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Demographic and Clinical Characteristics of Breast Cancer Patients in Bahawalpur Pakistan: A Comprehensive Analysis

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Abstract: This study was conducted at Bahawalpur Medical and Dental College (BMDC) in collaboration with Bahawalpur Institute of Nuclear Oncology (BINO) Hospital, Pakistan, and aimed to analyze the demographic and clinical characteristics of breast cancer patients. A self-structured questionnaire was developed to collect comprehensive data, including gender, age, regional residence, marital status, reproductive history, BMI, cancer type, stage, time of detection, and family cancer history. Data were collected from 500 female breast cancer patients, with 402 meeting inclusion criteria after excluding incomplete records and male patients. The study revealed a distribution of breast cancer cases across age groups, with a majority aged 41–60 years. BMI classification showed notable proportions of patients classified as obese. Family cancer history was reported in 35.3% of patients. Most patients were non-smokers (97%), and reproductive status showed 37.3% premenopausal, 60.2% postmenopausal, and 2.5% nulliparous. Cancer staging indicated 7.9% with stage 1, 27.4% with stage 2, 42.0% with stage 3, and 16.2% with stage 4 cancer. The majority (95.3%) were diagnosed within 0–5 years of detection. Comparisons with existing literature highlight consistency in age distribution trends and BMI correlations, while variations exist in family cancer history and smoking prevalence. The findings emphasize the importance of tailored prevention and early detection strategies, considering demographic and clinical profiles to enhance breast cancer management and outcomes in Bahawalpur, Pakistan. Further research is warranted to validate these findings and explore additional factors influencing breast cancer incidence and treatment responses.

Keywords: Cancer; Epidemiology; Clinical parameter; BMI

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1. Introduction

Cancer is one of the leading causes of mortality worldwide [1]. Globally, 1.7 million new breast cancer cases

are diagnosed every year and 33% of them die of the disease [2]. Every 14 s, a woman somewhere in the world is diagnosed with breast cancer. In 2020, more than 2.3 million women were diagnosed with breast cancer globally, and out of these 6,85,000 died [3]. In case of the Asia breast cancer is the most common and second leading cause accounting for cancer-related deaths with a figure of 39% of all breast cancers diagnosed globally [4]. In the case of the Pakistani population incidence of breast cancer is 2.5 times higher as compared to India and Iran, accounting for 34.6% of female cancers [2]. The incidence of breast cancer is highly increasing as compared to other Asian countries with an average lifespan of 67 years. Even the ratio of recurrence is almost 20–30% among the women treated or considered free of this disease [5]. Breast cancer is generally classified based on the histological appearance, either into lesions that originate from the ductal epithelium (inner lining) or the lobular epithelium which is the conduit of milk to ducts [1]. WHO has classified breast cancer into 21 distinctive histological types depending on cell morphology, growth and architectural patterns. The two most common types of breast cancer are Invasive Ductal Carcinoma (IDC) and Invasive Lobular Carcinoma (ILC) according to the incidence of about 75% and 15% respectively [2]. Overall, there are multiple risk factors for breast cancer including epigenetic [6], genetic [7] and environmental or specific lifestyle factors. It is estimated that genetic factors contribute to 5–10% of breast cancer cases while 90–95% are related to environmental factors [8]. These factors including inheritance or family history [9–11], genetic alterations [12], age of women [13], reproductive status of the women [14–16], geographic variations [15], alcohol consumption [17], tobacco smoking [8,18], exposure to pesticides [19,20], exposure to arsenic [21], exposure to cadmium [22], obesity [21,23,24], excess fat consumption [25], fertility treatments [26], use of contraceptive pills [27,28], hormone replacement therapy [29,30], sedentary behavior or lack of physical activity [31], early age at menarche [14], marital status [32–34], skin microbiota [35]. Risk factors can also be placed into two main camps, i.e. non-modifiable risk factors and modifiable risk factors [36]. The goal of the current study is to summarize most of the major demographic factors such as the age of the woman, marital status of the woman, reproductive status, BMI of the woman, tobacco smoking, family history of any type of cancer, time of detection of breast cancer and geographical variations contributing to the high possibility of developing breast cancer up to date.

