



# Clinicopathological profile of mastalgia in females: incidence, types, and pathological correlations. a cross-Sectional study

Aqeed Abid Ali, PhD\*, Faruk Hasan Faraj, FRCS

**Introduction:** Mastalgia was the most common symptom in patients attending a breast clinic. The two most common types of mastalgia were (cyclical and non-cyclical). The common cause of cyclical was Physiological changes due to premenstrual tension syndrome fibrocystic changes or fibroadenosis and (Aberrations in the Normal Development and Involution of the breast ). Non-cyclical diseases are mainly benign rather than malignant. Solid masses (fibroadenomas), cysts, infections, abscesses, trauma, and nipple discharge (hormones) are rare diseases associated with breast cancer. The aim of this study is to study the incidence of mastalgia, types (cyclical and non-cyclical) and pathological types of mastalgia (benign and malignant pathologies)

**Material and methods:** A cross-sectional descriptive study of mastalgia was carried out at the Breast Center Department of Maternity Teaching Hospital located in Erbil, from January 2014 to September 2015. A total of 150 breast pain cases (available clinical data) were studied in detail.

**Results:** There are two types of mastalgia based on triple assessments, these are as follows, cyclical 90 cases (60%) and non-cyclical 60 cases (40%). Fibrocystic breast changes or fibroadenosis 35 cases (23.3%) and thirdly nipple discharges as part of fibrocystic (fibroadenosis) five cases (3.3%). Non-cyclical mastalgia was subdivided into benign breast pathologies, fibroadenoma 30 cases (20%), breast cyst 10 cases (6.7%), nipple discharge (hormonal) five cases (3.3%), mastitis three cases (2%) abscess two cases (1.3%), fat necrosis one case (0.7%), and malignant breast pathologies, cancer three cases (2%). Clinicopathological correlations in the current study were highly significant ( $P < 0.005$ ).

**Conclusion:** Not all discomfort or pain can be diagnosed as mastalgia; occasionally, chest wall, referral pain, and systemic causes can mimic mastalgia. These results highlight the importance of differentiating between cyclical and non-cyclical mastalgia using clinical assessment, sonography, mammography, and blood investigations. Most mastalgia cases are benign, with cyclical mastalgia primarily related to hormonal changes during the menstrual cycle.

**Keywords:** benign, clinicopathological correlations, cyclical, malignant diseases, mastalgia, non-cyclical

## Introduction

Breast pain (mastalgia, mastodynia, or mammalgia) is the most common breast symptom in patients attending a breast clinic<sup>[1]</sup>. Approximately 60–70% of women experience some degree of breast pain at some stage of their lives, 10–20% of these cases it is severe<sup>[2,3]</sup>. The two most common concerns of patients presenting

Department of Surgery, College of Medicine, University of Sulaimani, Sulaimani, Kurdistan Region, Iraq

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\*Corresponding author. Address: College of Medicine, University of Sulaimani, Sulaimani, Kurdistan Region, Iraq, Tel./fax: +964 770 152 3691. E-mail: drqeed1978@gmail.com (A.A. Ali).

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## HIGHLIGHTS

- Documenting that mastalgia is a benign condition and should be without fear of cancer.
- Triple assessment is an essential standard in most of breast diseases.
- Reporting clinicopathological relation between mastalgia and pathological results.
- The majority of mastalgia patients do not require treatment just reassurance and instructions are sufficient, as medication itself can on occasion cause breast pain.

with mastalgia are the presence of severe pain, which affects quality of life and fear of breast cancer. Most patients with mastalgia can be treated with medication, as the pain is not connected to any severe problems; therefore, a vital responsibility of the breast specialist is to rule out cancer and assiduously reassure the patient. Most patients have physiological [premenstrual tension syndrome (PMTS) and Aberrations in the Normal Development and Involution of the breast (ANDI)] mastalgia; in order to reduce the pathological basis for their breast pain, they require an appropriate diagnostic and therapeutic approach<sup>[4]</sup>.

Mass as fibroadenoma, cysts, infection as periductal mastitis, trauma as fat necrosis, nipple discharge (fibroadenosis), abscess,

cancer, Mondor's disease, and diabetic mastopathy). Medications; (Digitalis, methyl dopa, spironolactone, chlorpromazine, hormone contraception). Non-breast pain can mimic mastalgia<sup>[5,6]</sup>. The aetiology of mastalgia is yet to be fully understood, but the following factors play a role. The first type is cyclical mastalgia, which includes Endocrine Abnormalities. There are three main theories regarding the aetiology of painful breasts: (a) increased oestrogen levels, (b) progesterone deficiency, and (c) hyperprolactinemia. Cyclical pain in both (PMTS and ANDI) often begins with major hormonal changes and commonly ceases at the onset of menopause. Cyclical mastalgia is not confused with the menstrual cycle (PMTS), which differs in presentation, treatment, and aetiology<sup>[7,8]</sup>. However, clinical evidence from reproductive endocrinology states that plasma estradiol levels do not entirely reflect the hormonal impact at the target level<sup>[9,10]</sup>. Studies on serum hormone levels do not support the first two theories, as hormonal levels were found to be similar between patients and controls<sup>[10]</sup>. However, studies have shown significantly lower levels of luteal progesterone, thus supporting the second theory<sup>[11]</sup>. Patients with mastalgia had a significantly greater increase in prolactin compared to controls<sup>[12]</sup>, and a study reported an increase in stimulated prolactin levels in women with mastalgia<sup>[13]</sup>. Psychoneurosis: Patients with mastalgia are not deemed "neurotic," most patients have a physiological or pathological basis for their breast pain and deserve a valid yet suitable diagnostic and therapeutic approach<sup>[14]</sup>. Caffeine and Methyl xanthine: Overstimulation of breast cells may occur due to interference with adenosine triphosphate degradation by methyl xanthine<sup>[15]</sup>.

