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Study of histopathological characteristics and hormonal receptors biomarkers of breast cancer in Benghazi medical Centre in the period between (2019-2024)

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Abstract

Background: Breast cancer is considered as the most frequently diagnosed cancer worldwide accounting for 11.7% of new cancer cases in 2020. Thus, breast cancer remains a significant global health concern despite the rapid advances in this field.

Material and methods: Study data were collected and medical records of patients at Benghazi Medical Centre were reviewed to obtain data on age, sex, tumour site, nationality, family history, year of diagnosis, site, pathological grade and tumour markers.

Result: The results showed that the highest number recorded was 23 cases in 2020 and 22 cases in 2023, the mean age was 53 years, while the age group was from 31 to 80 years, in a geographical area of Benghazi 43%, there were 68 cases from Libya and one case from Egypt, 68% showed a negative family history, and most of the cases were between stage II and stage III. Regarding site of the tumour 49% are in the left side of the tumour site and 47.8% in the right side, and 2.9% were bilateral. Most of the cases were negative for Her2, positive for ER, and positive for PR, regarding expression of Ki-67 level values in 12 cases expression was (20-40%) and in10 cases expression was>80%. Most of the cases 91% the histopathological report reported invasive ductal carcinoma.

Conclusion: Early detection and diagnosis using new technologies, improved access to affordable treatment, more palliative care and support for breast cancer research are all important measures that must be addressed to reduce morbidity and mortality.

Keywords: Breast cancer; Mammography; Invasive carcinoma; Histopathology; Hormonal receptors

1 Introduction

Breast cancer is a leading cause of cancer-related deaths worldwide, with significant variations in incidence and mortality rates across different populations. Understanding the epidemiological characteristics of breast cancer including its incidence, prevalence, and mortality across different demographic and geographic aspects, as well as identifying the risk factors, could facilitate the development of proper public health policies. Screening is a key part of the overall management of breast cancer, which can detect breast cancer at an early stage, thereby reducing the associated mortality dramatically (1). The global burden of breast cancer is substantial, with an estimated 2.3 million new cases diagnosed annually (2). Incidence rates vary widely across countries, with higher rates observed in developed regions such as North America and Europe. In recent years, there has been a rising trend in breast cancer incidence in

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developing countries, particularly in Asia and Africa (3). Many risk factors may influence development of breast cancer. female gender is the primary risk factor, as breast cancer is very rare in men. Furthermore, the risk of breast cancer increases with age, with the majority of cases occurring in women over the age of 50. Furthermore, in regard to Family history and genetic factors; Women with a close relative (mother, sister, daughter) who has had breast cancer have a higher risk (4). Early menarche, late menopause, nulliparity, and older age at first birth are associated with increased risk. Lifestyle factors like Obesity, physical inactivity, alcohol consumption, and postmenopausal hormone therapy use can increase breast cancer risk (5).

Histopathological examination of breast tissue is essential for accurate diagnosis and classification of breast cancer. The most common histological type is invasive ductal carcinoma, accounting for approximately 80% of cases (6). Other histological subtypes include invasive lobular carcinoma, ductal carcinoma in situ, and lobular carcinoma in situ. Hormonal receptors, estrogen receptor (ER) and progesterone receptor (PR), play a crucial role in the growth and development of breast cancer cells. Approximately 70-80% of breast cancers are ER-positive and/or PR-positive, making them hormone-dependent tumors (7). The presence of hormone receptors influences treatment options, with hormone therapy being a mainstay treatment for hormone-receptor-positive breast cancer.

Clinical breast cancer staging is based on physical examination and imaging studies before treatment. Histopathologic breast cancer staging is determined by pathologic examination of the primary tumor and regional lymph nodes after definitive surgical treatment (8). Staging is performed to group patients into risk categories that define prognosis and guide treatment recommendations for patients with a similar prognosis. Breast cancer is classified with the TNM classification system, which groups patients into 4 stage categories based on the primary tumor size (T), the regional lymph nodes status (N), and if there is any distant metastasis (M) 9)). The most widely used TNM system is that of the American Joint Committee on Cancer (8).

Aim

The aim of the present study is to review a large series of patients with breast cancer and to analyze a variety of histopathological findings. Also, to assess the hormonal receptor biomarkers expression in breast cancer.

