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Radiological and Histopathological Correlation by Age in among Women with Breast Lesions: A Single-Center Study

Meme Lezyonlu Kadınlarda Yaşa Göre Radyolojik ve Histopatolojik Korelasyon: Tek Merkezli Bir Çalışma

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Abstract

Background: This study aimed to compare pathology results and pre-biopsy radiological diagnoses of patients who underwent breast biopsy, and to determine whether there are any changes according to age.
Materials and Methods: The study included 217 patients (aged 13-87) who underwent ultrasonography (US)-guided biopsy. Pre-biopsy ultrasonographic features and Breast Imaging Reporting and Data Systems (BIRADS) score of the lesions were recorded. Fine-needle aspiration was performed for cystic lesions and tru-cut biopsy for solid lesions. Histopathology results were grouped according to benign and malignant lesion types. The results were compared by dividing into two groups under 40 years old and over 40 years old.
Results: In this study, 50% of the lesions were malignant (mean age: 54.9), and 50% were benign (mean age: 44.9). The most common benign and malignant lesions were fibroadenoma and invasive ductal carcinoma. The lesion had irregular contours, microcalcification and the presence of axillary lymphadenopathy were statistically significant for malignancy ($p<0.001$). On US, 15.5% of lesions (n=34) were not clearly demarcated from the surrounding fibroglandular tissue (non-mass lesion). Of these, 50% were diagnosed as cancer, 8.8% as idiopathic granulomatous mastitis, and 8.8% as fibrocystic changes. The result of the Cohen's Kappa coefficient for the agreement between the BIRADS system and pathological findings is 0.718 (sensitivity: 1, specificity: 0.71, positive predictive value: 0.78, negative predictive value: 1, accuracy rate: 0.85) ($p<0.05$). In logistic regression analysis, 91.3% accuracy was obtained in the patient's age, diameter, lateralization, contour of the mass, presence of microcalcification, and axillary lymphadenopathy parameters.
Conclusions: The radiopathological correlation of the diagnosis was found to be high rate. Since invasive breast carcinoma shows sonographic similarities with benign conditions such as granulomatous mastitis and fibrocystic changes, histopathological diagnosis is recommended for suspicious lesions that can not be clearly demarcated.
Keywords: Breast cancer, BIRADS, Histopathological type, Ultrasonography

Öz

Amaç: Bu çalışmada, meme biyopsisi yapılan hastaların patoloji sonuçları ile biyopsi öncesi radyolojik tanılarının karşılaştırılması ve yaşa göre herhangi bir değişiklik olup olmadığının belirlenmesi amaçlandı.
Materyal ve metod: Çalışmaya ultrasonografi (US) rehberliğinde biyopsi yapılan 217 hasta (yaşları: 13-87) dahil edildi. Lezyonların biyopsi öncesi ultrasonografik özellikleri ve Meme Görüntüleme Raporlama ve Veri Sistemleri (BIRADS) skorları kaydedildi. Kistik lezyonlar için ince iğne aspirasyonu, solid lezyonlar için ise tru-cut biyopsi uygulandı. Histopatoloji sonuçları benign ve malign lezyon tiplerine göre gruplandırıldı. Sonuçlar 40 yaş altı ve 40 yaş üstü olmak üzere iki gruba ayrılarak karşılaştırıldı.
Bulgular: Bu çalışmada lezyonların %50'si malign (ortalama yaş: 54,9), %50'si ise benign (ortalama yaş: 44,9) idi. En sık görülen benign ve malign lezyonlar fibroadenom ve invaziv duktal karsinomdu. Lezyonun düzensiz konturları, mikrokalsifikasyonu ve aksiller lenfadenopati varlığı malignite açısından istatistiksel olarak anlamlıydı ($p<0,001$). US'de lezyonların %15,5'i (n=34) çevre fibroglandüler dokudan net olarak ayrılamıyordu (kitlesel olmayan lezyon). Bunların %50'si kanser, %8,8'i idiyopatik granülomatöz mastit ve %8,8'i fibrokistik değişiklik olarak teşhis edildi. BIRADS sistemi ile patolojik bulgular arasındaki uyum için Cohen'in Kappa katsayısının sonucu 0,718'dir (duyarlılık: 1, özgüllük: 0,71, pozitif öngörü değeri: 0,78, negatif öngörü değeri: 1, doğruluk oranı: 0,85) ($p<0,05$). Lojistik regresyon analizinde, hastanın yaşı, çapı, lokalizasyonu, kitlenin konturu, mikrokalsifikasyon varlığı ve aksiller lenfadenopati parametrelerinde %91,3 doğruluk elde edildi.
Sonuç: Tanıdaki radyopatolojik korelasyon yüksek oranda bulundu. İnvaziv meme karsinomu, granülomatöz mastit ve fibrokistik değişiklikler gibi iyi huylu durumlarla US benzerlikler gösterdiğinden, net olarak ayrılamayan şüpheli lezyonlar için histopatolojik tanı önerilmektedir.
Anahtar Kelimeler: Meme kanseri, BIRADS, Histopatolojik tip, Ultrasonografi

