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*Research article*

# Demographic and Clinical Characteristics of Breast Cancer at the National Cancer Center in Benghazi

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**Abstract**

**Background:** Breast cancer ranks among the top five cancers in Libya, with incidence rates varying globally and generally lower in African countries such as Libya and Nigeria. **Aim:** This study aimed to characterize the demographic and clinical profiles of breast cancer patients treated at the Oncology Department of the National Cancer Center in Benghazi, Libya. **Methods:** A retrospective cross-sectional study was conducted at the aforementioned department from February to August 2024. The study included 100 patients. Patients' data were extracted from medical records and analyzed using Microsoft Excel 2016. **Results:** The study patients comprised predominantly Libyan females, with a mean age of 55.4 years. Most patients (98%) were non-smokers and diabetes was the most frequently reported comorbidity. Nearly half (49%) of patients had no family history of breast cancer. Invasive ductal carcinoma was the predominant tumor type. Surgical treatment was the primary modality, frequently combined with chemotherapy and radiotherapy. **Conclusion:** The breast cancer patient population in this study was mainly female with an average age of 55.4 years. The high prevalence of diabetes underscores potential lifestyle influences on breast cancer risk. The absence of family history in nearly half of the cases emphasizes the importance of broad-based awareness and screening programs.

**Keywords:** breast cancer, invasive ductal carcinoma, chemotherapy, radiotherapy, recurrence, Benghazi

## Introduction

Worldwide, breast cancer accounts for one in four cancer cases and is responsible for six cancer-related deaths among women (Boder et al, 2011). The incidence of breast cancer varies significantly across regions; as Western countries, such as Finland, report higher rates, while African countries like Libya and Nigeria have lower incidences (Boder et al., 2011). Furthermore, breast cancer is often diagnosed at a younger age in African patients compared to their European counterparts (Boder et al., 2011).

In Libya, breast cancer is the most prevalent cancer among women, according to the GLOBOCAN 2020 study (Houssein, 2024). While breast cancer is common in women, particularly those aged 50-69, it is most frequently observed in high-income countries (Zhu et al., 2023). Early diagnosis is crucial for improving survival rates for breast cancer. However, due to its propensity to spread easily, regular screening is essential (Zhu et al., 2023). The number of adults diagnosed with cancer who also have one or more chronic health conditions is steadily increasing. Aging is associated with a higher risk of developing cancer alongside other age-related illnesses such as diabetes, chronic obstructive pulmonary disease, heart disease, arthritis, and hypertension (Duthie et al., 2017). A significant majority of older cancer patients, especially those aged 60 and above, live with additional chronic conditions. Moreover, older adults managing three or more chronic illnesses tend to have nearly three times as many healthcare visits compared to those without chronic conditions (Duthie et al., 2017). As the population of individuals living with both cancer and multiple chronic diseases continues to grow, it becomes increasingly important to gain a deeper understanding of their healthcare experiences and needs (Duthie et al., 2017).

There are two types of tumors: benign tumors, which are not dangerous and can be removed by doctors without usually recurring, and malignant tumors, which are life-threatening and have the ability to spread from one part of the body to another (Zhu et al., 2023). Additionally, one of the major risks associated with malignant cancer is its potential to reappear in patients after treatment and recovery, a phenomenon known as cancer recurrence (Hussein et al., 2024). It has also been reported that breast cancer mortality rates are higher in low socio-economic countries (Fu et al., 2025). Therefore, efforts should prioritize these regions by implementing swift intervention strategies to address and reduce the escalating cancer burden (Fu et al., 2025).

There are different types of breast cancer, with the most common being invasive ductal carcinoma and invasive lobular carcinoma (Elfrgani et al., 2024; Masood et al.,

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2025). Despite advances in treatment, managing breast cancer becomes limited once it spreads to other organs. Challenges include the lack of effective methods for preventing the original disease and issues related to drug resistance, whether acquired or new (Ahmad, 2012). In the early stages, the chances of remaining disease-free are good; however, there are cases where the tumor may recur after a period of treatment (Lamerato et al, 2010). Breast cancer recurrence remains a significant issue despite advancements in treatment. Early interventions are effective, but the disease may return even after initial treatment (Zhu et al., 2023). The aim of this study was to investigate the demographic and clinical characteristics of breast cancer patients treated at the National Cancer Center in Benghazi.