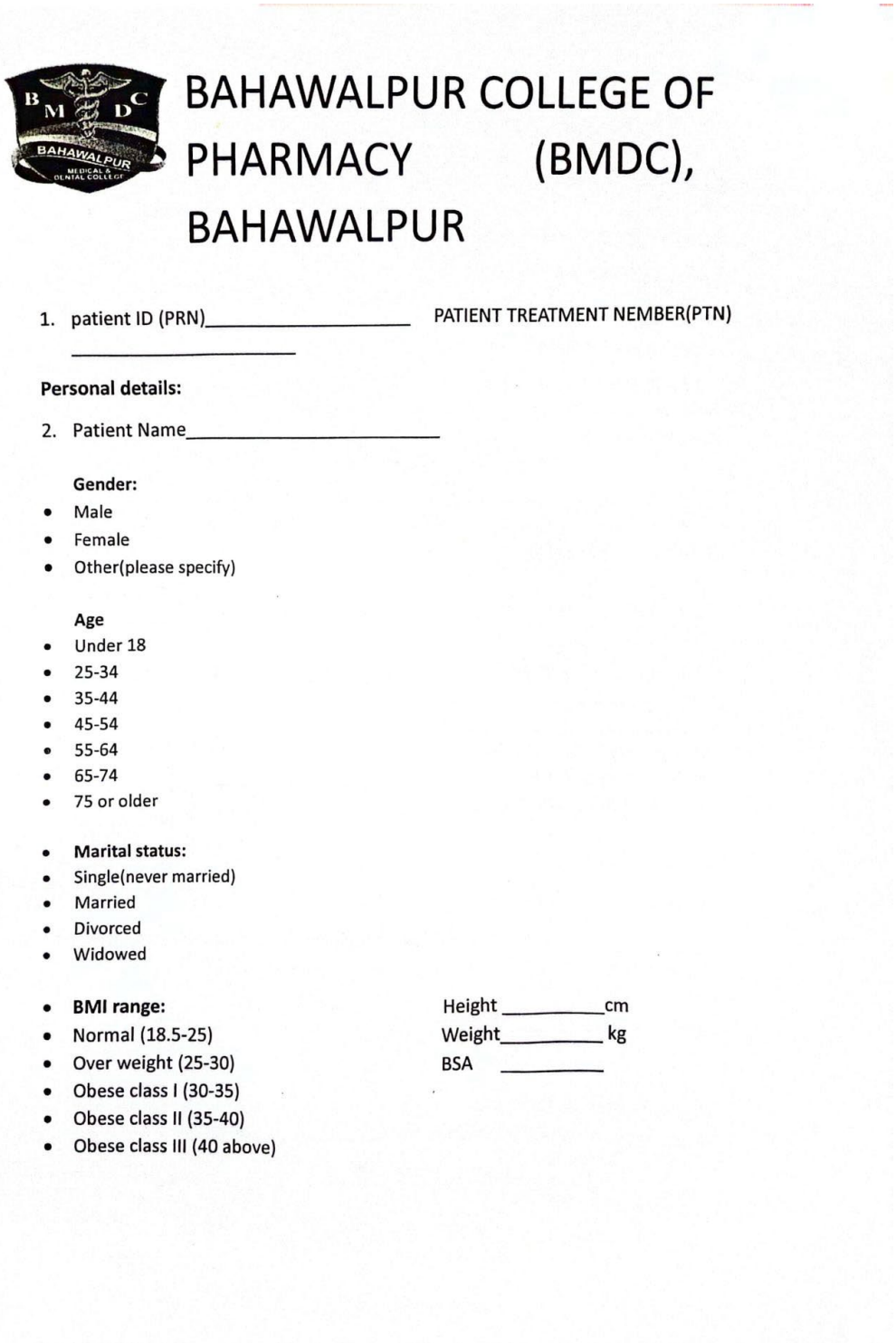
2. Methodology

2.1. Site of the study

This study was conducted at Bahawalpur Medical and Dental College (BMDC), Bahawalpur, in collaboration with the Bahawalpur Institute of Nuclear Oncology (BINO) Hospital, Bahawalpur, Pakistan.