The second is the cause of non-cyclical mastalgia, which includes hormonal changes (part of physiological changes or fibrocystic changes (ANDI)<sup>[3]</sup>. (a) Puberty (both in girls and boys), (b) menopause, and (c) pregnancy. Alcoholism; (likely due to abnormal steroid metabolism)<sup>[3]</sup>. Breast pathology<sup>[3,6]</sup>. (Chest wall: pain includes costochondritis (Teitze's disease), referred to as nerve root pain such as cervical spondylitis, systemic diseases such as cardiovascular (CVS) such as ischaemic heart disease, gastrointestinal biliary pain, and peptic ulcers, a respiratory system such as pneumonitis and pleuritis, musculoskeletal, and psychological<sup>[6,9]</sup>. The aim of this study was to investigate the incidence of mastalgia, as well as its clinical and pathological manifestations, including cyclical and non-cyclical mastalgia, benign and malignant breast pathology, and clinicopathological associations.

## Material and methods

### Study design

A cross-sectional, descriptive study. The article has been reported in line with the STROCSS (strengthening the reporting of cohort, cross-sectional and case-control studies in surgery) 2021 criteria (Supplementary Table 1, Supplemental Digital Content 1, <http://links.lww.com/MS9/A210>)<sup>[16]</sup>.

### Study population and sample size calculation

The study population consisted of non-pregnant women who presented to the Breast Center Department of the Maternity Teaching Hospital in Erbil. The study was conducted between January 2014 and September 2015. As it was not possible to determine how many women presented to the study where the study was conducted, the sample size from an unknown

population formula was used in sample selection:  $[N = \lambda 2p(1 - p) / d^2]$ , where N is the sample size,  $\lambda$  is the confidence level (was set at 1.96 for 95%), p is the approximate number of mastalgia in the province, and d is the tolerance (was set at 0.05). Since the approximate number of patients with mastalgia in the province was 200, the sample size needed was 150 patients of various ages. Convenience sampling was used in this study. The study inclusion criteria were women who agreed to participate in the study; all women had the main complaints of mastalgia, proper triple assessments, and non-pregnancy. The exclusion criteria were surgery on the breast as mastectomy, improper triple assessments, and pregnancy.

### Data collection

Data were collected using a questionnaire created by the investigators after evaluating the relevant literature. Data were collected from patients by direct interview after sign inform concept, using a structured questionnaire form that was separated into two subcategories: (a) General preparation: (First; History of present illness, obstetrical, gynaecological menstrual, breast, lactational, socioeconomic, medical diseases, history of drugs, operation, and chief complaint and duration. (B) Examination (General, Local, and System = chest, musculoskeletal, CVS). (C) Investigations, haematology, ultrasonography, biopsy, cytology, culture, sensitivity, and breast imaging reporting and data system (BI-RADS). The mammography results are reported as follows:

0: incomplete (additional imaging and prior examination). 1: Negative (routine screening). 2: Benign (routine screening and follow-up every 6 months). 3: Probably benign (monthly routine follow-up—the risk of malignancy 2%); 4: Suspicious (biopsy due to the higher risk of malignancy 20%); 5: Highly suggestive of malignancy (biopsy due to the severe risk of malignancy 90%). 6: Known biopsy (proven malignancy by biopsy, 100 risk of malignancy). Second, specific preparation (triple assessments: clinical (history and examination), imaging (sonography and mammography), and histopathological (FNAC and Tru-cut or core biopsy)).

### Statistical analysis

Data were entered into an Excel Sheet and transferred into SPSS version 21 32bit. Descriptive analysis (Numbers, Percentages, means, and SDs) was used to obtain descriptive statistics. Associations were found between variables using the  $\chi^2$  test, t-test, and ANOVA variance. P was set at P less than 0.05.

### Ethical considerations

Ethical approval was obtained from the ethical committee of Higher Education of the Iraqi Board of Medical Specialties (FICMS) on January 20, 2014 (reference number 768). Informed consent was obtained from all participants after the study objectives were explained to them. If a patient preferred a hard copy to answer the survey, a signature was obtained. No respondent was forced to participate in the survey, and their participation was based on their agreement. All study participants were free to decline or withdraw from their participation at any time.

## Results

The sociodemographic characteristics of the studied sample, 150 patients were Premenopausal age (50.7%). Occupation status: Unemployed (52.0%). Marital status: married (82.7%); education level: school (61.3%). The history of breast pain was mostly bilateral (63.8%) and unilateral breast pain (36.2%) was mostly concentrated in the upper outer quadrant of the breast. Gradual pain from the onset (67.1%), progression of pain was mostly progressive (57.3%), severity of pain was moderate (62.7%), and the nature of the pain was mostly heaviness had to relieve factors (64.0%) and had precipitating factors (25.3%) (Table 1). The obstetrical history of patients was parity (73.3%), gynaecological disorders were normal (84.7%), menstrual history was regular (66.0%) and lactation was (79.3%) (Table 1).

The mean age range from (17–55 years) was (33.88). Duration of pain 1–24 weeks (mean duration, 2.83). Menarche's mean age was 14.36 years while menopause age was 48.25 years old. Patients' mean weight = 79.04 kilograms, height = 164.1 cm and BMI 29.47 (Table 2).

The associated mass (28.0%), no shape changes (98.0%), nipple discharge (9.3%), and positive axillary lymph nodes (3.3%) were noted. The reviews of the systems were normal in most patients, and only (6.7%) have gastrointestinal changes associated with appetite, fever, and malaise (Table 3).

History of breast pain (49.3%), history of mass (7.3%), surgical history (78.0%) (breast, gynaecological, obstetric, and other surgical diseases), medical disease history (32.0%), trauma history (4.0%), drug history (42.0%), smoking (4.7%), contraceptive use (43.3%), and family history of breast disease (40.0%) (Table 4). Breast mass (32.0%), localized mass in the LLOQ and LUOQ (14.6%), RLOQ (12.2%) with diffuse (61.2%), nipple discharge in the right breast (9.3%), left breast (8.0%), and axillary lymph nodes in the left axilla (3.3%) in the right axilla (2%) (Table 5).

