



Case report

# Comparison of BIRADS score on imaging with the histopathology result in Tripoli Central Hospital

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## Abstract

Breast cancer is the most common malignancy in females, with a global incidence of 2.26 million in 2020. The projected incidence of breast cancer is estimated at 2.7 million annually by 2030. The purpose of this study is to assess the histopathology result of BIRADS score on imaging and to determine the accuracy of imaging reports using the BIRADS system in our setting. This was a retrospective cross-sectional study conducted at breast clinic, general surgery department, Tripoli Central Hospital from 2018 to 2022. After obtaining the ethical approval, the study included 150 female patients diagnosed with breast diseases and cancer during the time interval which were selected by convenient sampling techniques and the extracted data was filled through predesigned questionnaire. The mean age  $\pm$  SD of patients was  $45.51 \pm 12.983$  (age range 14 to 76 years). There were 147 (98%) females and 3 (2%) males. A total of 38 (25.3%) of patients reported positive family history of breast disease. Eighty-four (56%) of patients had mammogram while 66 (44%) of them had breast ultrasound. Regarding the radiological imaging findings frequency, 54.7% (82) of patients had ill-defined mass on mammogram, 22.7% (34) had micro calcifications on mammogram, 4.7% (7) had dense fibro glandular tissue calcifications and 11.3% (17) had cysts. A total of 112 (74.7%) of patients had core biopsy (True-cut biopsy) followed by 26 (17.3%) had excisional biopsy, 8 (5.3%) had incisional biopsy and 4 (2.7%) had fine needle aspiration. Generally, the Breast Imaging Reporting and Data System (BIRADS) scoring system frequency had identified that 29.3% (44) of patients had score 3 which divided into 36 (24%) with benign features and 8 (5.3%) with malignant features followed by 20.7% (31) of them had score 4A which divided into 23 (15.4%) with malignant features and 8 (5.3%) with benign features. Regarding the breast lesions frequency, 46.7% (70) of patients had benign breast lesions while 53.3% (80) had malignant breast lesions. On determine the relationship between BIRADS scoring and other related variables had revealed statistically significant results with malignant breast lesions ( $P=0.017$ ), benign breast lesions ( $P=0.046$ ), radiological imaging used ( $P=0.006$ ) and breast biopsy ( $P=0.000$ ). In the current study, high frequency of patients was reported in BIRADS 3 which were turned to be benign (81.9%/36) while (18.1%/8) of them had malignant features. Hence, frequent biopsies and short interval observations are advised in this cohort of patients with BIRADS 3 lesions

**Keywords:** Breast Cancer, BIRADS Scoring, Benign Lesion, Malignancy.

## Introduction

Breast cancer is the most common malignancy in females, with a global incidence of 2.26 million in 2020. The projected incidence of breast cancer is estimated at 2.7 million annually by 2030 [1]. Breast cancer is also the leading cause of cancer deaths among women. Worldwide, breast cancer is responsible for deaths at an age-adjusted rate of 13.6/100000 [1].

The increasing trend in the incidence of breast cancer worldwide mandates that every woman who presents with a breast lump must be subjected to the triple assessment. This signifies the great importance of each step of the triple assessment, clinical examination, imaging, and cytological and/or histopathological diagnosis of the breast lump, to provide corroborative diagnostic evidence for choosing the right clinical action. [1-2]

After the clinical assessment, Breast Imaging Reporting and Data System (BIRADS) characterize the radiological findings and categorize breast lesions into six groups for easy clinical understanding (Ta-

ble). This is a risk assessment tool and quality indicator developed by the American College of Radiology. Following imaging, fine needle aspiration cytology (FNAC) or more commonly a core needle biopsy is performed for a definite pathological diagnosis [3-4].

