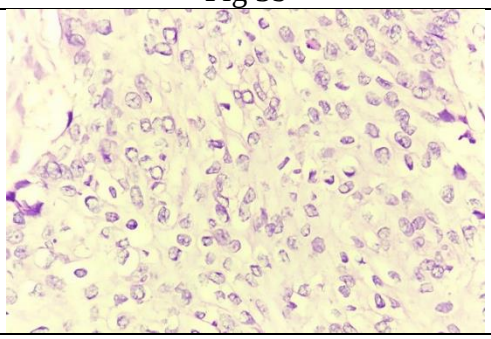
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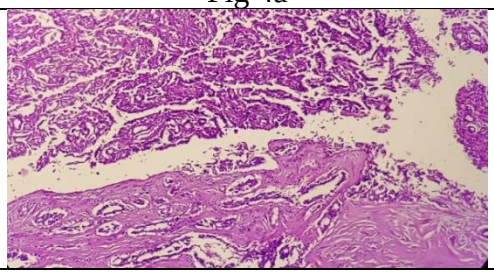	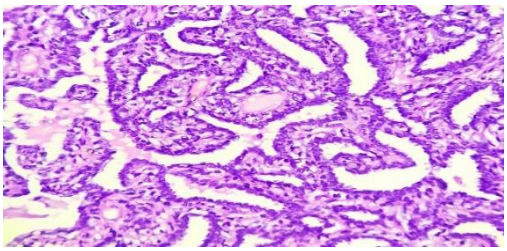
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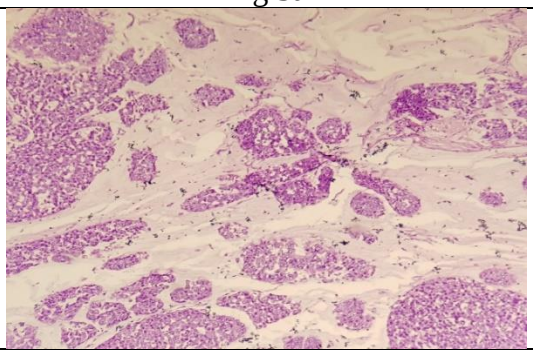	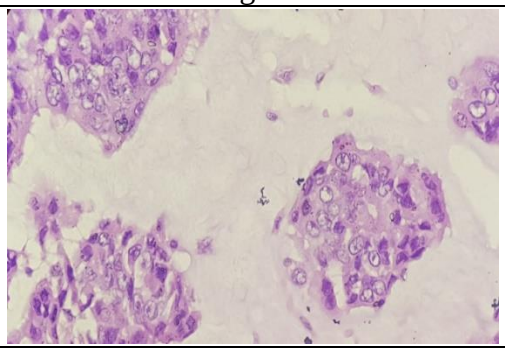
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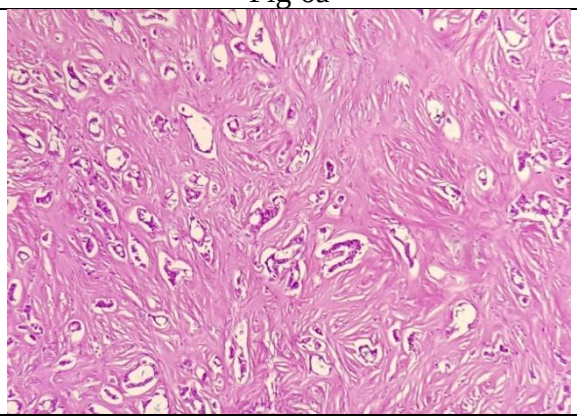	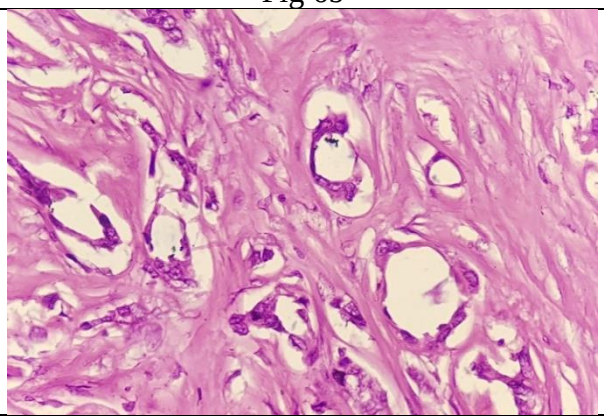