Investigation of normal (87.3%) and only (6.7%) patients showed elevated white blood cell (WBC) and (6.0%) hormonal changes. Ultrasonography according to BI-RADS classification was normal (46.7%), benign (48.0%), likely benign (4.7%), and suspicious (0.7%). Mammography by BI-RADS classification was normal (46.7%), benign (48.7%), likely to be benign (3.3%), suspicious (0.7%), and malignant (0.7%). Biopsy was benign in (75.0%) and malignant in (25.0%). The nipple discharge results of culture and sensitivity were milky (45.4%), green (45.4%), and bloody (9.2%) (Table 6).

The final diagnoses were PMTS (33.3%), ANDI (23.3%), nipple discharge (fibroadenosis) (3.3%), non-cyclical mastalgia with fibroadenoma (20.0%), cyst (6.7%), nipple discharge (hormonal) (3.3%), mastitis (2.0%), abscess (1.3%), fat necrosis (0.7%), cancer (2.0%), and other systemic disorders (4.0%) (Table 7).

In the present study, the association of mastalgia clinically with sonography can differentiate cyclical from non-cyclical because it shows normal results more in cyclical (84.1%) than non-cyclical, while benign findings are higher in non-cyclical (55.6%) than cyclical, likely to be benign and suspicious in non-cyclical (100.0%), this association was statistically highly significant ( $P < 0.001$ ). The association of mastalgia clinically with mammography can differentiate cyclical from non-cyclical because it shows normal results are higher in cyclical 84.1% than non-cyclical, while benign findings are higher in non-cyclical 56.2%

**Table 1**

**The Sociodemographic characteristics**

Characteristics	n (%)
Sociodemographic	
Age groups	
Pre-menopause	76 (50.7)
Peri-menopause	70 (46.7)
Post-menopause	4 (2.7)
Occupation	
Employee	72 (48)
Unemployed	78 (52)
Marital status	
Single	20 (13.3)
Married	124 (82.7)
Widow	6 (4)
Total	150 (100)
Education	
School	92 (61.3)
Institute	19 (12.7)
University	18 (12)
Higher	21 (14)
History of mastalgia	
Unilateral or Bilateral pain	
Unilateral breast pain	54 (36.2)
Bilateral breast pain	95 (63.8)
Right breast	
Right upper outer quadrant pain	10 (8.1)
Right lower outer quadrant pain	8 (6.5)
Right upper inner quadrant pain	7 (5.6)
Right lower inner quadrant pain	4 (3.2)
Areola	7 (5.6)
Diffuse	88 (71)
Left breast	
Left upper outer quadrant pain	11 (9.1)
Left lower outer quadrant pain	8 (6.6)
Left upper inner quadrant pain	3 (2.5)
Left lower inner quadrant pain	4 (3.3)
Areola	7 (5.8)
Diffuse	88 (72.7)
History of pain	
Onset of pain	
Gradual	100 (67.1)
Sudden	49 (32.8)
Progression	
Steady	64 (42.7)
Progressive	86 (57.3)
Severity	
Mild	33 (22)
Moderate	94 (62.7)
Severe	23 (15.3)
Nature	
Heaviness	60 (40)
Pin prick	47 (31.3)
Burning	9 (6)
Agonizing	34 (22.7)
Relieving factors	
No	54 (36)
Yes	96 (64)
Precipitating factors	
No	112 (74.7)
Yes	38 (25.3)
Obstetrical history	
Null parity	40 (26.7)
Parity	110 (73.3)
Gynaecological disorders	

**Table 1**  
**(Continued)**

Characteristics	n (%)
Normal	127 (84.7)
Abnormal	23 (15.3)
Menses regularity	
Regular	99 (66.0)
Irregular	51 (34.0)
Pain	
Non-cyclical	59 (39.6)
Cyclical	90 (60.4)
Lactation history	
Lactation	119 (79.3)
Non lactation	31 (20.7)

than cyclical, cases that were likely to be benign and suspicious in non-cyclical were 100.0%, which was statistically highly significant ( $P < 0.001$ ) (Table 8).

Mastalgia clinically with blood investigations showed that the blood result in cyclical was mostly normal at 65.4%, while in non-cyclical it was abnormal WBC 100.0% and hormonal changes in cyclical were mostly positive; this association was statistically highly significant because the  $P$  value shows ( $P \leq 0.001$ ), (Table 8). Biopsies in the study sample can differentiate benign from malignant among the 12 patients sent for histopathology; 75.0% were benign and 25.0% were malignant (Table 8).

The general homogenous change in results from blood investigations was reported among the older group (Mean and SD =  $40.8 \pm 5.7$ ), while normal results were presented from the younger group (Mean and SD =  $33.2 \pm 6.9$ ), this difference statistically was highly significant ( $P = 0.003$ ),

In the ultrasonography findings, suspicious results were reported among the older group (mean and SD =  $40.0 \pm 15.1$ ), while normal results were reported from the younger group (mean and SD =  $32.0 \pm 7.9$ ); this difference was statistically highly significant ( $P = 0.003$ ). A long duration of pain was reported among suspicious cases (mean and SD =  $24.0 \pm 6.6$ ), and this difference was statistically highly significant ( $P < 0.001$ ). In mammography findings, suspicious results were reported among the older group (mean and SD =  $50.0 \pm 19.5$ ) and malignant results in the older group (mean and SD =  $40.0 \pm 7.0$ ), while normal results were from the younger group (mean and SD =  $32.0 \pm 7.9$ ); this difference was statistically highly significant ( $P = 0.002$ ). A long duration of pain was reported among malignant cases (mean and S.D =  $24.0 \pm 4.7$ ), and this difference was highly significant ( $P < 0.001$ ). In biopsy findings, malignant results were reported in the older group (mean and S.D =  $46.6 \pm 5.7$ ), while