2.2. Questionnaire design

The authors of this study developed a self-structured, detailed questionnaire to collect demographic data from breast cancer patients. This comprehensive questionnaire was designed to capture a wide range of demographic variables, including gender, age, regional area of residence, marital status, reproductive status, body mass index (BMI), type and stage of cancer, time of detection, and family history of cancer. The questionnaire is presented in detail below (**Figure 1**).



BAHAWALPUR COLLEGE OF PHARMACY (BMDC), BAHAWALPUR

1. patient ID (PRN)_____ PATIENT TREATMENT NEMBER(PTN) _____

Personal details:

2. Patient Name_____

Gender:

- Male
- Female
- Other(please specify)

Age

- Under 18
- 25-34
- 35-44
- 45-54
- 55-64
- 65-74
- 75 or older

- **Marital status:**
- Single(never married)
- Married
- Divorced
- Widowed

- **BMI range:**
- Normal (18.5-25)
- Over weight (25-30)
- Obese class I (30-35)
- Obese class II (35-40)
- Obese class III (40 above)

Height _____cm
Weight_____ kg
BSA _____

Figure 1. A scan copy of the designed questionnaire for data collection.

2.3. Data collection procedure

2.3.1. Application for data collection

The study submitted a formal written application to the concerned department at BINO Hospital. The purpose of this application was to seek permission to collect the demographic data required for the study. This step was essential to gain authorized access to the hospital's patient records.

2.3.2. Study duration

The application underwent a thorough review by the hospital authorities, and another application was forwarded for security clearance to the Pakistan Atomic Energy Commission. Access was granted to the patient record room for a specified period of six months, from February 15, 2024, to August 15, 2024. This access was crucial for the primary investigators to gather the necessary data.

2.3.3. Data collection

The data collection process involved extracting information on demographic variables, clinical history, and pathological findings. The primary investigators conducted this data collection by filling out questionnaires based on the information available in the patient records. A comprehensive review was undertaken, examining the records of 500 breast cancer patients during the specified period.

2.3.4. Inclusion and exclusion criteria

To ensure the relevance and completeness of the data, specific inclusion and exclusion criteria were applied. The inclusion criteria focused on female breast cancer patients with a confirmed diagnosis. Conversely, 94 patients were excluded from the study due to incomplete information pertinent to the study objectives. Additionally, 2 male breast cancer patients were excluded, as the study aimed solely at female patients.

2.3.5. Final sample size

After applying the inclusion and exclusion criteria, the final sample consisted of female breast cancer patients whose records were complete and met the study's objectives. This process ensured that the dataset used for the study was both relevant and comprehensive.

3. Results

3.1. Stratification of BC patients according to age

In this section of the study, the collected samples were categorized into the following age groups: 0–20 years, 21–40 years, 41–60 years, and 61–80 years. The total number of breast cancer patients included in the study was 402. Among these patients, there were no individuals aged 0–20 years (0%). A total of 94 patients (23.4%) were aged 21–40 years, while the majority, 249 patients (61.9%), were aged 41–60 years. Additionally, 59 patients (14.7%) were aged 61–80 years (**Figure 2**).