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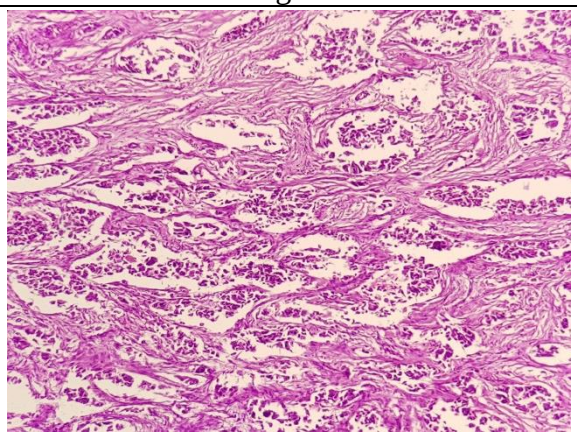	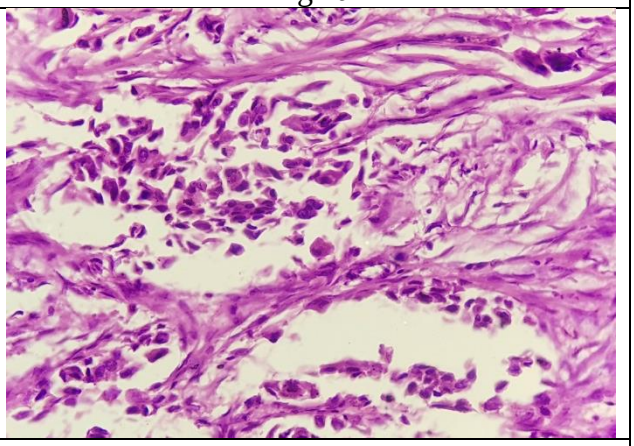
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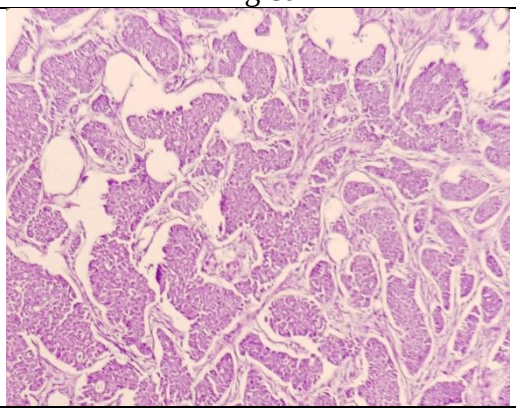	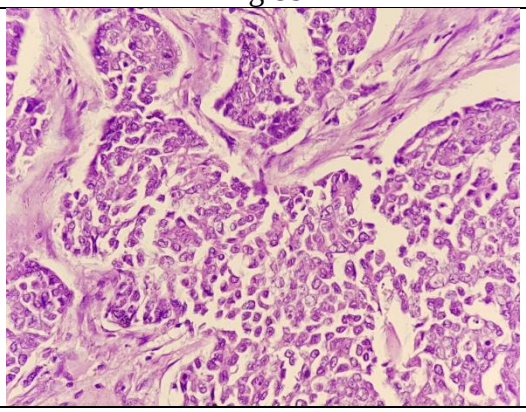
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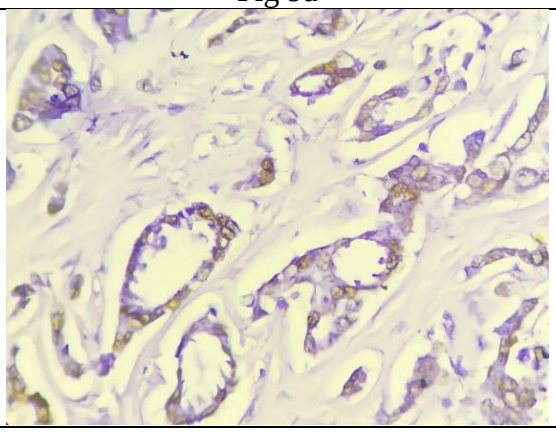	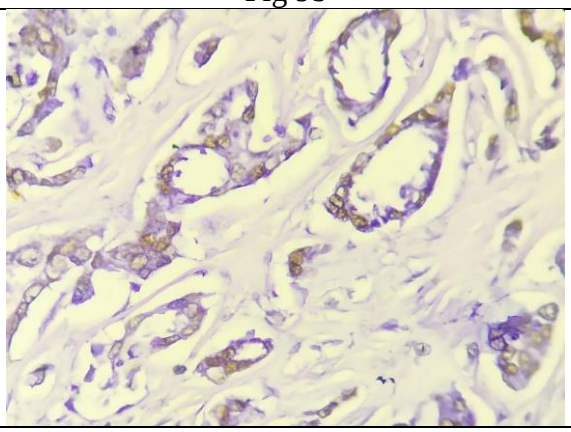
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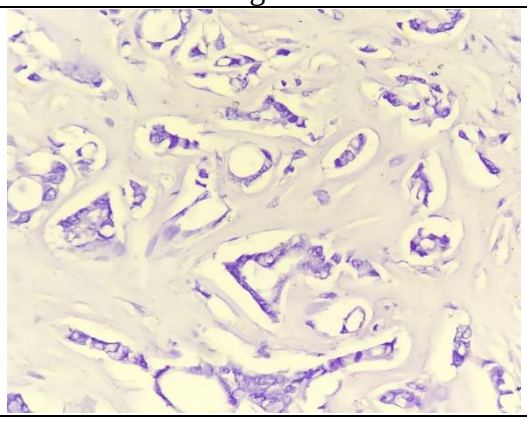	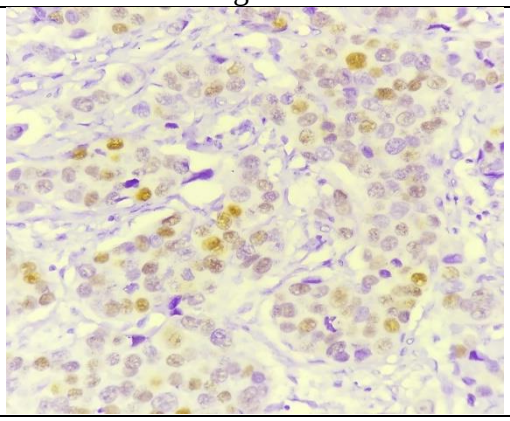