## Patients and methods

This retrospective cross-sectional study was conducted in Oncology Department at the National Cancer Center for tumors in Benghazi, Libya, from February 2024 to the end of August 2024. Total sample size was 100 patients including 99 female and 1 male with an age range of 35 to 65 years. The data was collected from the patients' files and records and analyzed by Microsoft Office Excel 2016 program (Microsoft, USA).

### *Ethical approval*

This study was approved by the Biomedical Regional Ethics Committee and conducted in accordance with their guidelines, as well as the principles outlined in the 1964 Declaration of Helsinki and its subsequent amendments. Informed consent for the use of anonymized data was obtained from all participants as part of their initial treatment consent. Patient confidentiality was strictly maintained throughout the research process.

## Results

Most of the patients were non-smokers (98%), and their nationality was either Libyan (95%), Syrian (2%), Egyptian (2%) or Sudanese (1%). The average age of the patients was 55.4 years, ranging from 30 to 89 years.

Although more than the half of patients (about 53%) did not suffer any chronic diseases, 10% of patients had diabetes mellitus (DM), 4% had DM and hypertension (HTN), 4% had DM and hypothyroidism, 1% had DM and heart diseases, 4 % had HTN alone, 1% had DM, HTN and hypothyroidism (Figure 1), while 19% of the cases were unknown.

Although 49% of patients had no known family history of breast cancer, 12% of them stated they had a sister, 4% had a mother, 3% had an aunt and 1% had a brother with breast cancer history. Four percent of patient claimed they had a relative without stating the relationship while 27% of them did not know.

The breast cancer was found unilateral with a similar percentage for both the right and left breast sides (48%) and only 4% of patients presented with bilateral cancer lesions. Regarding the size, about the half of tumors were between 2 and 5 cm (47%), 40% of them were less than 2 cm, nine percent (9%) were larger than 5 cm and four percent (4%) of tumors were growing into the chest wall or skin. Regarding the tumor grade, 48% of patients were of grade 2, 27% of patients had grade 3 tumors and grade 1 was present in only 9% of patients. The tumor grade was not indicated in 16 cases.

In terms of tumor type, Invasive ductal carcinoma (IDC) was the most frequently diagnosed breast cancer with a percentage of 80%. Moreover, invasive lobular carcinoma (ILC) was the second most type with 14%. The ductal carcinoma in situ (DCIS) was present in 5% of patients and mucinous cancer was present in only one case (1%).

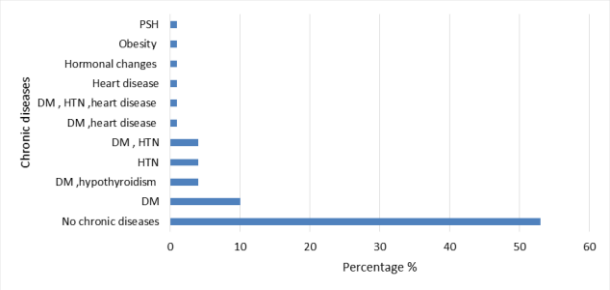


**Figure 1.** The distribution of chronic diseases in breast cancer patients in Benghazi. PSH: paroxysmal sympathetic hyperactivity. DM: diabetes mellitus. HTN: hypertension

The mostly applied treatment was the surgical removal of the cancerous tissue. Mastectomy was used 10 times, modified radical mastectomy (MRM) was used in 7 cases, excisional surgery was used 2 times and biopsy and lumpectomy was used once each (Figure 2). Fifty six cases (56%) were labeled surgery only without indicating the type of surgical intervention applied, so no further analysis was possible (Figure 2). In 23 cases (23%), no record was available regarding whether they receive a surgical treatment or not.