**Table 2**  
**The characteristics of the studies sample**

characteristics	Range	Minimum	Maximum	Mean	SD
Age	38	17	55	33.88	7.053
Pain duration (week)	24	1	24	2.83	3.25
Menarche age	5	11	16	14.36	1.00
Menopause age	2	47	49	48.25	0.95
BMI	17.1	20.7	37.8	29.47	4.10
Weight	37	60	97	79.04	8.64
Height	27.0	154.0	181.0	164.1	6.3

**Table 3**  
**Associate features of pain and review of systems of the studied sample**

Associated features of pain	n (%)
Mass	
No	108 (72.0)
Yes	42 (28.0)
Total	150 (100.0)
Shape changes	
No	147 (98.0)
Yes	3 (2.0)
Total	150 (100.0)
Nipple discharges	
No	136 (90.7)
Yes	14 (9.3)
Total	150 (100.0)
Ulcers	
No	150 (100.0)
Lymph nodes	
No	145 (96.7)
Yes	5 (3.3)
Total	150 (100.0)
Review of systems	
No	140 (93.3)
Yes	10 (6.7)
Total	150 (100.0)

benign results were reported in the younger group (Mean and S. D =  $33.0 \pm 5.1$ ), and this difference was statistically highly significant ( $P = 0.003$ ) (Table 9).

In the present study, bilateral breast pain was higher (63.76%) than unilateral (36.24%) (Fig. 1), and the triple assessment of mastalgia was mostly cyclical (60.40%) and non-cyclical (39.60%) (Fig. 2). Clinicopathological study of mastalgia shows that the most common types of mastalgia are cyclical with (PMTS, ANDI) and nipple discharges; the second type is non-cyclical with fibroadenoma, cyst, nipple discharges, mastitis, abscess, fat necrosis, cancer and non-breast causes of pain such as chest wall, and others such as musculoskeletal or CVS or Respiratory and Gastrointestinal tract (Fig. 3). Histopathology of Mastalgia with breast lesions in 12 of 150 cases showed 75% benign and 25% malignant lesions (Fig. 4).

**Discussion**

In the current study, cyclical mastalgia was found in 90 cases (60.4%), all with a BI-RADS score of 1 (normal). The primary cause was identified as the menstrual cycle, specifically PMTS, in 50 cases (33.3%) among the age group of  $32.0 \pm 7.9$  years old. This is in line with other studies that confirm cyclical mastalgia is one of the most common clinical syndromes<sup>[17]</sup>, Additionally, fibrocystic breast changes or fibroadenosis (ANDI) were observed in 35 cases (23.3%) in the age group of  $35.0 \pm 5.2$  years old with a BI-RADS score of 2 (benign). However, other researchers have reported a larger number of cases among varying age ranges, particularly 18–40 years<sup>[18–20]</sup>. Additionally, five cases (3.3%) presented with bilateral nipple discharge, which was a part of fibroadenosis. This aligns with a previous study that demonstrated the effects of hormones on mastalgia and nipple discharge<sup>[18]</sup>.

**Table 4**  
Past history characteristics of the studied sample

Past history	n (%)
History of breast pain	
No	76 (50.7)
Yes	74 (49.3)
Total	150 (100.0)
History of breast mass	
No	139 (92.7)
Yes	11 (7.3)
Total	150 (100.0)
Surgical history	
No	33 (22.0)
Yes	117 (78.0)
Total	150 (100.0)
Medical history	
No	102 (68.0)
Yes	48 (32.0)
Total	150 (100.0)
Trauma history	
No	144 (96.0)
Yes	6 (4.0)
Total	150 (100.0)
Drug history	
No	87 (58.0)
Yes	63 (42.0)
Total	150 (100.0)
Smoking	
No	143 (95.3)
Yes	7 (4.7)
Total	150 (100.0)
Contraception (hormones)	
No	85 (56.7)
Yes	65 (43.3)
Total	150 (100.0)
Family history of breast diseases	
No	90 (60.0)
Yes	60 (40.0)
Total	150 (100.0)

In the study, 65 patients (43.3%) reported past use of contraception, which has been shown to influence breast pain and fibrocystic changes. These patients displayed a moderate degree of epitheliosis but no atypia<sup>[21]</sup>. It has been observed that patients taking oral oestrogen or contraceptives exhibit a range of epithelial hyperplasia, compared to patients not taking hormones<sup>[22]</sup>. The pathophysiology of fibrocystic breast disease is influenced by oestrogen predominance and progesterone deficiency. This hormonal balance results in hyperproliferation of connective tissue, followed by epithelial proliferation, and subsequently increases the risk of breast cancer 2–4-fold in these patients<sup>[22]</sup>.

In this study, we encountered a broad spectrum of histopathological findings related to fibrocystic change. These findings were associated with BI-RADS scores of two (benign) and three (probably benign), as determined by biopsy. Observations ranged from focused areas of duct ectasia, sclerosing adenosis, abscess, and florid proliferative processes. These results are consistent with previous studies that have observed an association between fibrocystic disease, foci of sclerosing adenosis, and mastalgia. Additionally, they noted a relationship between a rare form of fibrocystic disease, atypical epithelial hyperplasia, and cancer<sup>[18,23]</sup>.