2   Material and Method

2.1   Patients

A retrospective study was conducted in relation to 69 patients diagnosed with Breast cancer within the period from 2019 to 2024 in Benghazi medical center. The study screened for all Breast cancer types, and included only female patients.

2.2   Study design

Patient medical records in the Benghazi medical center were reviewed to obtain the following data: age, sex, tumor site, Nationality, Family history, Year of diagnosis, Histopathology and tumor biomarkers

2.3   Statistical analysis

Data was processed using Microsoft Excel 2010 then coded and processed on IBM compatible computer, using the statistical package for social science (SPSS) software for statistical analysis

3   Results

3.1   Year of diagnosis

Data was collected from patients' files of years (2019 to 2024). As shown in Figure (1) most of the cases diagnoses in 2020 and 2023.
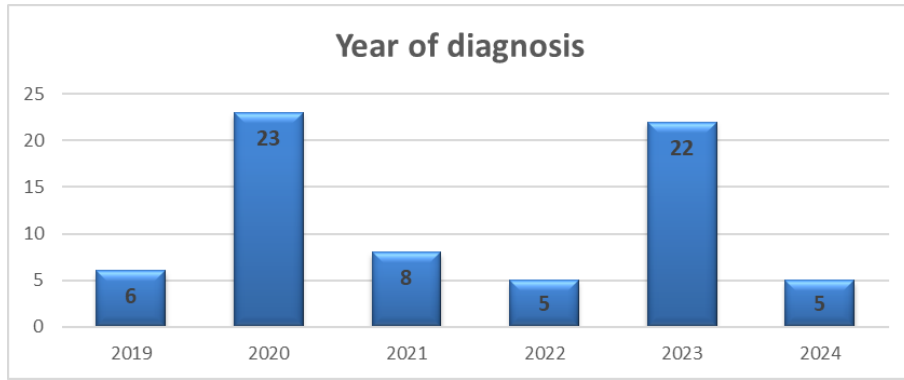
Figure 1 Year of diagnosis of cases

3.2 Age

Regarding the age distribution of cases; the mean age is 53; and age group range from 31 to 80 years of age (figure 2).
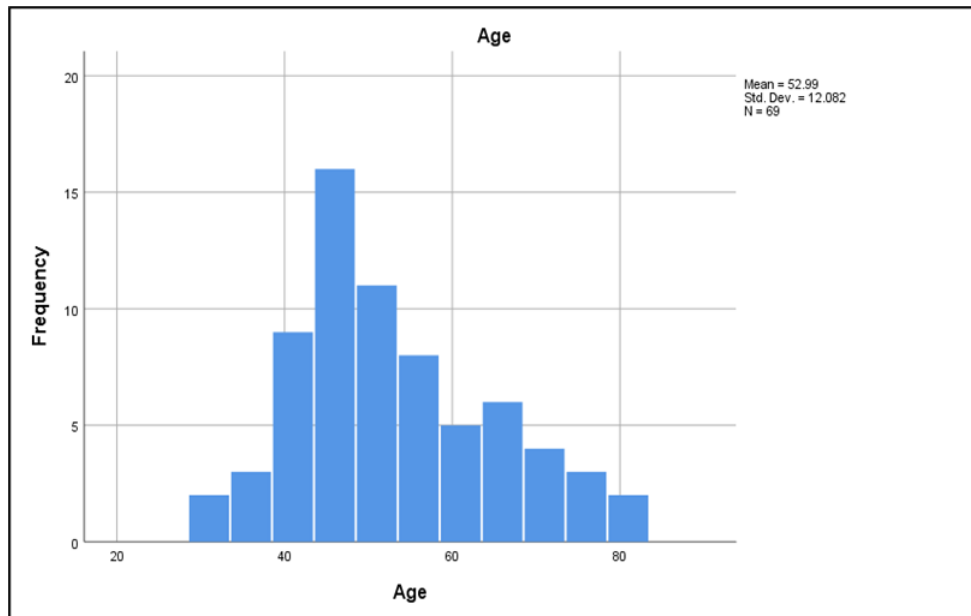