**Table 1. Breast Imaging Reporting and Data System (BIRADS) for mammography and ultrasound (US) Scoring**

BIRADS Group	Description
BIRADS 0	Incomplete assessment, additional imaging evaluation and/or prior mammograms for comparison are needed.
BIRADS 1	Negative, annual screening mammogram is recommended.
BIRADS 2	Benign finding(s), annual screening mammogram is recommended.
BIRADS 3	Probable benign finding, initial short-interval follow up is suggested (> 2% malignancy risk).
BIRADS 4A	Suspicious abnormality, biopsy should be considered: - 4A (low suspicion): >2% to >10% malignancy risk. - 4B (moderate suspicion): >10% to >50% malignancy risk. - 4C (high suspicion): > 50% to < 95% malignancy risk.
BIRADS 5	Highly suggestive of malignancy, appropriate action should be taken (> 95% malignancy risk).
BIRADS 6	Known biopsy-proven malignancy, appropriate action should be taken.

In 1992, the American College of Radiology (ACR) formed Breast Imaging Reporting and Data system (BI-RADS) to standardize mammographic interpretation<sup>3</sup>. The fourth edition of BI-RADS was introduced in 2003 and proposed a BI-RADS system for the ultrasound (US).

BI-RADS category was created to format mammographic and US interpretation among radiologists, to standardize assessment of the findings, to communicate with the referring physicians and to recommend appropriate care according to imaging findings [16-18]. The purpose of this study is to assess the histopathology result of BIRADS score on imaging and to determine the accuracy of imaging reports using the BIRDS system in our setting.

## Methods

### Study design

Retrospective cross-sectional study.

### Study settings and period

Conducted at breast clinic, general surgery department, Tripoli central hospital from 2018 to 2022.

### Study population

After obtaining the ethical approval; the study included 150 female patients diagnosed with breast diseases and cancer during the time interval which were selected by convenient sampling techniques and the extracted data was filled through predesigned questionnaire.

### Study tool

The used tool contains items to compare the BIRADS score on imaging with the histopathology result.

### Statistical management

The used data was entered, encoded and analyzed through computerized program SPSS (Statistical Package for the Social Sciences) 20 version. Descriptive statistics and inferential statistics were used and summarized on graphical and tubular presentation. The P-value of less than 0.05 and confidence interval of 95% was considered as statistical significant results.

### Ethical consideration

Permission was obtained from breast clinic, general surgery department, Tripoli central hospital. The data collection tools were anonymous with maintained confidentiality throughout the study.

**Results**

We studied 150 female patients diagnosed with breast diseases and cancer at breast clinic, general surgery department, Tripoli central hospital from 2018 to 2022.

**Age distribution**

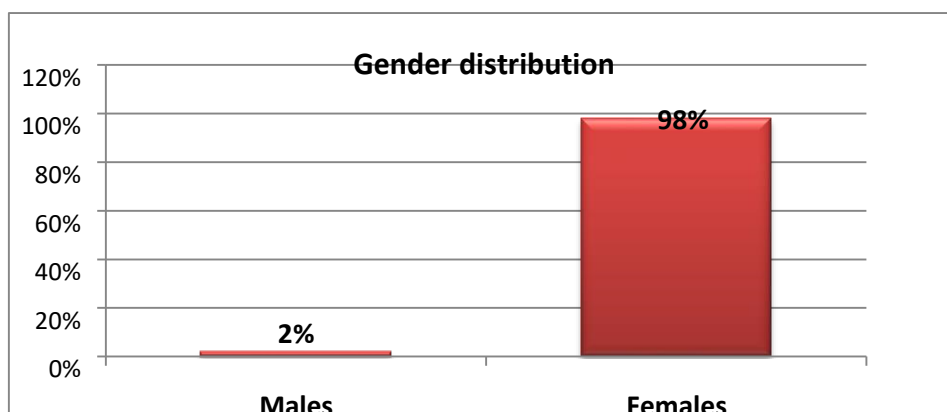
Regarding the age frequency, the mean age of patients was  $45.51 \pm 12.983$  SD with the minimum age was 14 years while the maximum age was 76 years (Table 2).