**Table 5**  
Local examination characteristics of the studied sample

Local examination	n (%)
Right breast mass	
Nil	102 (68.0)
Yes	48 (32.0)
Total	150 (100.0)
Quadrant	
Right upper outer quadrant	5 (10.2)
Right lower outer quadrant	6 (12.2)
Right upper inner quadrant	5 (10.2)
Right lower inner quadrant	2 (4.1)
Diffuse	30 (61.2)
Total	49 (100.0)
Left breast mass	
No	102 (68.0)
Yes	48 (32.0)
Total	150 (100.0)
Quadrant	
Left upper outer quadrant	7 (14.6)
Left lower outer quadrant	7 (14.6)
Left upper inner quadrant	1 (2.1)
Left lower inner quadrant	3 (6.3)
Diffuse	30 (61.2)
Total	48 (100.0)
Right nipple discharge	
No	136 (90.7)
Yes	14 (9.3)
Total	150 (100.0)
Left nipple discharge	
No	140 (94.0)
Yes	10 (6.0)
Total	150 (100.0)
Right axillary lymph nodes	
No	147 (98.0)
Yes	3 (2.0)
Total	150 (100.0)
Left axillary lymph nodes	
No	145 (96.7)
Yes	5 (3.3)
Total	150 (100.0)

This study has shown that the non-cyclical mastalgia 60 (40%) was further assessed by investigation and pathological results, mostly benign breast lesions 51 (94%) with BI-RADS = score 2, our results were slightly higher than previous studies (82.9%)<sup>[19]</sup>, (80.7%)<sup>[18]</sup>, and (71.6%)<sup>[20]</sup>. This study included 30 cases of fibroadenoma (20%), showing it is the most common breast lesion, as in other studies reported higher (30.7%)<sup>[19]</sup> (62.32%)<sup>[18]</sup> (41%)<sup>[20]</sup>.

Breast cysts were the second most common benign breast lesion, accounting for 10 cases (6.7%) of all breast lesions<sup>[18–20]</sup>. Contraception (hormones) played a salient role in this study, as 65 cases (43.3%) were using these hormones, and the presentation was non-cyclical mastalgia with nipple discharges (hormonal changes) due to prolactinoma in five cases (3.3%), aligning with findings from other studies<sup>[24,25]</sup>. Our patients between the ages of 21–30 years present similar findings to those of the study done<sup>[24]</sup>.

In this study, inflammatory lesions such as mastitis were encountered in three cases (2%) among individuals aged 21–40 years. The majority were parous women and lactating

**Table 6**  
**Investigations characteristics of the studied sample**

Investigations	n (%)
Blood	
Normal	131 (87.3)
Elevated (WBC)	10 (6.7)
Hormonal (prolactinoma, oestrogen, and progesterone changes)	9 (6.0)
Total	150 (100.0)
Ultrasonography	
Normal	70 (46.7)
Benign	72 (48.0)
Probably benign	7 (4.7)
Suspicious	1 (0.7)
Total	150 (100.0)
Mammography	
Normal	70 (46.7)
Benign	73 (48.7)
Probably benign	5 (3.3)
Suspicious	1 (0.7)
Malignant	1 (0.7)
Total	150 (100.0)
Biopsy	
Benign	9 (75.0)
Malignant	3 (25.0)
Total	12 (100.0)
Discharge for culture and sensitivity	
Whitish (prolactinoma)	5 (45.4)
Greenish (fibrocystic changes)	5 (45.4)
Bloody (cancer)	1 (9.2)
Total	11 (100.0)

WBC, white blood cell.

mothers. Histopathology confirmed these lesions to be confined to the breast lobule, a finding that aligns with results from another study<sup>[20]</sup>. Most of the cases were between the ages of 31–40 years of age. Khanna *et al.*<sup>[24]</sup> reported that all his patients were parous women, and observed mastitis confined to the lobule<sup>[26]</sup>. In our study, other benign breast lesion groups where abscesses were encountered in two cases (1.3%) of total breast

**Table 7**  
**Diagnosis characteristics of the studied sample**

Diagnosis	n (%)
Cyclical mastalgia	
Cyclical mastalgia with PMTS	50 (33.3)
Cyclical mastalgia with ANDI	35 (23.3)
Cyclical mastalgia with nipple discharges (fibro adenosis)	5 (3.3)
Non-cyclical mastalgia	
Non-cyclical mastalgia with fibro adenoma	30 (20.0)
Non-cyclical mastalgia with cyst	10 (6.7)
Non-cyclical mastalgia with nipple discharge (hormonal)	5 (3.3)
Non-cyclical mastalgia with mastitis	3 (2.0)
Non-cyclical mastalgia with abscess	2 (1.3)
Non-cyclical mastalgia with fat necrosis	1 (0.7)
Non-cyclical mastalgia with cancer	3 (2.0)
Non-breast pain (mimic mastalgia)	
Chest wall, musculoskeletal, systemic diseases	6 (4.0)
Total	150 (100.0)

ANDI, and Aberrations in the Normal Development and Involution of the breasts; PMTS, premenstrual tension syndrome.

biopsies, which align with other research showed (1.2%)<sup>[22]</sup>. This study shows that these two cases were in lactating females, while other study also observed that abscesses occurred most frequently in lactating females in the postpartum period<sup>[21]</sup>, and our patient's ages ranged between 21 and 30 years of age that aligns with findings from previous study<sup>[24]</sup>. A history of trauma is important as injury to the breast will cause fat necrosis after assessment; one case was fat necrosis (0.7%) with a history of trauma to the breast<sup>[25]</sup>.

In the present study, three cases (2%) of breast biopsies BI-RADS = five scores by the true cut or (core) biopsies belonged to breast cancer patients aged (46.6 ± 5.7) and with a family history of breast diseases in addition to histological features of the lesion, the age at biopsy, and the degree of family history of breast cancer are reported to be the major determinants of breast cancer risk<sup>[27]</sup>. Only one patient had ductal carcinoma in situ (DCIS), one had invasive ductal cancer, and three had inflammatory breast carcinomas. Radiologic investigations were available in these three cases, mammographic findings revealed a mass with linear, clustered microcalcification, and histopathology results, where one case was diagnosed as DCIS with micro invasion<sup>[19]</sup> reported 2.6%, while<sup>[18]</sup> reported 6.7% of multiple papillomae with foci of DCIS with micro invasion.