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Introduction

The prevalence of breast cancer, which is commonly considered the leading cause of cancer-related deaths worldwide, is steadily increasing. Risk factors associated with breast cancer encompass advanced age, obesity, tobacco use, a sedentary lifestyle, high-fat dietary patterns, early menarche, delayed age of first pregnancy, limited breastfeeding duration, oral contraceptive usage, race, the presence of dense fibroglandular breast tissue, and familial medical history (1). The prognosis of early-stage breast cancer is notably favourable compared to advanced-stage breast cancer, leading to the widespread adoption of breast cancer screening programs on a global scale (2,3).

Progress has been achieved in the early detection of breast cancer due to the increased utilization of imaging techniques, including mammography and ultrasonography (US). The combined application of various imaging modalities, detailed clinical examinations, and histopathological analysis of tissue biopsies is recommended for achieving the most precise diagnosis (4). Previous studies have highlighted that breast cancers occurring at an early age exhibit distinct clinical and pathological characteristics compared to those developing at an advanced age (5,6). In creating a more accurate and personalized breast cancer screening program, patients' demographic data and the radiopathological characteristics of lesions will contribute.

Logistic regression (LR) is a statistical method employed to analyze the association between a binary or categorical outcome and multiple influencing factors. Variants of LR include multiple LR, conditional LR, multicategory LR, ordinal LR, and adjacent categorical LR (7). In the context of this study, our objective is to compare the pathology results of patients who underwent breast biopsy at our center on an age-based basis and assess the relationship between these lesions and pre-biopsy radiological findings using LR analysis.

Materials and Methods

In this research, all methods were carried out in accordance with relevant guidelines and regulations and all experimental protocols were approved by Karabük University Non-interventional Research Ethics Committee (approval no: 2021/594, date: August 5, 2021). Informed consent was obtained from the patients before biopsy. This cross-sectional study included 217 patients aged between 13 and 87 years who underwent US-guided fine needle aspiration (FNA) and core (tru-cut) biopsy for breast lesions between January 2018 and May 2021. Patients included in the study were detected in the examinations of suspicious lesions, and for the first time by clinicians, they are directed to biopsy and do not have the history of breast operation and radiotherapy. All of the patients with biopsy between January 2018 and May 2021 were included. As a result of pathology, patients without US report and images were not included in the study.

Lateralization (left/right), quadrant (upper outer quadrant, upper inner quadrant, lower inner quadrant, lower outer quadrant, retro areolar, multiple, diffuse), maximum diameter (mm), contour (smooth, irregular, or lobulated), presence or absence of microcalcification, Breast Imaging Reporting and Data Systems (BIRADS) category by US, presence or absence of axillary lymphadenopathy (LAP) of the mass in biopsy reports, and histopathological diagnosis were recorded in an Excel spreadsheet. The BIRADS assessment categories were defined as follows: BIRADS 0 (incomplete), BIRADS 1 (negative), BIRADS 2 (benign), BIRADS 3 (probably benign), BIRADS 4 (probably malignant), BIRADS 5 (malignant), and BIRADS 6 (biopsy-proven malignancy). In this study, BIRADS 2 and 3 were categorized as benign, while BIRADS 4 and 5 were categorized as equivocal-malignant. Although biopsy is not recommended for BIRADS 2 and 3 lesions, biopsies were performed in such patients in instances where the patients desired biopsy. The biopsy procedures, guided by US, were conducted by a radiologist (S. O.) with over ten years of experience in the Radiology Unit, using an ultrasound system (Aplio 500, Canon Medical Systems, Netherlands) equipped with an 11-5 MHz Linear Transducer. Before the biopsy, detailed characteristics of all lesions were documented, and optimum images identifying the lesions were recorded. FNA was used for cystic lesions, while tru-cut biopsy was employed for solid lesions. As the routine procedure of FNA, cystic lesions were aspirated with a 20 ml syringe and an 18-22 gauge, 1-1.5-inch-long needle, with the syringe content immediately fixed in 95% alcohol for cytologic evaluation. A routine tru-cut biopsy was performed with at least three samples taken per session, with a 16-18 gauge, 10-15 cm long automatic biopsy gun, and excised tissues were fixated in 10% neutral buffered formalin.