**Table 2. Age distribution, TCH, Tripoli, Libya, 2018-2022.**

Variables (n = 150)	Age frequency
Mean	45.51
Median	46.00
Mode	54
Std. Deviation	12.983
Minimum	14
Maximum	76

**Gender distribution**

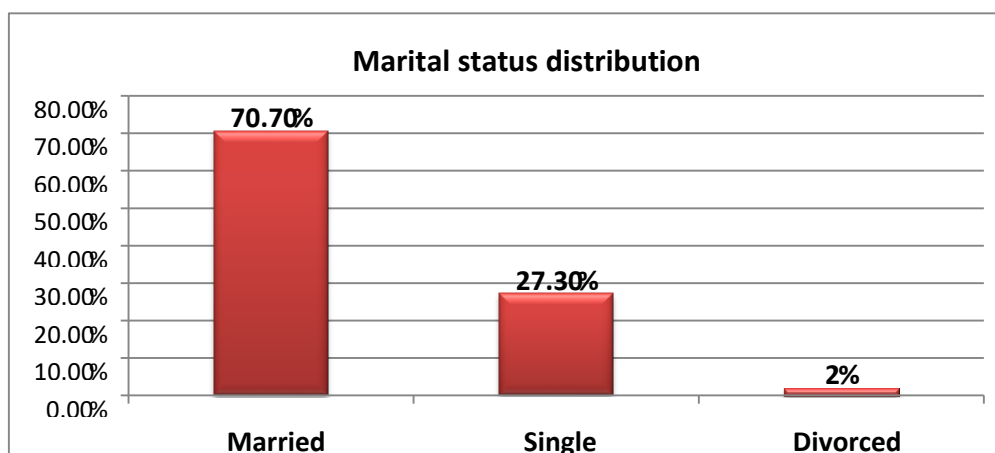
Regarding the gender frequency, majority of patients were females which accounted 98% (147) while just 2% (3) of them were males (Figure 1).



**Figure 1: Gender distribution, TCH, Tripoli, Libya, 2018-2022.**

**Marital status distribution**

Regarding the marital status frequency, 70.7% (106) of patients were married followed by 27.3% (41) were single and 2% (3) were divorced (Figure 2).



**Figure 2: Marital status distribution, TCH, Tripoli, Libya, 2018-2022.**

**Family history of breast disease distribution**

Regarding the family history of breast disease frequency, 25.3% (38) of patients reported positive family history of breast disease (Figure 3).

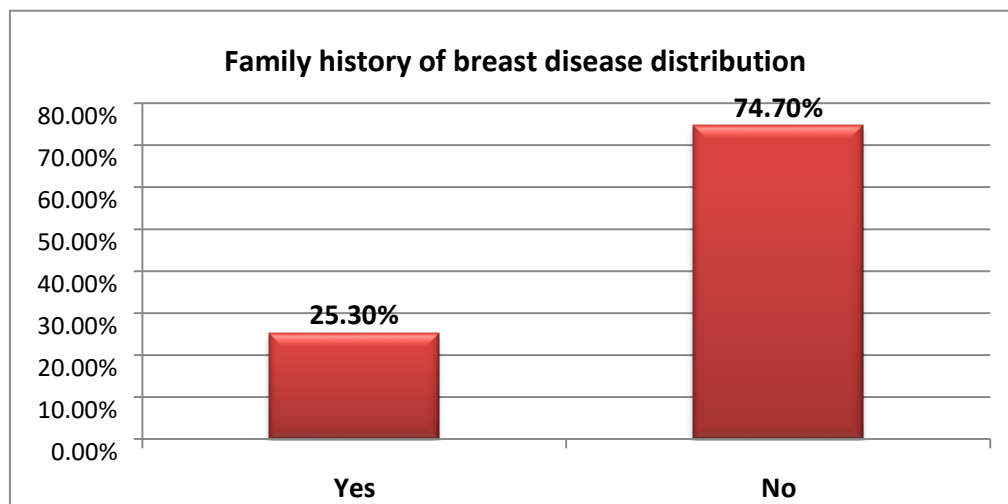


Figure 3: Family history of breast disease distribution, TCH, Tripoli, Libya, 2018-2022.

**Main complains distribution**

Regarding the main complains frequency, 68% (102) of patients had breast lump followed by 13.3% (20) had breast pain and 7.3% (11) had nipple discharge (Table 3).