Finally, out of 150 cases, six patients (4%) were found to have no mastalgia at all, receiving a BI-RADS score of 0. This indicates that further investigation is required due to non-breast related complaints such as musculoskeletal, respiratory, and psychological issues, necessitating referrals to other medical specialties. In this study, the association of mastalgia with sonography allowed for differentiation between cyclical and non-cyclical forms. The cyclical form was mostly negative (84.1%), while benign findings were higher in non-cyclical forms (55.6%). Both probably benign and suspicious findings were solely represented in non-cyclical forms, yielding a 100.0% result. This association was deemed highly significant ( $P \leq 0.001$ )<sup>[21]</sup>.

**Table 8**  
**Association of mastalgia clinically with blood, imaging, and pathology results characteristics of the studied sample**

Investigations	Mastalgia		P
	Non-cyclical, N (%)	Cyclical, N (%)	
Ultrasonography			
Normal	11 (15.9)	58 (84.1)	
Benign	40 (55.6)	32 (44.4)	< 0.001
Probably benign	7 (100.0)	0	
Suspicious	1 (100.0)	0	
Mammography			
Normal	11 (15.9)	58 (84.1)	
Benign	41 (56.2)	32 (43.8)	< 0.001
Probably benign	5 (100.0)	0	
Suspicious	1 (100.0)	0	
Malignant	1 (100.0)	0	
Blood			
Normal	45 (34.6)	85 (65.4)	
Elevated WBC	10 (100.0)	0	< 0.001
Hormonal changes	4 (44.4)	5 (55.6)	
Biopsy			
Benign	9 (75.0)	0	
Malignant	3 (25.0)	0	

WBC, white blood cell.

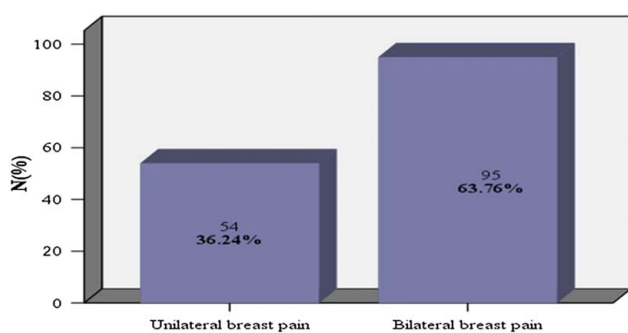
**Table 9**

**Significant differences of age, pain duration, BMI with investigation results characteristics of the studied sample**

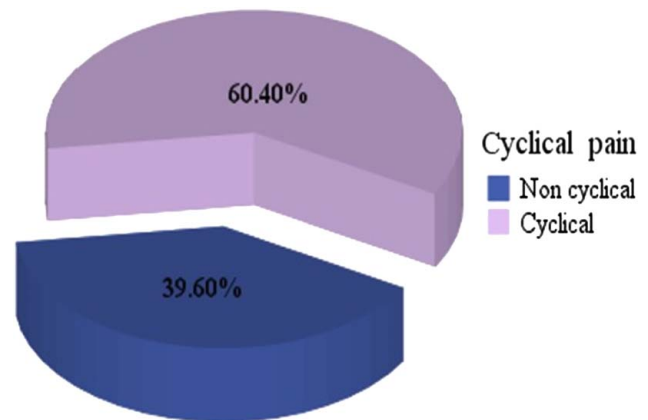
Investigation measures	BMI mean ± SD	Age mean ± SD	Duration of pain mean ± SD
Blood	<i>P</i> = 0.329	<i>P</i> = 0.003	<i>P</i> = 0.121
Normal	29.6 ± 4.1	33.2 ± 6.9	3.0 ± 1.4
Elevated WBC	27.9 ± 3.7	36.4 ± 5.2	0.9 ± 0.15
Hormonal changes	28.4 ± 4.1	40.8 ± 5.7	2.1 ± 1.3
Ultrasonography	<i>P</i> = 0.477	<i>P</i> = 0.003	<i>P</i> ≤ 0.001
Normal	29.6 ± 4.0	32.0 ± 7.9	2.8 ± 1.1
Benign	29.4 ± 4.1	35.0 ± 5.2	2.7 ± 1.3
Probably benign	27.4 ± 4.0	39.5 ± 9.3	0.86 ± 0.24
Suspicious	32.8 ± 0.12.5	40.0 ± 15.1	24.0 ± 6.6
Mammography	<i>P</i> = 0.632	<i>P</i> = 0.002	<i>P</i> ≤ 0.001
Normal	29.6 ± 4.04	32.0 ± 7.9	2.8 ± 2.1
Benign	29.3 ± 4.2	35.0 ± 5.2	2.71 ± 3.3
Probably benign	29.3 ± 2.7	38.4 ± 9.8	0.80 ± 0.2
Suspicious	24.2 ± 12.5	50.0 ± 19.5	1.00 ± 0.03
Malignant	32.8 ± 4.1	40.0 ± 7.0	24.0 ± 4.7
Biopsy	<i>P</i> = 0.898	<i>P</i> = 0.003	<i>P</i> = 0.098
Benign	28.6 ± 4.07	33.0 ± 5.1	1.17 ± 0.70
Malignant	28.2 ± 4.3	46.6 ± 5.7	8.50 ± 3.4
Mastalgia	<i>P</i> = 0.099	<i>P</i> = 0.459	<i>P</i> = 0.298
Non-cyclical	28.7 ± 4.0	34.2 ± 7.0	2.4 ± 1.5
Cyclical	29.8 ± 4.0	33.4 ± 6.7	3.0 ± 1.8

WBC, white blood cell.