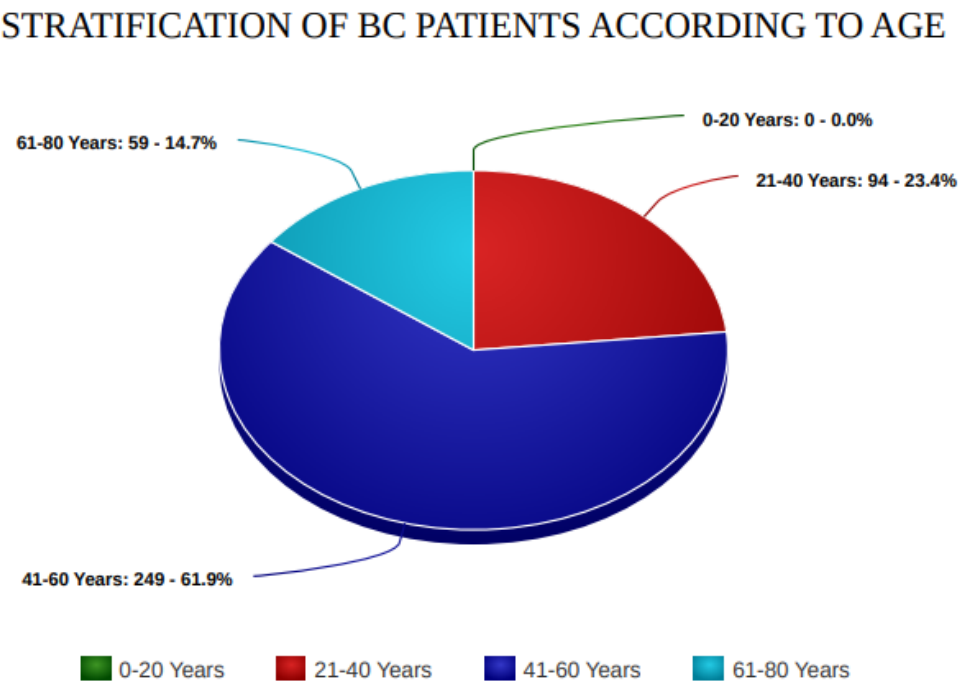


Figure 2. Stratification of breast cancer cases into different age groups.

3.2. Stratification of BC patients according to the BMI ranges

In this section of our study, the collected breast cancer cases were divided into the following categories: underweight, normal weight, overweight, and obese. The total number of breast cancer patients included in the study was 402. Among these patients, 32 (7.9%) were underweight, 147 (36.6%) had normal weight, 88 (21.9%) were overweight, and 135 (33.6%) were classified as obese (**Figure 3**).

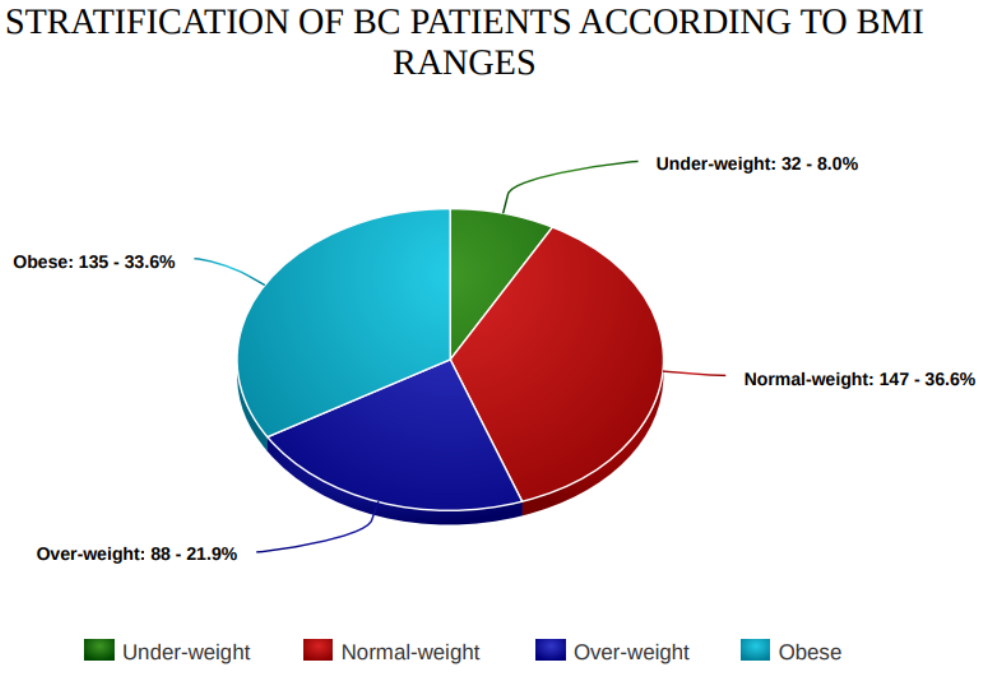


Figure 3. Stratification of breast cancer cases into different groups based on BMI status.