Table 3: Main complains distribution, TCH, Tripoli, Libya, 2018-2022

Variables (n = 150)	Frequency	Percentage
Breast lump	102	68.0%
Breast pain	20	13.3%
Nipple discharge	11	7.3%
Nipple retraction	7	4.7%
Peaud orange skin	4	2.7%
Skin tethering	4	2.7%
Skin ulcer	1	0.7%
Skin eczema	1	0.7%

**Site of breast lesions distribution**

Regarding the site of breast lesions frequency, 49.3% (74) of patients in right breast followed by 48% (72) of them in left breast while 2.7% (4) had bilateral lesions (Figure 4).

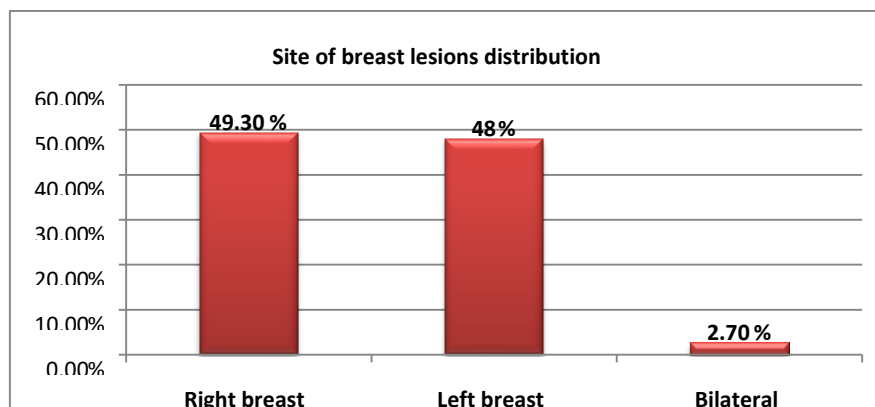


Figure 4: Site of breast lesions distribution, TCH, Tripoli, Libya, 2018-2022.

**Radiological imaging used distribution**

Regarding the radiological imaging used frequency, 56% (84) of patients had mammogram while 44% (66) of them had breast ultrasound (Figure 5).

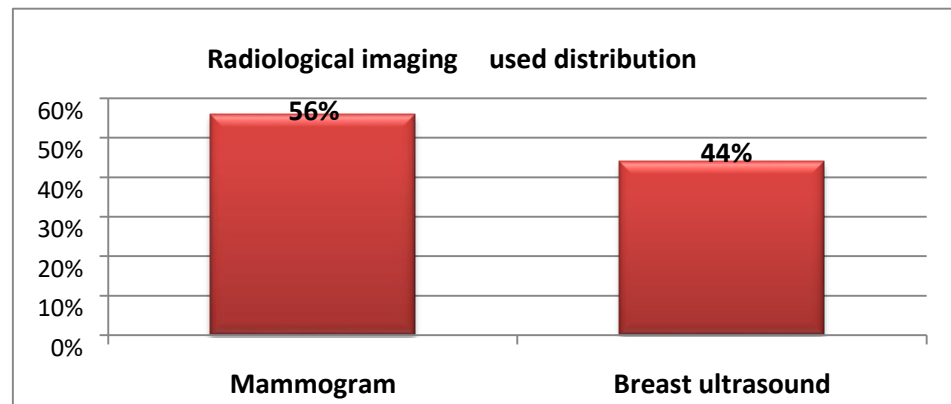


Figure 5: Radiological imaging used distribution, TCH, Tripoli, Libya, 2018-2022.

**Radiological imaging findings distribution**

Regarding the radiological imaging findings frequency, 54.7% (82) of patients had ill defined mass on mammogram, 22.7% (34) had micro calcifications on mammogram, 4.7% (7) had dense fibro glandular tissue calcifications and 11.3% (17) had cysts (Table 4).

Table 4: Radiological imaging findings distribution, TCH, Tripoli, Libya, 2018-2022.

Variables (n = 150)	Frequency	Percentage
Mammogram mass		
Well defined	68	45.3%
Ill defined	82	54.7%
Mammogram calcifications		
With micro calcification	34	22.7%
Without micro calcification	116	77.3%
Dense fibro glandular tissue		
With micro calcification	7	4.7%
Without micro calcification	143	95.3%
Cysts		
Yes	17	11.3%
No	133	88.7%

**Features of micro calcifications distribution:**

Regarding the features of micro calcifications frequency, 9.3% (14) had coarse heterogeneous micro calcifications followed by 5.3% (8) had scattered micro calcifications and another 5.3% (8) had pleomorphic micro calcifications but 25.3% (38) had unknown micro calcifications (Table 5).