Figure 2 Distribution of patients according to the age

3.3 The geographical distribution

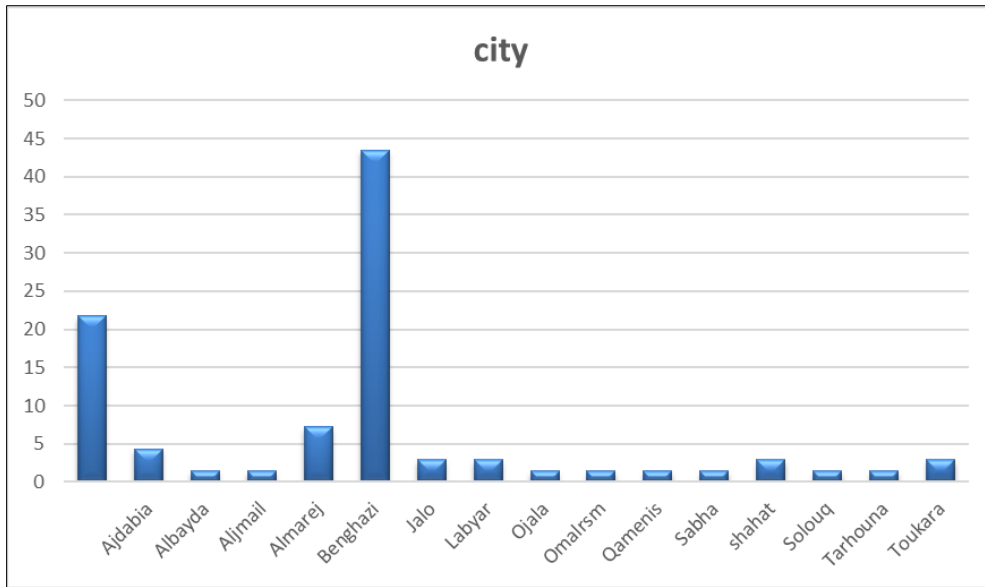Regarding breast cancer patients per city the majority of cases are from Benghazi (43%) (figure 3).

Figure 3 Distribution of patients according to the city

3.4   The nationality

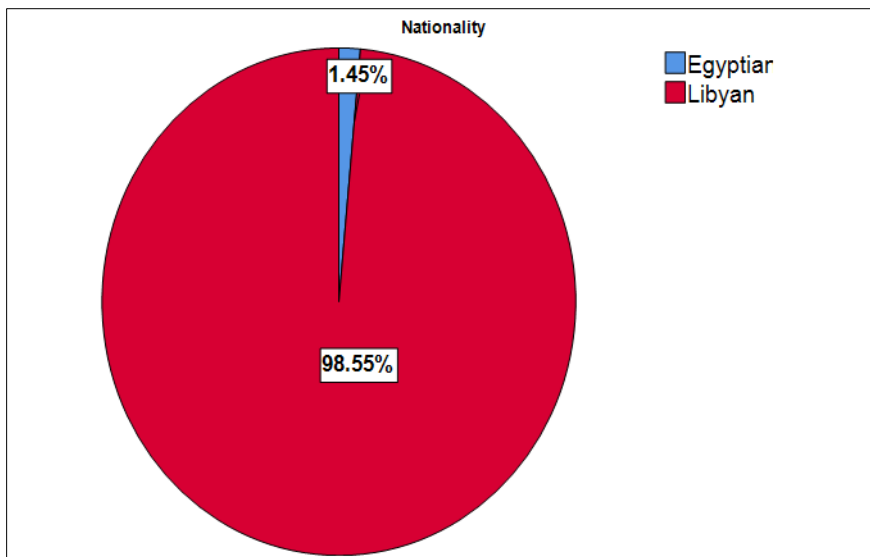Of 68 cases all patients were Libyan except one case from Egypt as shown in figure 4.

Figure 4 The nationality of patients expressed in numbers

3.5   Family history

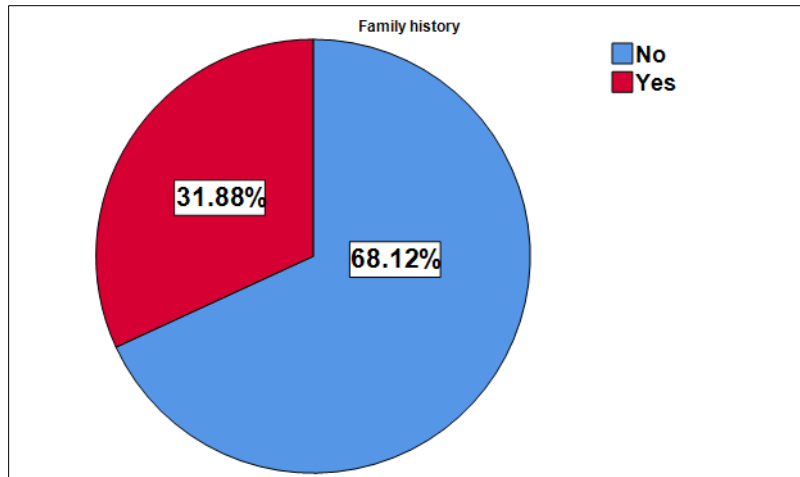Regarding family history as a risk factor for breast cancer 68% demonstrate negative family history (figure 5).