3.3. Stratification of BC patients according to family history of prior cancer

In this segment of the study, all cases were organized into two categories: breast cancer patients with a family history of cancer and those without. The total number of breast cancer patients included in the study was 402. Among these, 142 patients (35.3%) had a family history of cancer, while 260 patients (64.7%) had no family history of cancer (**Figure 4**).

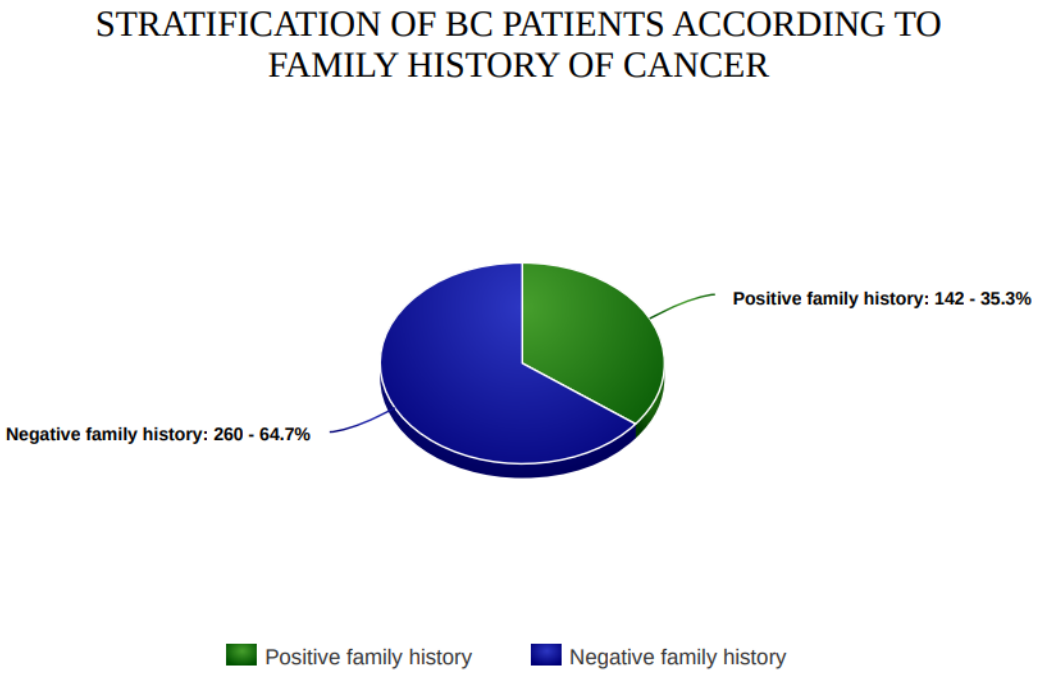


Figure 4. Stratification of breast cancer cases into different groups based on family history of cancer.

3.4. Stratification of BC patients according to smoking status

In this section of the study, all cases of breast cancer (BC) patients were organized into two major categories: smokers and non-smokers. Out of the 402 BC patients, 390 (97%) were non-smokers, whereas 12 (3%) were active smokers (**Figure 5**).