Table 5: Features of micro calcifications distribution, TCH, Tripoli, Libya, 2018-2022.

Variables (n = 150)	Frequency	Percentage
Coarse heterogeneous	14	9.3%
Scattered	8	5.3%
Pleomorphic	8	5.3%
Oval	3	2.0%
Punctuate Linear	2	1.3%
Rod shape	2	1.3%
Unknown	38	25.3%

	1	0.7%
	38	25.3%

**Types of biopsy distribution**

Regarding the types of biopsy frequency, 74.7% (112) of patients had core biopsy (True-cut biopsy) followed by 17.3% (26) had excisional biopsy, 5.3% (8) had incisional biopsy and 2.7% (4) had fine needle aspiration (FNAC) (Figure 6).

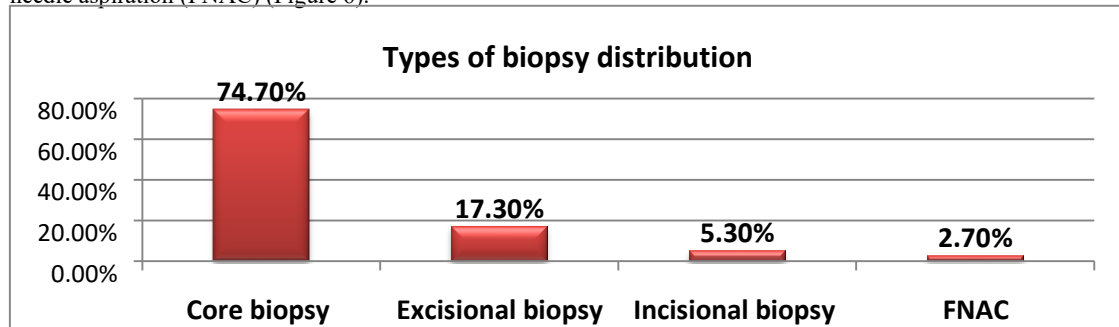


Figure 6: Types of biopsy distribution, TCH, Tripoli, Libya, 2018-2022.

Table 6: General BIRADS scoring and histopathological findings distribution

BIRADS Groups (n = 150)	Benign (n = 70)	Malignant (n = 80)	Total (F/%)
1	1 (0.7%)	0 (0%)	1 (0.7%)
2	22 (14.6%)	3 (2.1%)	25 (16.7%)
3	36 (24%)	8 (5.3%)	44 (29.3%)
4A	8 (5.3%)	23 (15.4%)	31 (20.7%)
4B	2 (1.3%)	9 (6%)	11 (7.3%)
4C	1 (0.7%)	12 (8%)	13 (8.7%)
5	0 (0%)	25 (16.7%)	25 (16.7%)

**BIRADS scoring distribution:**

Generally, the BIRADS scoring system frequency had identified that 29.3% (44) of patients had score 3 which divided into 36 (24%) with benign features and 8 (5.3%) with malignant features followed by 20.7% (31) of them had score 4A which divided into 23 (15.4%) with malignant features and 8 (5.3%) with benign features (Table 6) .

The BIRADS 1: Prone to be benign (100%/1). (Table 6 - Figure 7)

BIRADS 2: Majority of them had recognized to be benign (88%/22) with just (12%/3) had malignant features.

BIRADS 3: Most of them had recognized to be benign (81.9%/36) while (18.1%/8) had malignant features.

BIRADS 4A: Majority of them had recognized to be malignant (74.2%/23) while (25.8%/8) had benign features.