Figure 5 Distribution of patients according to family history

3.6   Tumour site

49% are in left side; 47.8% in right side and 2.9% are bilateral as clarified in figure 6.
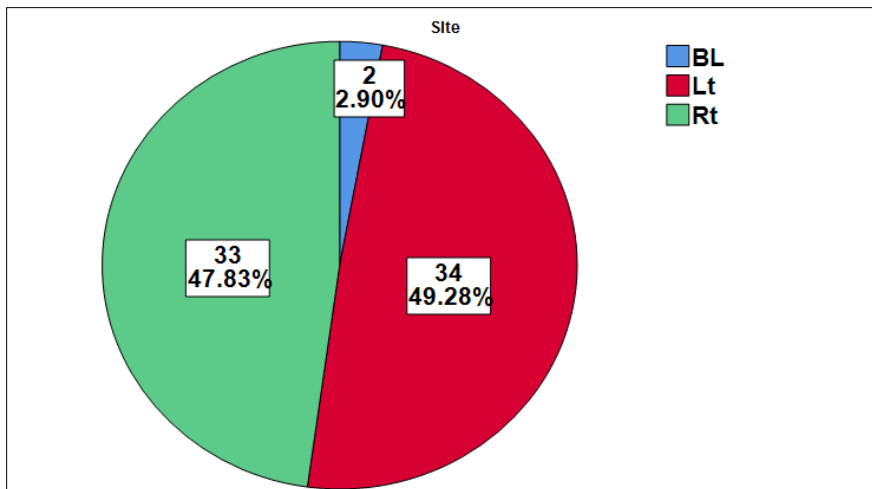

Figure 6 Distribution of patients according to site of the tumor

3.7   Hormonal receptors

Of all patients (57.97%) were positive ER(ER+), and (33.33%) were negative ER (ER-), This is compared to (50.72%) was PR positive (PR+) and (40.58%) was negative (PR-). Furthermore (57.97%) of cases were HER2 negative, and (33.33%) were positive (Figures 7-8-9).
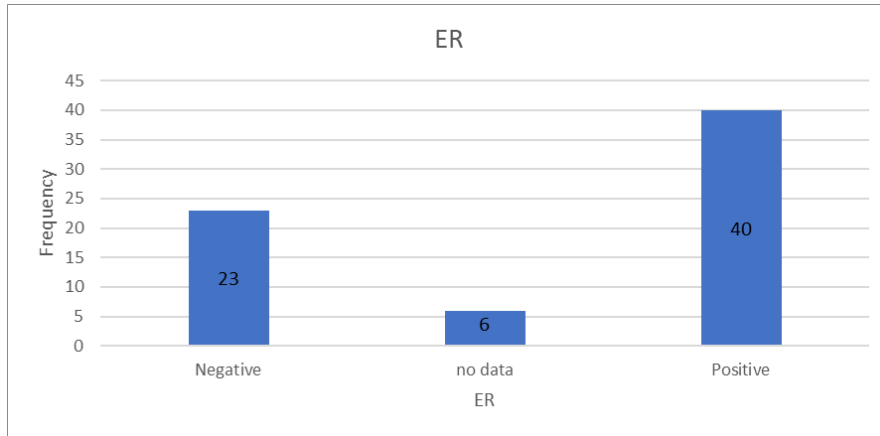
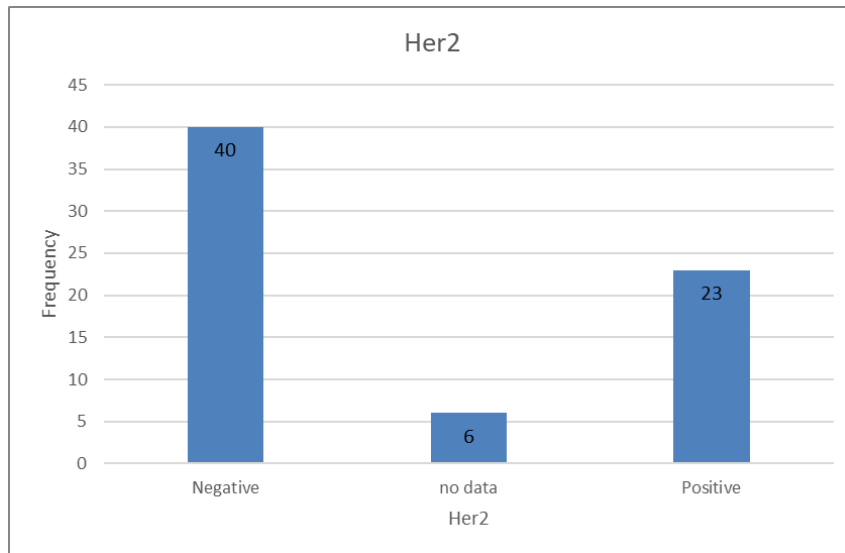**Figure 7** Biomarker distribution of patients (ER)