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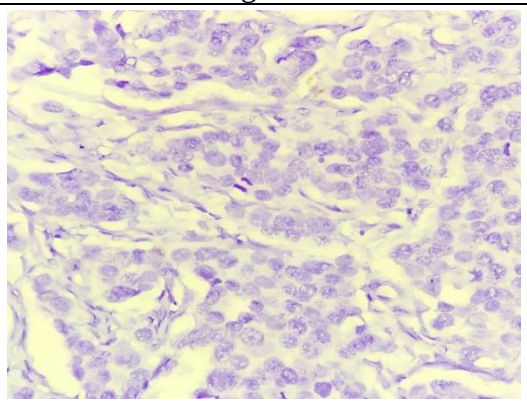	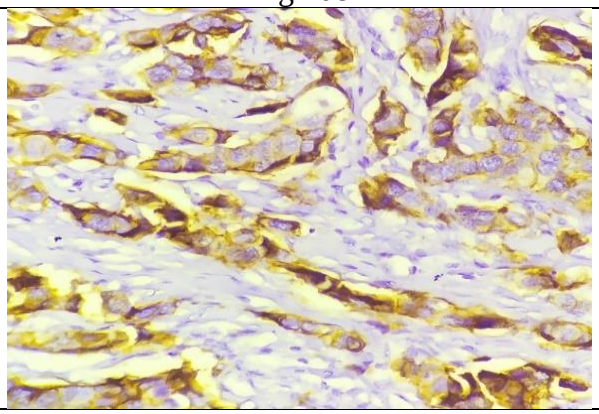
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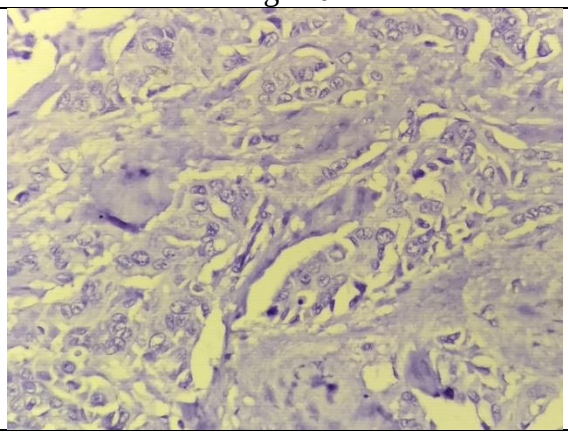	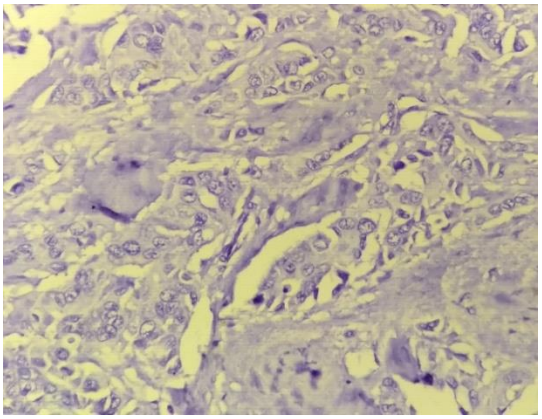
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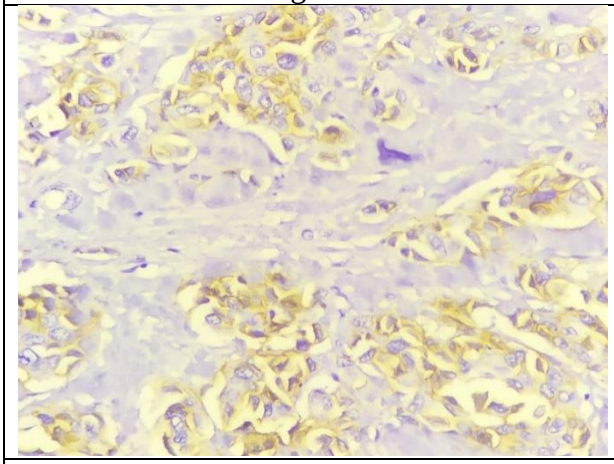	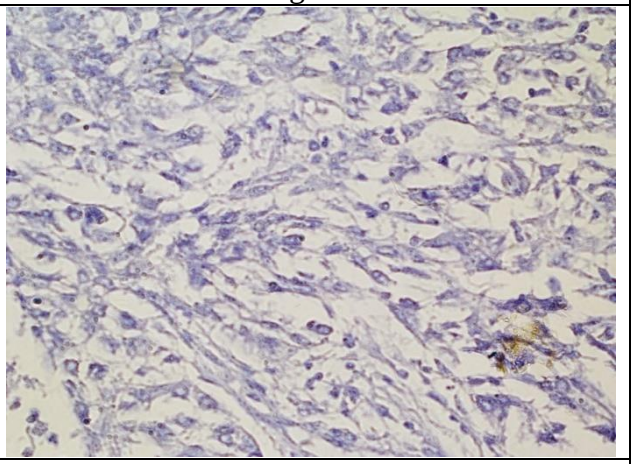