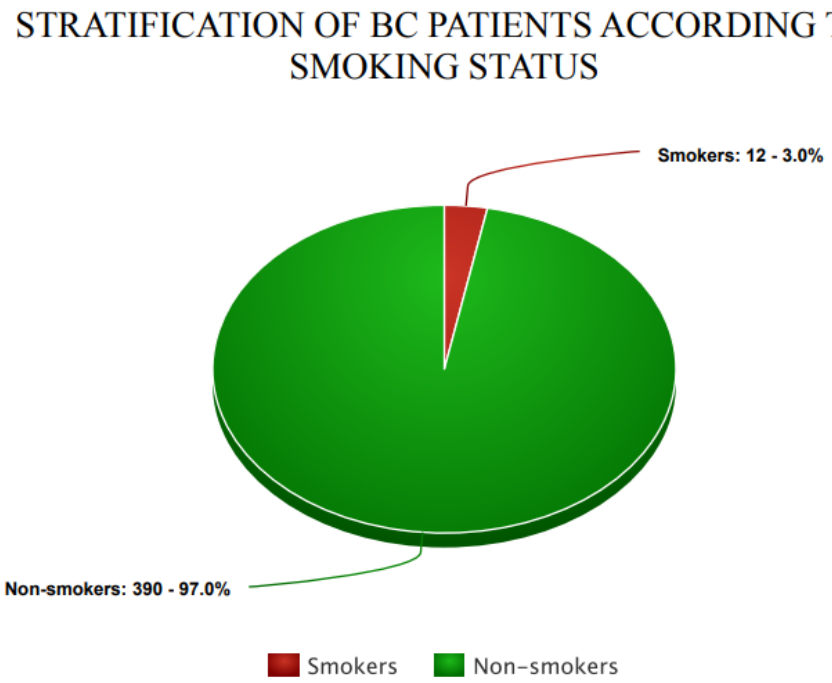


Figure 5. Stratification of breast cancer cases into different groups based on smoking status.

3.5. Stratification of BC patients according to reproductive status

Within this part of the research, all the collected data were classified according to the reproductive status of the female breast cancer patients into three categories: premenopausal, postmenopausal, and nulliparous. Among the total 402 female breast cancer patients, 150 (37.3%) were premenopausal, 242 (60.2%) were postmenopausal, and 10 (2.5%) were nulliparous (**Figure 6**).

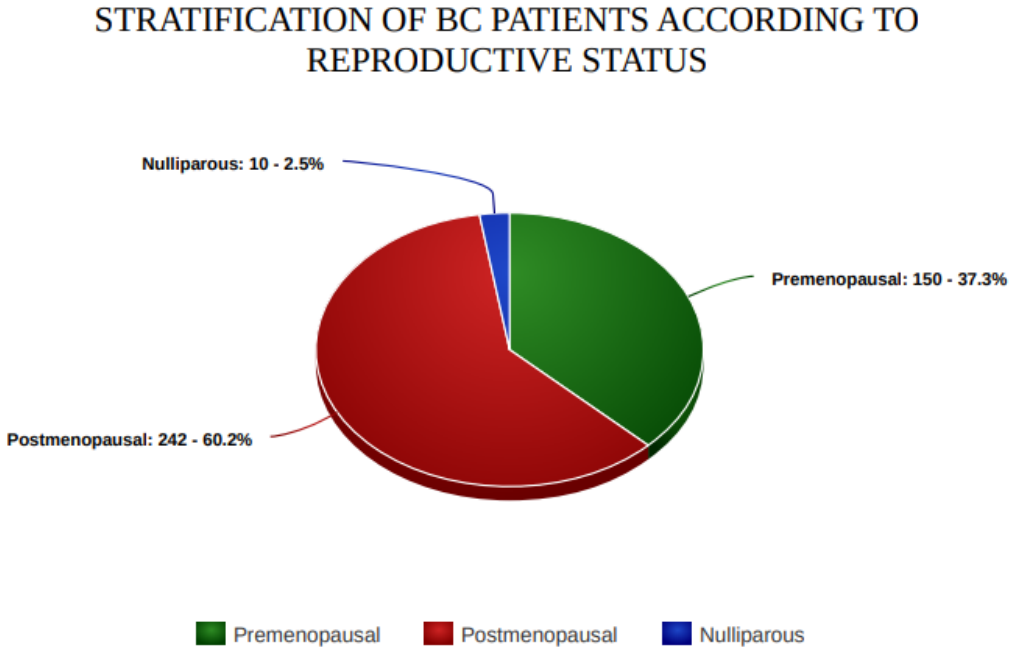


Figure 6. Stratification of breast cancer cases into different groups based on reproductive status.