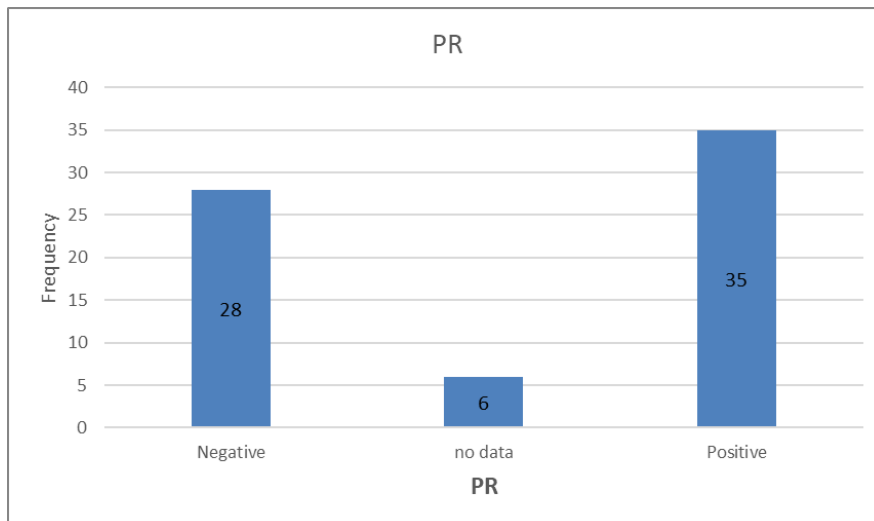**Figure 8** Biomarker distribution of patients (HER2)

Figure 9 Biomarker distribution of patients (PR)

3.8   ki biomarker expression:

Regarding expression of Ki-67 level values as shown in figure 10 are almost in close range between all cases ranging from 27% for (20-40%) to 11% for >80%.
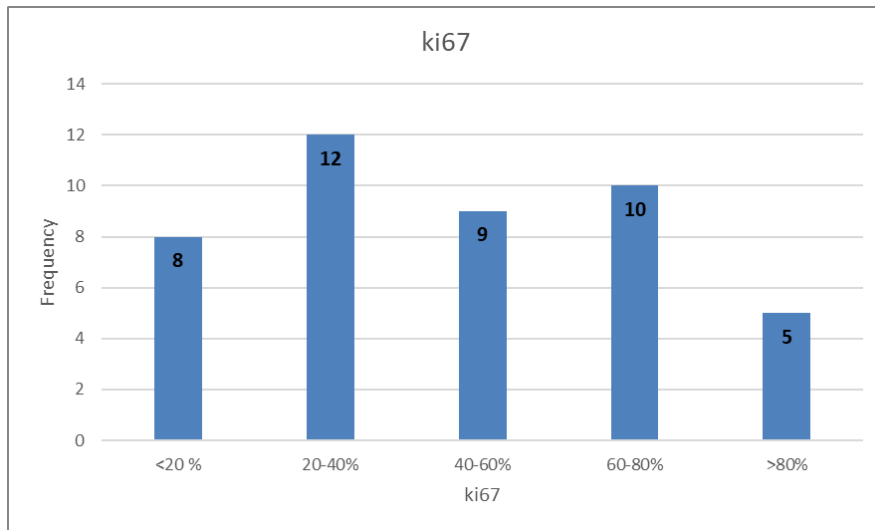