The association of mastalgia clinically with mammography can differentiate cyclical from non-cyclical because cyclical was (84.1%) than non-cyclical, while benign findings were higher in non-cyclical (56.2%), probably benign and suspicious totally in non-cyclical (100.0%), which is highly significant (*P* = 0.001)<sup>[27]</sup>. Mastalgia clinically with a cyclical blood result is mostly normal (65.4%), while in non-cyclical, it is abnormal as it has an elevated WBC (100.0%) and hormonal changes in the cyclical form are mostly positive, which is highly significant (*P* = 0.001)<sup>[21]</sup>. Biopsies of a study sample from 12 patients sent for histopathologists showed the results as (75.0%) benign and (25.0%) malignant. In general, homogenous changes in results from blood investigations were reported among older groups of the studied group (mean and SD = 40.8 ± 5.7), while normal results were from the younger group (mean and SD = 33.2 ± 6.9); this difference was statistically highly significant (*P* = 0.003)<sup>[18]</sup>.



**Figure 1.** Unilateral or bilateral breast.

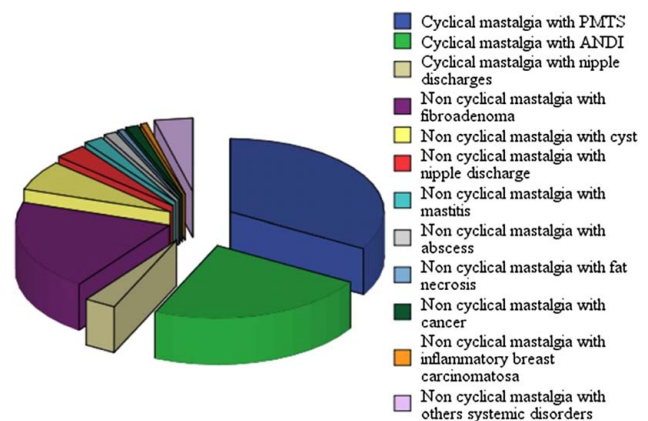


**Figure 2.** Cyclical and non-cyclical types of mastalgia characteristics of the studied sample.

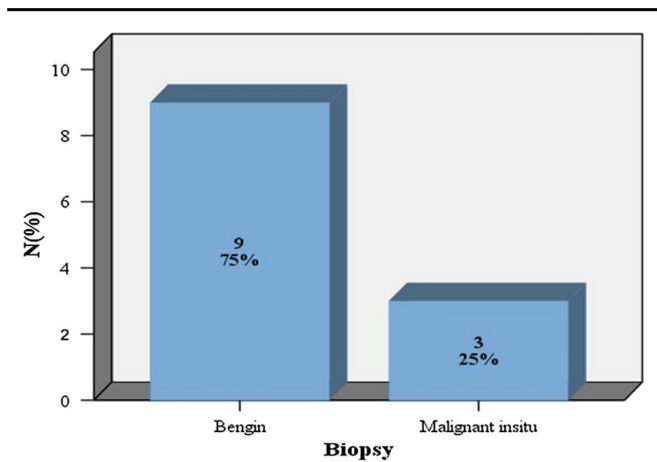
In ultrasonography findings, suspicious results were reported among the older studied group (mean and SD = 40.0 ± 15.1), while normal results were from the younger group (mean and SD = 32.0 ± 7.9), and this difference was statistically highly significant (*P* = 0.003).

A long duration of pain was reported among suspicious cases (mean and SD = 24.0 ± 6.6), and this difference was statistically highly significant (*P* < 0.001)<sup>[21]</sup>. In mammography findings, suspicious results were reported amongst the older studied group (mean and SD = 50.0 ± 19.5) and malignant results in the older group (mean and SD = 40.0 ± 7.0), while normal results were from the younger group (mean and SD = 32.0 ± 7.9), and this difference was statistically highly significant (*P* = 0.002)<sup>[26]</sup>. Long durations of pain were reported among malignant cases (mean and SD = 24.0 ± 4.7), and this difference was statistically highly significant (*P* < 0.001)<sup>[23]</sup>. In biopsy findings, malignant results were reported amongst the older studied group (mean and SD = 46.6 ± 5.7), while benign results were from the younger group (mean and SD = 33.0 ± 5.1), and this difference was statistically highly significant (*P* = 0.003)<sup>[21,27]</sup>.

This study had some limitations, such as the patient’s psychosocial trauma of breast diseases that made them uncompliant,



**Figure 3.** Clinicopathological results and diagnosis characteristics of the studied sample. PMTS, premenstrual tension syndrome. ANDI, Aberrations in the Normal Development and Involution of the breast.



**Figure 4.** Biopsy results characteristics of the studied sample.

Improper Triple assessment was made to exclude some patients, and the patient’s embarrassment; therefore, they do not allow a full examination (cultural).

**Conclusions**

Mastalgia is a common breast symptom that affects a significant number of women. The study revealed that cyclical mastalgia, associated with PMTS and ANDI, was the most prevalent type. Non-cyclical mastalgia was also observed, with fibroadenoma and cysts being the most common benign breast lesions. Hormonal factors, such as contraception and lactation, played a role in the development of mastalgia and related conditions. The histopathological examination confirmed a variety of benign breast lesions, including fibrocystic changes, abscesses, and mastitis. Breast cancer was identified in a small percentage of cases. The association between mastalgia and clinical, radiological, and pathological findings provided valuable insights into the diagnosis and management of mastalgia. Further research and investigation are needed to improve our understanding of the underlying causes and optimal treatment approaches for mastalgia.

**Recommendations**

Based on the study findings, the following recommendations are proposed:

- (1) Healthcare professionals should be aware of the different types of mastalgia and the associated benign and malignant pathologies. This knowledge will aid in accurate diagnosis and appropriate management.
- (2) Continued education and awareness programs should be implemented to ensure early detection and timely intervention in cases of malignant mastalgia. This will help improve patient outcomes and reduce the burden of breast cancer.
- (3) Further research with larger sample sizes and longitudinal studies is needed to validate the findings of this study and explore additional risk factors associated with mastalgia.
- (4) Collaboration among healthcare providers, including gynaecologists, breast surgeons, radiologists, and pathologists, is essential for the comprehensive evaluation and management of mastalgia cases.