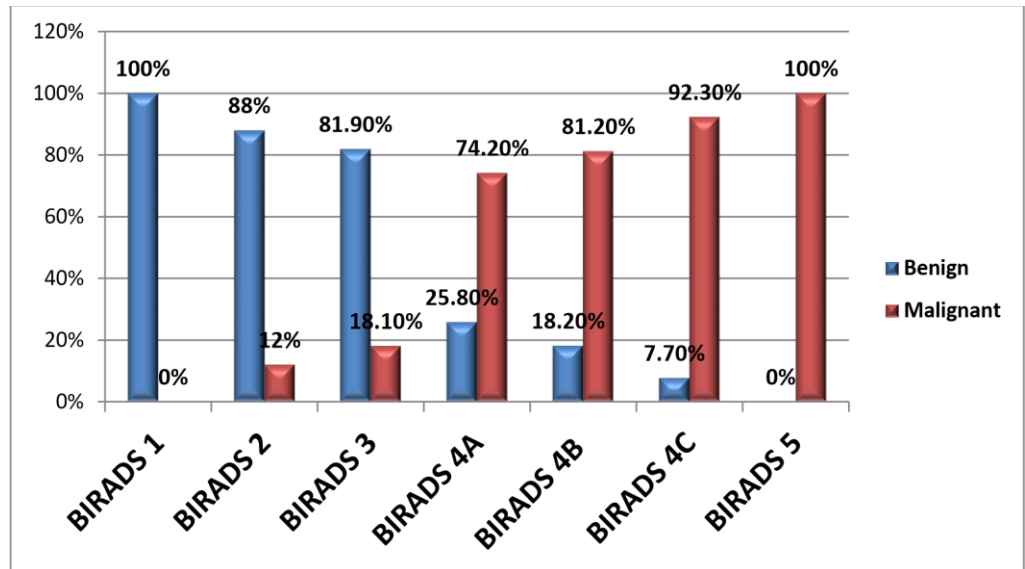
BIRADS 4B: Majority of them had recognized to be malignant (81.2%/9) while (18.2%/2) had benign features.

BIRADS 4C: Majority of them had recognized to be malignant (92.3%/12) while (7.7%/1) had benign features.

BIRADS 5: Almost all cases prone to be malignant (100%/25).

**Table 7: Specific BIRADS scoring and histopathological findings distribution**

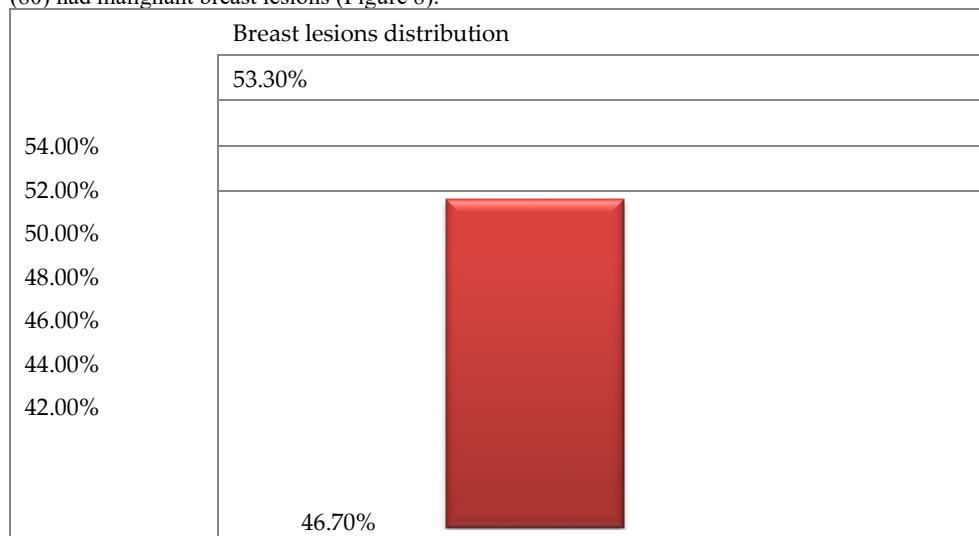
Variables (n = 150)	Total	Benign (n = 70)	Malignant (n = 80)
1	1	1 (100%)	0 (0%)
2	25	22 (88%)	3 (12%)
3	44	36 (81.9%)	8 (18.1%)
4A	31	8 (25.8%)	23 (74.2%)
4B	11	2 (18.2%)	9 (81.2%)
4C	13	1 (7.7%)	12 (92.3%)
5	25	0 (0%)	25 (100%)



**Figure 7: Specific BIRADS scoring and histopathological findings distribution, TCH, Tripoli, Libya, 2018-2022.**

**Breast lesions distribution**

Regarding the breast lesions frequency, 46.7% (70) of patients had benign breast lesions while 53.3% (80) had malignant breast lesions (Figure 8).