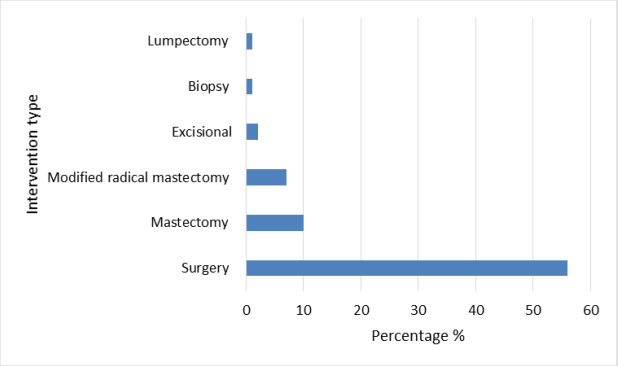


**Figure 2.** Types of surgical interventions in breast cancer patients.

Chemotherapy was essentially used either alone in 33% of cases or with radiotherapy in 35 cases (35%), while the radiotherapy alone was administered in only 6 cases (6%). Chemotherapy with hormonal therapy was applied also in 6 cases (6%) (Figure 3). Similarly, the three types (chemotherapy, radiotherapy and hormonal therapy) were collectively also used in 6 cases (6%) (Figure 3). Hormonal therapy alone was used in 4 cases (4%) and radiotherapy with hormonal therapy were only used 3 times (3%) (Figure 3). In seven cases (7%), the type of

therapy, either chemotherapy, radiotherapy or hormonal therapy, was not indicated.

In this study, the data analysis indicated also that, within the represented sample, a substantial majority of breast cancer cases (93%) did not have a recurrence. In contrast, a smaller fraction of cases (7%) experienced a recurrence.

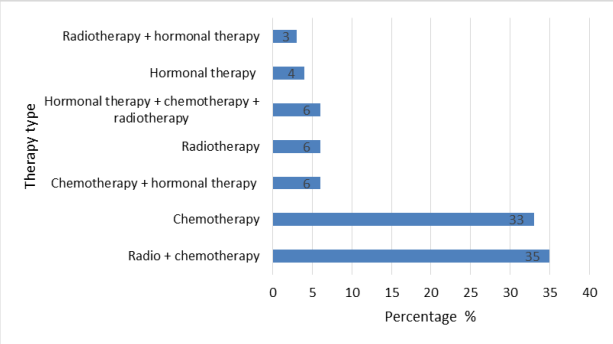


**Figure 3.** Types of therapies applied to breast cancer patients.

## Discussion

This study aimed to investigate the demographic and clinical characteristics of breast cancer in patients admitted to the National Cancer Center in Benghazi. The predominance of females in this study aligns with global breast cancer trends and may reflect both biological and social risk factors. Previous studies have reported similar trends regarding the average age of patients (Masood *et al.*, 2025; Elhawari *et al*, 2025). The average age of 55.4 years for patients diagnosed with breast cancer suggests that many may be experiencing hormonal menopausal changes, which can influence both the development and progression of the disease (Chlebowski and Anderson, 2012; Elfrgani *et al.*, 2024; Masood *et al.*, 2025; Elhawari *et al*, 2025). This finding is consistent with existing literature that highlights the age-related incidence of breast cancer, although some studies have indicated a lower age of incidence (Elfrgani *et al*., 2024; Masood *et al*., 2025). According to the American Cancer Society (2022), the risk of breast cancer increases with age, with the majority of cases diagnosed in women over 50. Furthermore, women diagnosed at older ages may present with different comorbidities that can complicate treatment decisions (Derks *et al.*, 2016).

The current study provides valuable insights into the prevalence of chronic diseases and family history among patients diagnosed with breast cancer. Among those with chronic conditions, 10 patients were diagnosed with diabetes mellitus. The association between diabetes and breast cancer is supported by multiple studies, which suggest that insulin resistance and hyperglycemia may promote tumorigenesis through various pathways, including increased levels of insulin-like growth factors (Chlebowski and Anderson, 2012). Additionally, the presence of other chronic conditions such as hypertension, heart disease, and hypothyroidism complicates the clinical landscape, as patients with hypertension may require careful management during chemotherapy due to potential cardiovascular risks (Pandey *et al.*, 2023). These findings align with existing literature that emphasizes the importance of monitoring chronic conditions in cancer patients (Pandey *et al.*, 2023). Comorbidities like diabetes and hypertension are prevalent among cancer patients and can adversely affect survival rates, indicating a need for integrated care approaches that address both cancer treatment and the management of chronic diseases (Pandey *et al.*, 2023).