Figure 10 Distribution of patients according to KI67 Biomarker

3.9   Stage

Stage of the tumour according to WHO classification. Most of cases were between stage II (28.99%) and III (27.54%) (figure 11).
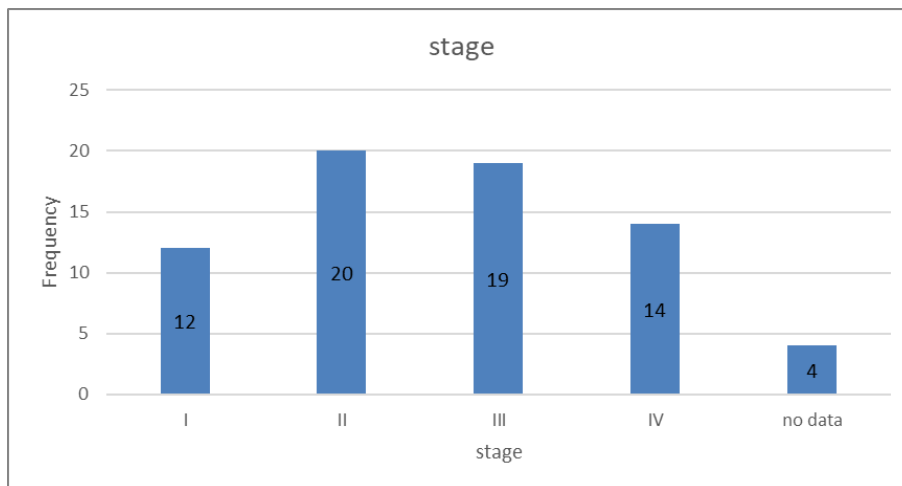

Figure 11 Distribution of patients according to the stage of the tumour

3.10   Grade of tumour

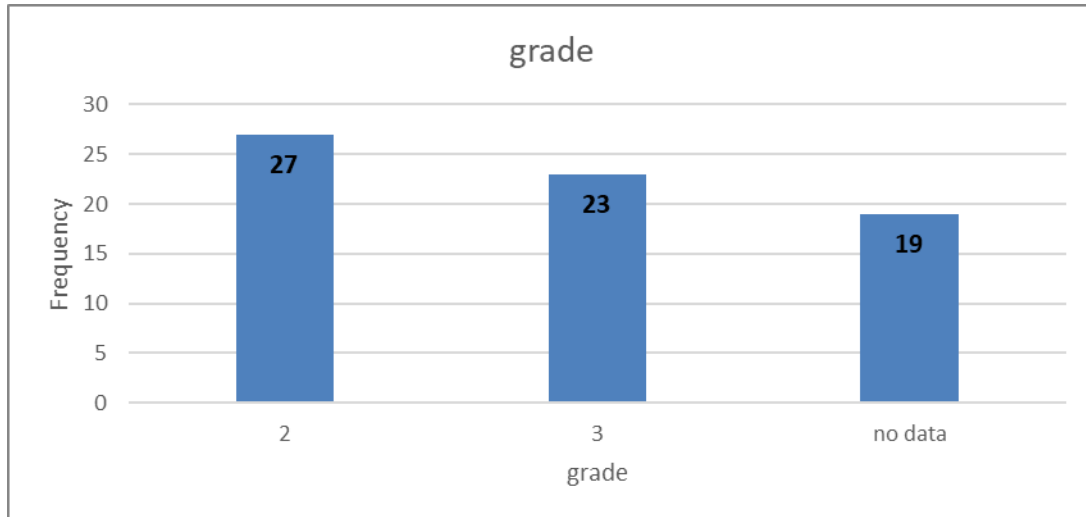As shown in figure 12 grade 2 is the common grade (39.13%).

Figure 12 Distribution of patients according to grade of tumour

3.11 Histopathology result of the tumor

Four histological types are reported. The predominant type represented in 91% of cases is invasive ductal carcinoma shown in table 1.