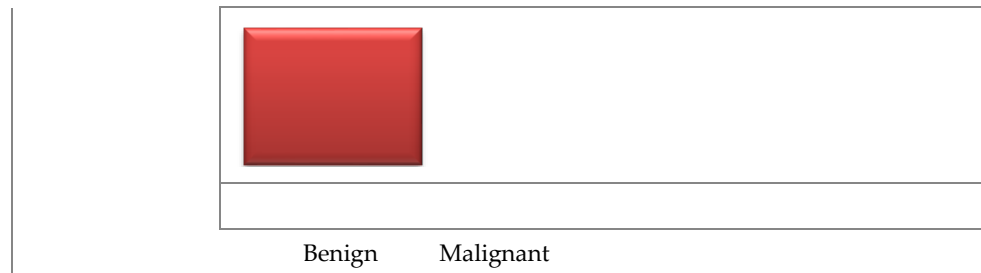


Figure 8: Breast lesions distribution, TCH, Tripoli, Libya, 2018-2022.

**Malignant breast lesions on histopathology results distribution:**

Regarding the malignant breast lesions on histopathology results frequency, out of 80 patients (53.3%) which had malignant breast lesions, 33.3% (50) of them had invasive ductal carcinoma (IDC)- non-specific and 7.3% (11) of them had ductal carcinoma in situ (DCIS)-cribriform (Table 8).

Table 8: Malignant breast lesions on histopathology results distribution, TCH, Tripoli, Libya, 2018-2022.

Variables (n = 80/150)	Frequency	Percentage
Invasive ductal carcinoma (IDC) - non specific	50	33.3%
Invasive ductal carcinoma (IDC) – mucinous (colloid)	3	2.0%
Ductal carcinoma in situ (DCIS)cribriform	11	7.3%
Ductal carcinoma in situ (DCIS)- Comedo	2	1.3%
Ductal carcinoma in situ (DCIS)-Solid	2	1.3%
Ductal carcinoma in situ (DCIS)Papillary	6	4.0%
Invasive lobular carcinoma (ILC) Phyllodes tumor	4	2.7%

**Grades of malignancy distribution**

Regarding the grades of malignancy frequency, 32.7% (49) of patients had Grade II followed by 10.7% (16) had Grade III and 10% (15) had Grade I (Figure 9).

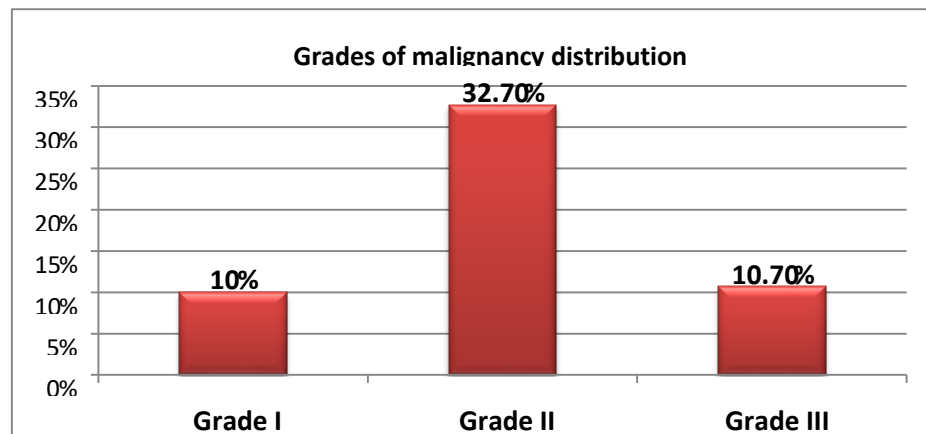


Figure 9: Grades of malignancy distribution, TCH, Tripoli, Libya, 2018-2022.