- (5) Future studies should also consider the psychological impact of mastalgia on patients, as well as the impact on their quality of life, to provide a holistic approach to patient care.

By implementing these recommendations, healthcare providers can enhance their understanding and management of mastalgia, leading to improved patient care and outcomes.

**Ethical approval**

Ethical approval was obtained from the ethical committee of the Higher Education of the Iraqi Board of Medical Specialties (FICMS) in 2014 with reference number 768.

**Consent**

Written informed consent was obtained from the patient for publication of this research and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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**Author contribution**

A.A.A.: study design, data collection and analysis and writing. F.H.F.: literature review, discussion, conclusions, and final approval of the manuscript. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

**Conflicts of interest disclosure**

The authors declare that they have no conflicts of interest.

**Research registration unique identifying number (UIN)**

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**References**

[1] Barton MB, Elmore JG, Fletcher SW. Breast symptoms among women enrolled in a health maintenance organization: Frequency, evaluation, and outcome. *Ann Intern Med* 1999;130:651–7.



- [2] Ader DN, South-Paul J, Adera T, *et al.* Cyclical mastalgia: Prevalence and associated health and behavioral factors. *J Psychosom Obstetr Gynecol* 2001;22:71–6.
- [3] Orr B, Kelley JL III. Benign breast diseases: evaluation and management. *Clin Obstet Gynecol* 2016;59:710–26.
- [4] Olawaiye A, Withiam-Leitch M, Danakas G, *et al.* Mastalgia: a review of management. *J Reprod Med* 2005;50:933–9.
- [5] Kumar S, Rai R, Das V, *et al.* Visual analogue scale for assessing breast nodularity in non-discrete lumpy breasts: The lucknow-cardiff breast nodularity scale. *Breast* 2010;19:238–42.
- [6] Makumbi T, Galukande M, Gakwaya A. Mastalgia: Prevalence at a sub-saharan african tertiary hospital. *Pain Res Treat* 2014;2014:972726.
- [7] DM A, S K, D A, *et al.* Epidemiology of premenstrual syndrome (pms)-a systematic review and meta-analysis study. *J Clin Diagn Res* 2014;8:106–9.
- [8] Ali HAM, Alawad AA, Abdalla A. Prevalence of cyclic mastalgia among university students in sudan. *Medicine* 2015;2:59.
- [9] Smith RL, Pruthi S, Fitzpatrick LA. Evaluation and management of breast pain. *Mayo Clin Proc* 2004;79:353–72.
- [10] Malarkey WB, Schroeder LL, Stevens VC, *et al.* Twenty-four-hour pre-operative endocrine profiles in women with benign and malignant breast disease. *Cancer Res* 1977;37:4655–9.
- [11] Gann PH, Geiger AS, Helenowski IB, *et al.* Estrogen and progesterone levels in nipple aspirate fluid of healthy premenopausal women: Relationship to steroid precursors and response proteins. *Cancer Epidemiol Biomarkers Prev* 2006;15:39–44.
- [12] Kataria K, Dhar A, Srivastava A, *et al.* A systematic review of current understanding and management of mastalgia. *Indian J Surg* 2014;76:217–22.
- [13] Watt-Boolsen S, Andersen AN, Blichert-Toft M. Serum prolactin and oestradiol levels in women with cyclical mastalgia. *Horm Metab Res* 1981;13:700–2.
- [14] Preece PE, Mansel RE, Hughes LE. Mastalgia: Psychoneurosis or organic disease. *Br Med J* 1978;1:29–30.
- [15] Rossignol AM. Caffeine-containing beverages and premenstrual syndrome in young women. *Am J Public Health* 1985;75:1335–7.
- [16] Mathew G, Agha R, Albrecht J, *et al.* Strocxs 2021: Strengthening the reporting of cohort, cross-sectional and case-control studies in surgery. *Int J Surg* 2021;96:106165.
- [17] Ader DN, Shriver CD, Browne MW. Cyclical mastalgia: Premenstrual syndrome or recurrent pain disorder? *J Psychosom Obstetr Gynecol* 1999;20:198–202.
- [18] Sangeeta K, Voralla M, GhorpadeKanchanmala G, *et al.* Histopathological spectrum of breast lesions with reference to uncommon cases. *Tuberculosis* 2009;2:1–45.
- [19] Amr SS, Sa'di AR, Ilahi F, *et al.* The spectrum of breast diseases in saudi arab females: a 26 year pathological survey at dhahran health center. *Ann Saudi Med* 1995;15:125–32.
- [20] Malik M, Irshad H, Salahuddin O, *et al.* Breast diseases; spectrum in wah cantt; pof hospital experience. *Professional Med J*. 2010;17:366–72.
- [21] Karpas CM, Leis HP, Oppenheim A, *et al.* Relationship of fibrocystic disease to carcinoma of the breast. *Ann Surg* 1965;162:1–8.
- [22] Vorherr H. Fibrocystic breast disease: pathophysiology, pathomorphology, clinical picture, and management. *Am J Obstet Gynecol* 1986;154:161–79.
- [23] Yuan QQ, Xiao SY, Farouk O, *et al.* Management of granulomatous lobular mastitis: an international multidisciplinary consensus (2021 edition). *Mil Med Res* 2022;9:20.
- [24] Khanna AK, Tapodar J, Misra MK. Spectrum of benign breast disorders in a university hospital. *J Indian Med Assoc* 1997;95:5–8.
- [25] Winkler JM. Galactocele of the breast. *Am J Surg* 1964;108:357–60.
- [26] Donn W, Rebbeck P, Wilson C, *et al.* Idiopathic granulomatous mastitis. A report of three cases and review of the literature. *Arch Pathol Lab Med* 1994;118:822–5.
- [27] Hartmann LC, Sellers TA, Frost MH, *et al.* Benign breast disease and the risk of breast cancer. *N Engl J Med* 2005;353:229–37.