Table 1 Distribution of patients according to Histopathology of the tumour

Type		number	%
	IMUC	1	1.4
	lDC	63	91.3
	lLC	3	4.3
	lPC	2	2.9
	Total	69	100.0

IMUC Invasive mucoid carcinoma **IDC** Invasive ductal carcinoma **ILC** Invasive lobular carcinoma **IPC** invasive papillary carcinoma

4 Discussion

This study aimed to shed light on breast cancer, the most common cancer among women worldwide, with the aim of reviewing a large series of breast cancer patients and analysing a variety of histopathological findings in relation to age, in order to determine if there are any indicators of less or more aggressive features. In different age groups, since the incidence and mortality rates due to breast cancer have increased significantly over the past decades, there is an urgent need to provide the most effective prevention, considering that modifiable risk factors may be crucial in providing a reduction in breast cancer incidence.

The incidence of breast cancer varies significantly by region, with higher rates in more developed countries compared to less developed regions (10). In the United States, breast cancer is the most common cancer among women, with an estimated 281,550 new cases expected to be diagnosed in 2021 (11). The incidence of breast cancer in Arab countries is generally lower than in European and American countries, but it is increasing over time (12). This study involved cases of eastern part of Libya were Benghazi showed the highest number of cases 43% and this is similar to a study done in Benghazi by Bilhassan et al. were (66%) of patients were from Benghazi (13). Also, in rural areas, the estimated prevalence rates were four times lower than in urban areas. The overall trend is an increase in breast cancer rates in Arab countries over time, likely due to demographic shifts and lifestyle changes (12).

In this study the mean age was 53 years a similar range found by Bilhasan et al where the mean age was 50 years old. Our results were also consistent with a study conducted by Albasri A. et al., where the average age 53.7 years (14). However; a study of Abdalkarem et al done in Albayda medical center shows a lower age group where mean age was 30 years (15) in contrast; higher age group was found in a study of Papalexis et al where a median age of 70 years (16).

According to literature review Invasive ductal carcinoma account for about 80% of all invasive breast cancer and this is what our current result agree with were IDC tumor was the most common histopathological type 91% among patients of this study.

There are significant differences in the stages at which breast cancer is detected across Arab countries, with some countries still detecting many cases in late stages, which negatively impacts survival (17). Similarly; Albasri et al. reported that Approximately 48.7% IDC were stage III tumor (14). However; in this study most of the cases were between stage II and stage III, 29% and 27.5% respectively. This is in accordance with Rathod et al., in their study, found that stage II (44.5%) and III (44.5%) were the most common stages of presentation (18), and Papalexis et al. where stage II was the common pattern with 65% (16).

Tissue-based biomarkers, including the expression of estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor 2 (HER2), have been integral in subtyping of tumours, prognostication, and choice of systemic therapies. Approximately 70–80% of all breast cancers are hormone receptor-positive (HR+). ER+ breast cancers have a better prognosis compared with ER-negative breast cancer. Furthermore; PR expression is a valuable prognostic biomarker in breast cancer. Low and negative expression of PR in ER+ tumours is associated with a more aggressive and proliferative disease, resulting in poorer prognosis and clinical outcome (19). Regarding ER and PR expression in this study; the majority of patients (57.97%) were ER-positive (ER+), while a smaller proportion (33.33%) were ER-negative (ER-). Similarly, a higher proportion of patients were PR-positive (PR+) (50.72%) compared to PR-negative (PR-) (40.58%). Furthermore; for HER2 Expression; the majority of cases (57.97%) were HER2-negative, and a smaller proportion (33.33%). A study by Bilhasn et al. reported similar ER and PR positivity rates in a larger sample of breast cancer patients; where Positive ER (ER+) was (72.2%) and Negative ER (ER-) was (27.8%) compared to PR positive (PR+) was (66%) and negative (PR-) was (34%), and similar to our result (61.6%) of cases were HER2 negative, and (38.4%) were positive. Regarding expression of Ki-67 level values shown in this study all cases almost in close range ranging from 27% for (20-40%) to 11% for >80%. While in Bilhasan et al. the tumour marker Ki67 the most common range between 20%-40% in (77.6%) of patients (13).

5   Conclusion

Breast cancer is a leading cause of deaths worldwide, with significant variations in incidence and mortality rates across different populations. Early detection and diagnosis using new technologies, improved access to affordable treatment, more palliative care and support for breast cancer research are all important measures that must be addressed to reduce morbidity and mortality.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

[1]   Xu, H., &Xu, B. Breast cancer: Epidemiology, risk factors and screening. Chinese journal of cancer research = Chung-kuo yen cheng yen chiu. 2023;35(6), 565–583.