**Benign breast lesions on histopathology results distribution:**

Regarding the benign breast lesions on histopathology results frequency, out of 70 patients (46.7%) which had benign breast lesions, 17.3% (26) of patients had fibroadenoma followed by 16.7% (25) of them had fibrocystic changes (Table 9).



Table 9: Benign breast lesions on histopathology results distribution, TCH, Tripoli, Libya, 2018-2022.

Variables (n = 70/150)	Frequency	Percentage
Fibroadenoma	26	17.3%
	25	16.7%
Fibrocystic changes	6	4.0%
Fibroadenosis	5	3.3%
Fat necrosis	5	3.3%
Ductal epithelial hyperplasia Fibrosis	3	2.0%

**Relationship between BIRADS scoring and other variables distribution:**

On determine the relationship between BIRADS scoring and other related variables had revealed statistically significant results with malignant breast lesions (P-value = 0.017), benign breast lesions (P-value = 0.046), radiological imaging used (P-value = 0.006) and breast biopsy (P-value = 0.000).

**Discussion**

This study included 150 female patients diagnosed with breast diseases and cancer at breast clinic, general surgery department, Tripoli central hospital from 2018 to 2022. There were 68% (102) of patients had breast lump followed by 13.3% (20) had breast pain and 7.3% (11) had nipple discharge. On the present study, 46.7% (70) of patients had benign breast lesions while 53.3% (80) had malignant breast lesions. Chotiyano et al. documented that the PPV in 424 women for BI-RADS category 5 was 85%. This was in accordance with PPV suggested by American Cancer Research which was 95% and other studies that suggested a PPV value between 80% and 97%. Siegmann et al. correlated the BI-RADS category and tissue breast biopsy in suspected malignant cases. Tissue core biopsies were performed on 132 patients with detected mammogram lesions. The malignancy rates increased from 6.3% in category 3 to 16.7% in BI-RADS category 4 and up to 85% in BI-RADS category 5. Hoti et al. also supported the significant correlation between BI-RADS classification and histopathological results. An exception was made for BI-RADS category 3 in which the final diagnosis of one case was DCIS. Another study involving 97 patients recommended BI-RADS category 3 breast lesions should be followed up with tissue biopsy. [43-45]

According to the EC Working Group on Breast Screening Pathology, a repeat biopsy or excision biopsy is indicated if there are inconsistencies between clinical and radiological examination with a biopsy composed entirely of normal breast tissue. Hence, precise targeting of the lesion and getting a good adequate tissue sample might reduce false-negative cases. All of the cases in this study were followed up within a 6-month to 12-month period. Some of the patients diagnosed with malignancy received neoadjuvant chemotherapy prior to surgery. Other surgeons offered excision by either wide local excision or mastectomy to patients, followed by systemic therapy. [52-53]

In conclusion, high percentage of patients were reported in BIRADS 3 which were turned to be benign (81.9%/36) while (18.1%/8) of them had malignant features. The BIRADS 3 lesions are considered probably benign with the risk of malignancy between > 0 and < 2%. Followed by BIRADS 4A which were turned to be malignant (74.2%/23) while (25.8%/8) of them had benign features. Moreover, the BIRADS 1 was prone to be benign (100%/1), BIRADS 2 were majority of them had recognized to be benign (88%/22) with (12%/3) had malignant features which is alarming sign as the BIRADS 2 lesions are considered benign, BIRADS 4B were majority of them had recognized to be malignant (81.2%/9) while (18.2%/2) had benign features, BIRADS 4C were majority of them had recognized to be malignant (92.3%/12) while (7.7%/1) had benign features and almost all cases prone to be malignant (100%/25) on BIRADS 5. These findings raised the concern to surgeons and oncologist especially with BIRADS 2 and BIRADS 3 lesions for subsequent evaluation. So, the advice in our setting is to be very cautious with BIRADS 3 lesions, more biopsies and short interval observations are advised. More training of the radiologist for a better and more accurate interpretation of mammogram and ultrasound findings and better reporting lesion the BIRADS scoring system.

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