3.6. Stratification of BC patients according to the cancer stage

Herein, all collected cases of breast cancer patients were categorized based on the detected stage of breast cancer: stage 1, stage 2, stage 3, stage 4, and stage unknown. Among the 402 breast cancer patients, 32 patients (7.9%) were diagnosed with stage 1 cancer, 110 patients (27.4%) with stage 2 cancer, 169 patients (42.0%) with stage 3 cancer, and 65 patients (16.2%) with stage 4 cancer. Additionally, 26 patients (6.5%) had an unknown stage of cancer (**Figure 7**).

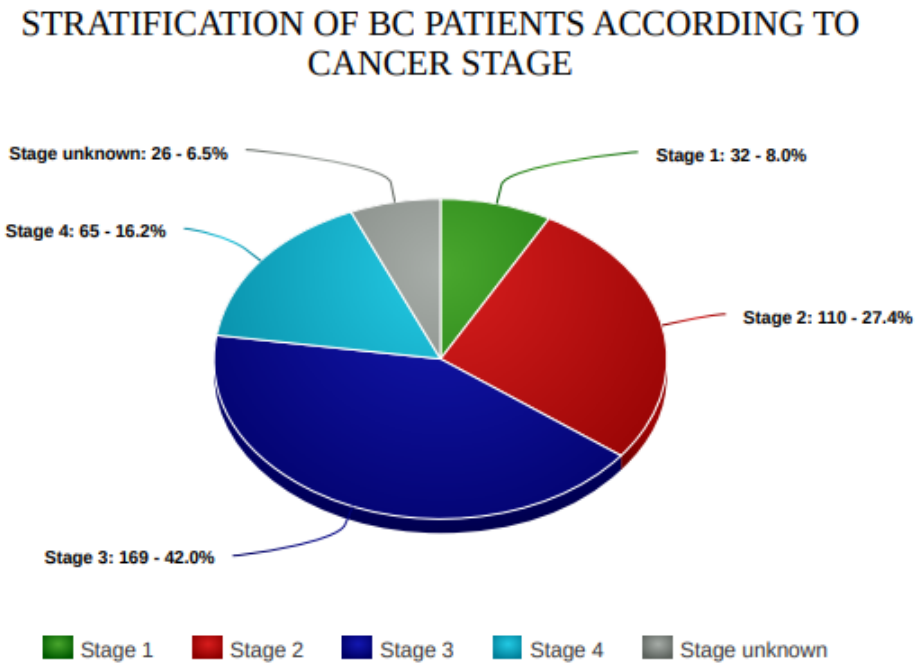


Figure 7. Stratification of breast cancer cases into different groups based on different cancer stages.

3.7. Stratification of BC patients according to the time of detection

Within this portion of the study, all collected data of breast cancer patients were classified into five categories based on the time since diagnosis: 0–5 years, 6–10 years, 11–15 years, and 16–20 years. Among the total 402 breast cancer patients, the distribution based on diagnosis duration was as follows: 383 patients (95.3%) were diagnosed within 0–5 years, 15 patients (3.7%) were diagnosed within 6–10 years, and 2 patients (0.5%) were diagnosed within both the 11–15 years and 16–20 years categories (**Figure 8**).