Regarding family history, 24% of reported cases had a close family member affected by the disease. However, the significant proportion of patients without a family history suggests that sporadic cases are common. This result is consistent with findings from other studies indicating that most breast cancers are not hereditary (Patnaik *et al.*, 2011; Haber *et al*., 2021).

The distribution of cancer involvement across breast sides showed no difference for either the right or left breast, with only 4% of cases being bilateral, which is consistent with previous research (Elfrgani *et al*., 2024). The size of breast tumors at diagnosis is a well-established prognostic factor. Tumors measuring less than 2 cm are generally associated with a better prognosis compared to larger tumors (Chudgar and Mankoff, 2017). The high percentage of tumors in the 2-5 cm range suggests that a considerable number of patients may present with more advanced disease, which could necessitate more aggressive treatment approaches (Chudgar and Mankoff, 2017). In terms of tumor grade, the findings are in agreement with previous studies, indicating that the majority of patients fell into grade 2, with a smaller number classified as grade 3 (Chlebowski and Anderson, 2012; Elfrgani *et al*., 2024). Tumor grade is determined by the degree of differentiation of cancer cells and serves as a crucial indicator of tumor aggressiveness. Higher-grade tumors (grade 3) are typically associated with poorer outcomes due to their more aggressive nature and higher likelihood of metastasis. The predominance of grade 2 tumors in this study suggests a potentially favorable prognosis.

Histologically, invasive ductal carcinoma (IDC) was the most prevalent subtype, accounting for 80% of cases in this study. This high incidence of IDC aligns with existing literature, which consistently identifies IDC as the predominant form of breast cancer (Chlebowski and Anderson, 2012; Elfrgani *et al*., 2024). The current study also provides insights into treatment modalities, revealing a predominant reliance on surgical interventions, specifically mastectomy and modified radical mastectomy (MRM). Surgical removal of cancerous tissue is a cornerstone of breast cancer treatment (Ozmen and Ozmen, 2023), with the data indicating that mastectomy was performed in 10 cases and MRM in 7 cases. Mastectomy, which involves the complete removal of one or both breasts, is often indicated in cases of large tumors or multifocal disease (Ozmen and Ozmen, 2023). MRM, which preserves some breast tissue while removing lymph nodes, is frequently employed for patients with node-positive disease and has been shown to provide effective local control (Ozmen and Ozmen, 2023). Additionally, the study highlights that chemotherapy was the primary adjuvant therapy administered either alone, in 33% of cases, or in combination with radiotherapy in 35% of cases. The combination of chemotherapy with radiotherapy is often recommended for patients

undergoing breast-conserving surgery to minimize local recurrence rates (Wang and Wu, 2023). The findings presented indicate that a substantial majority of patients did not experience a recurrence following treatment. This aligns with established literature suggesting that effective surgical and adjuvant therapies can lead to favorable long-term outcomes of treatment for breast cancer patients (EBCTCG, 2018).

## Conclusion

The patient population in this study shows a significant representation from Libya, with the majority diagnosed with invasive ductal carcinoma. Surgical intervention was the primary treatment modality, often supplemented by chemotherapy and radiotherapy. Notably, nearly half of the participants lacked a family history of breast cancer, highlighting the critical need for screening and awareness programs. These initiatives should be extended to individuals without a family history, considering the high proportion of sporadic cases.

### *Conflict of interest*

The authors declare no conflicts of interest.

### *Authors' contribution*

All authors contributed to the study conception and design. Material preparation and data collection were performed by Wail A. Elhawari, Tareq E. Lehmidi, Retaj A. Salem, Nabila M. Alwarfali, Sondos F. Alsadeg, Aisha M. Bazama, and Malak A. Alrayani. Data analysis was performed by Abeer H. Amer. The first draft of the manuscript was written by Hend R. Awad. All authors commented on the manuscript versions and read and approved the final version.

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