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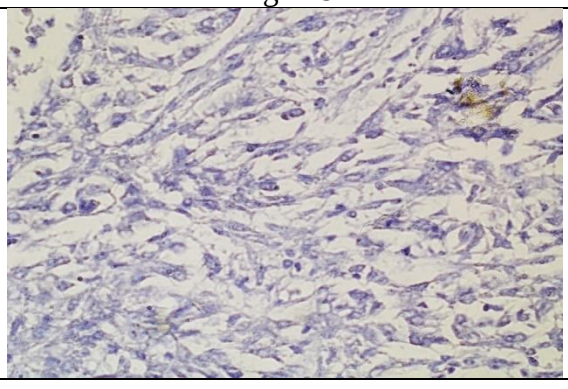	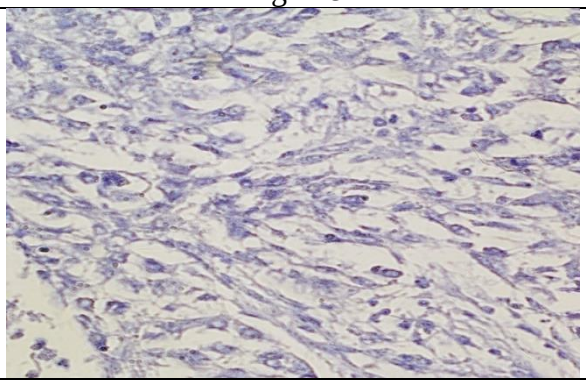

References

1. Incidence, Distribution, Trends in Incidence Rates and Projections of Burden of Cancer, Chapter 10, (Report of 27 PBCRs in India). Three Year Report of Population Based Cancer Registries 2012–2014. National Centre for Disease Informatics and Research, National Cancer Registry Programme ICMR 2016; 124-125.