[2]   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.

[3]   Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, Bray F. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2021;71(3):209-249.

[4]   Keum N, et al. Adult weight gain and adiposity-related cancers: a dose-response meta-analysis of prospective observational studies. J Natl Cancer Inst. 2015;107(2):djv088.

[5]   Hou N, Hong S, Wang W, et al. Hormone replacement therapy and breast cancer: heterogeneous risks by race, weight, and breast density. J Natl Cancer Inst. 2013;105(18):1365-1372.

[6]   National Cancer Institute. SEER Stat Fact Sheets: Breast Cancer. [Internet]. National Cancer Institute; 2023.

[7]   National Cancer Institute. Hormone Receptor Status: Know Your Results. [Internet]. National Cancer Institute; 2023.

[8]   Menon G, Alkabban FM, Ferguson T. Breast Cancer. [Updated 2024 Feb 25]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-.

[9]   Gradishar WJ, Moran MS, Abraham J, Aft R, Agnese D, Allison KH, Anderson B, Breast Cancer, Version 3.2022, NCCN Clinical Practice Guidelines in Oncology. J NatlComprCancNetw. 2022 Jun;20(6):691-722.

[10]   GLOBOCAN 2020 data from the International Agency for Research on Cancer (IARC).

[11]   American Cancer Society. Breast Cancer Facts & Figures 2021-2022.2Najjar H, Easson A. Age at diagnosis of breast cancer in Arab nations. Int J Surgery. 2010;8(6):448-452. American Cancer Society. Breast Cancer Risk and Prevention.

[12]   Kelsey JL, Gammon MD, John EM. Reproductive factors and breast cancer. Epidemiol Rev. 1993;15(1):36-47.

[13]   Bilhassan, N. M. ., Zoubi , S. ., & Attia , A. A Histopathological Study of the Breast Cancer Cases Registered at Benghazi Medical Center from 2016 to 2018. The Scientific Journal of University of Benghazi. 2023;36(1). https://doi.org/10.37376/sjuob.v36i1.3944

[14]   Mohammed, Mahmoud A.; Mokhtar, Sherif; Osama, Esraa; Sherif, Omar. Retrospective descriptive analysis of the demographic and clinicopathological presentation of breast cancer patients in Kasr Al-Ainy Hospital over 5 years. The Egyptian Journal of Surgery 43(2):p 515-523, April-June 2024. | DOI: 10.4103/ejs.ejs_316_23.

[15]   Raba Abdalkarem, Huda Abdallah, AsmaAbdalraziq, Marfoua Ali, AllafiAllafi, Almontaser Ali. Retrospective Histopathological Study of Breast Biopsies of Breast Lesions among Patients Attending Al-Bayda Medical Center. Alq   J   Med   App   Sci   [Internet].   2023;27:212-8.   Available   from: https://journal.utripoli.edu.ly/index.php/Alqalam/article/view/238

[16]   Papalexis, P., Georgakopoulou, V. E., Keramydas, D., Vogiatzis, R., Taskou, C., Anagnostopoulou, F. A., Nonni, A., Lazaris, A. C., Zografos, G. C., Kavantzas, N., &Thomopoulou, G. E. Clinical, Histopathological, and Immunohistochemical Characteristics of Predictive Biomarkers of Breast Cancer: A Retrospective Study. Cancer diagnosis & prognosis. 2024;4(3), 340–351.

[17]   Kelsey JL, Gammon MD, John EM. Reproductive factors and breast cancer. Epidemiol Rev. 1993;15(1):36-47.

[18]   Rathod V, Jha CK, Sinha U, Singh PK, Kumar A, Bhadani PP, Kumar M: First comprehensive report of clinicopathological profile of breast cancer from Bihar, India. Indian J SurgOncol. 2021, 12:598-602.10.1007/s13193-021-01404-7

[19]   Freelander A, Brown LJ, Parker A, Segara D, Portman N, Lau B, Lim E. Molecular Biomarkers for Contemporary Therapies in Hormone Receptor-Positive Breast Cancer. Genes (Basel). 2021 Feb 17;12(2):285. doi: 10.3390/genes12020285. PMID: 33671468; PMCID: PMC7922594.