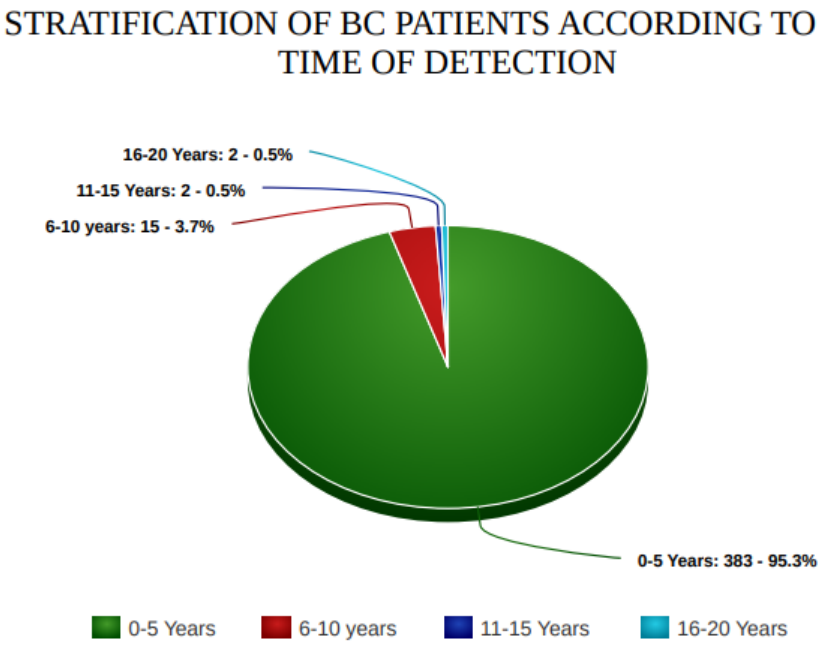


Figure 8. Stratification of breast cancer cases into different groups based on the status of time of detection.

4. Discussion

Breast cancer is a complex and prevalent form of cancer that originates in the cells of the breast tissue [37]. It is characterized by abnormal growth and proliferation of cells, which can form tumors that invade nearby tissues and, in advanced stages, metastasize to other parts of the body [38]. Breast cancer can affect both women and, although less commonly, men. It is the most common cancer among women worldwide, impacting millions of lives annually [39]. Early detection through screening programs, combined with advances in treatment modalities such as surgery, chemotherapy, radiation therapy, and targeted therapies has significantly improved survival rates and outcomes [40]. Ongoing research continues to unravel the genetic, environmental, and lifestyle factors contributing to breast cancer development, aiming to enhance prevention strategies and personalized treatment approaches.

This study aimed to comprehensively analyze various demographic and clinical factors among breast cancer patients at Bahawalpur Institute of Nuclear Oncology (BINO) Hospital, Bahawalpur, Pakistan. The findings from this study provide valuable insights into the distribution and characteristics of breast cancer within the studied population.

The study categorized breast cancer patients based on age, BMI, family history of cancer, smoking status, reproductive status, cancer stage, and time since detection. Regarding age distribution, a significant proportion of patients fell within the 41–60 years age group, consistent with global trends where breast cancer incidence peaks during middle-age [41,42]. The distribution based on BMI showed a notable prevalence of obesity among the patients, which is increasingly recognized as a risk factor for breast cancer [43,44].

Comparing the findings with previous studies reveals both consistencies and variations, similar to global and regional trends, the study found a predominant occurrence of breast cancer among middle-aged women [45,46]. However, the distribution of BMI categories and the prevalence of specific risk factors such as family history and smoking status may vary across different populations and settings.

Understanding the demographic and clinical profiles of breast cancer patients is crucial for informing targeted prevention strategies, early detection efforts, and personalized treatment plans. The high prevalence of obesity among the study population emphasizes the importance of lifestyle interventions and public health initiatives aimed at promoting healthy weight management to reduce breast cancer risk. It is important to

acknowledge several limitations of the study, including its retrospective nature and reliance on hospital records. Future research could benefit from longitudinal studies and larger sample sizes to further validate the findings and explore additional factors influencing breast cancer incidence and outcomes.

5. Conclusion

In conclusion, this study contributes to the growing body of knowledge on breast cancer epidemiology in Bahawalpur, Pakistan. By analyzing demographic and clinical data, key patterns and trends have been identified that can guide both clinical practice and public health interventions aimed at reducing the burden of breast cancer in this region. Future research and collaborative efforts are essential to further refine the understanding and improve outcomes for breast cancer patients.

Disclosure statement

The authors declare no conflict of interest.

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