2. Anand MT, Kumar S.CD44:A key player in breast cancer.Indian Journal Cancer. 2014; 51(3):247-54.
3. Kumar V, Abbas AK, Aster JC. The Breast. Robbins and Cotran Basis of disease, South Asia ed. New Delhi: Reed Elsevier India Private Limited; 2014. p. 1053-70.
4. American Cancer Society. Breast Cancer Facts & Figures 2017-2018. Atlanta: Am Cancer Soc Inc 2017; 1-5.
5. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018 : GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA: Cancer J clin 2018; 68(6):394-424.
6. Malvia S, Bagadi SA, Dubey US, Saxena S. Epidemiology of breast cancer in Indian women. Asia-Pacific J Clin Oncol 2017; 13(4):289-295.
7. Alizadeh AA, Ross DT, Perou CM, van de Rijn M. Towards a novel classification of human malignancies based on gene expression patterns. The Journal of pathology 2001; 195(1):41-52.
8. Gamble M. Theory and practice of histological techniques: The Hematoxylins and Eosin stains. Elsiever 2008; 6: 124-127.
9. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2016. CA. A Cancer J Clin 2016; 66(1):7-30.
10. Surakasula A, Nagarjunapu GC, Raghavaiah KV. A comparative study of pre-and post-menopausal breast cancer: Risk factors, presentation, characteristics and management. J Res Pharma Prac 2014; 3(1):12-13
11. Parkin DM, Bray F, Ferlay J, Pisani P. Global cancer statistics, CA Cancer J Clin 2002; 55: 74–108.
12. Shah P, Robbani I, Shah O. Clinicopathological study of male breast carcinoma: 24 years of experience. Annals of Saudi medicine. 2009; 29(4):288-93.
13. Ly D, Forman D, Ferlay J, Brinton LA, Cook MB. An international comparison of male and female breast cancer incidence rates. Int J Cancer 2013; 132(8): 1918-1926
14. Surakasula A, Nagarjunapu GC, Raghavaiah KV. A comparative study of pre-and post-menopausal breast cancer: Risk factors, presentation, characteristics and management. J Res Pharma Prac 2014; 3(1):12-13
15. Kakarala M, Rozek L, Cote M, Liyanage S, Brenner DE. Breast cancer histology and receptor status characterization in Asian Indian and Pakistani women in the US-a SEER analysis. BMC cancer. 2010; 10(1):191-97.
16. Redaniel MT, Martin RM, Ridd MJ, Wade J, Jeffreys M. Diagnostic intervals and its association with breast, prostate, lung and colorectal cancer survival in England: historical cohort study using the Clinical Practice Research Datalink. PloS one. 2015; 10(5):1375-92.
17. Koo MM, von Wagner C, Abel GA, McPhail S, Rubin GP, Lyratzopoulos G et al. Typical and atypical presenting symptoms of breast cancer and their associations with diagnostic intervals: Evidence from a national audit of cancer diagnosis. Cancer Epidemiol 2017; 48:140-146.
18. Ahtesham K, Jaffer R, Imran AA, Salaria SM, Hasan M. Correlation of Mean Argyrophilic Nucleolar Organizer Regions and AgNOR Proliferation Index with Estrogen Receptor Status in Carcinoma of Breast. Biomedica 2016; 32(3):297-298.
19. Aljarrah A and Miller WR. Trends in the distribution of breast cancer overtime in the southeast of Scotland and review of the literature. E Cancer 2014; 8:427-436.

20. Cheang MC, Chia SK, Voduc D, Gao D, Leung S, Snider J et al. Ki67 index, HER2 status, and prognosis of patients with luminal B breast cancer. J Nat Cancer Inst 2009; 101(10):736-750.
21. Martin A, Corte MD, Alvarez AM, Rodriguez JC, Andicoechea A, Bongera M et al. Prognostic value of pre-operative serum CA 15.3 levels in breast cancer. Anticancer Res 2006; 26(5B):3965-3971.
22. Madani SH, Payandeh M, Sadeghi M, Motamed H, Sadeghi E. The correlation between Ki-67 with other prognostic factors in breast cancer: A study in Iranian patients. Ind J Med Paed Oncol 2016; 37(2):95-96.
23. Yang P, Du CW, Kwan M, Liang SX, Zhang GJ. The impact of p53 in predicting clinical outcome of breast cancer patients with visceral metastasis. Sci Rep 2013; 3:46-47.