The processed tissue slides were evaluated and classified as either benign or malignant by a pathologist. Benign masses included breast tissue with normal histologic features, inflammatory conditions (such as an acute abscess or chronic idiopathic granulomatous mastitis), fibrocystic changes, fibrosis/fibroadipose tissue, and benign proliferative changes (usual epithelial hyperplasia, atypical ductal hyperplasia, papillary neoplasia, tubular adenoma, lactation adenoma), fibroepithelial lesions (fibroadenoma, juvenile fibroadenoma, complex fibroadenoma, phyllodes), tumours (hamartoma) and other benign lesions (galactocele, atypical ductal hyperplasia, signs of old bleeding, fat necrosis). Malignant masses were categorized based on their epithelial origin as invasive breast carcinoma (invasive ductal, invasive lobular), mucinous carcinoma, neuroendocrine carcinoma, ductal carcinoma in situ (DCIS), and lymphoma.

Statistical Analysis

Statistical analysis was conducted using Minitab 17 and SPSS 22.0. Continuous variables were assessed with the Mann-Whitney U test, while categorical variables were presented as numerical counts and analyzed using the chi-squared test. In cases where the assumptions of the chi-squared test were not met, the Monte Carlo test was employed. The radiological and histopathological features of the patients were classified in two as <40 years of age and ≥40 years of age, to evaluate the classification in young and elderly individuals. The biopsy material was compared with the radiology result using the Cohen's Kappa test. Ultrasonographic findings were evaluated for malignancy prediction using LR analysis. The p-value of <0.05 was considered statistically significant.

Results

The study compared 220 breast lesions seen in 217 women of 49.98±15.48 years mean age. According to histopathological results, the mean age of the benign lesions was 44.97±14.71 years, while the mean age of the malignant lesions was 54.99±14.64 years (p<0.05). The mean maximum diameter was 23.90±15.55 mm in benign and 24.94±12.48 mm in malignant lesions. The diameter, which did not exhibit a normal distribution, was determined to be 21.0 (6.0-118.0) mm for benign lesions and 23.0 (7.8-80.0) mm for malignant lesions. However, the difference in diameter between benign and malignant lesions was not found to be statistically significant (p>0.05).

Patients were divided into two groups: those under 40 years of age (n=50) and those 40 years and older (n=170). The presence of malignant masses in individuals over 40 years of age was statistically significant, compared to benign masses in individuals under 40 years of age (p<0.001). While benign masses were more frequently observed on the right side and malignant masses on the left side, this difference was not statistically significant (p>0.05). Additionally, one case of bilateral occurrence was noted. Although the majority of the masses were in the upper outer quadrant, no significant association with malignancy was found (p>0.05). It was determined that regular contours were significant in benign masses, whereas irregular contours were significant in malignant masses (p<0.001). The presence of microcalcifications was significant in malignant masses, while their absence was significant in benign masses (p<0.001). Axillary lymph node involvement was significant in malignant masses, while the absence of lymph node involvement was significant in benign masses (p<0.001) (Table 1).

Table 1. Distribution of benign and malignant masses according to radiological findings and age groups

Parameters		Total	%	Benign	Malignant	X2	p
Age	13-39	50	22.7	38	12	17.498	**<0.001**
	40-87	170	77.3	72	98		
Localization	Left	111	50.5	51	60	1.473	0.225
	Right	109	49.5	59	50		
Quadrant	Lower outer	28	12.7	17	11	5.246¶	0.670
	Lower inner	27	12.4	13	14		
	Diffuse	2	0.9	1	1		
	Multiple	2	0.9	2	0		
	Retroareolar	19	8.6	9	10		
	Upper outer	107	48.6	54	53		
	Upper inner	35	15.9	14	21		
Contour	Regular	50	22.7	49	1	82.467¶	**<0.001**
	Irregular	111	50.5	25	86		
	Lobulated	59	26.8	36	23		
Microcalcification	Absent	164	74.5	98	66	24.530	**<0.001**
	Present	56	25.5	12	44		
Axillary lymphadenopathy	Absent	170	77.3	104	66	37.374	**<0.001**
	Present	50	22.7	6	44		

¶: Monte Carlo test

The localization and quadrant of breast lesions, axillary LAP, and the presence of microcalcifications within the mass did not exhibit statistical significance with respect to age groups (p>0.05). However, the presence of regular and lobulated masses was significantly associated with patients under the age of 40, while irregular masses were significant among patients aged 40 and above. Furthermore, the evaluation of masses as BIRADS 2 and 5 was significantly more common among patients

aged 40 and above, in contrast to the prevalence of BIRADS 3 among patients under 40 (p<0.001).

According to the BIRADS category, 5 (2.3%) lesions were classified as BIRADS 2, 74 (33.6%) as BIRADS 3, 71 (32.3%) as BIRADS 4, and 70 (31.8%) as BIRADS 5. Table 2 displays the classification and age distribution based on histopathological diagnoses. Fibroadenoma represented the most prevalent among benign lesions, while invasive ductal carcinoma was the most frequent malignant lesion compared to other types.

Table 2. Classification of breast lesions by histopathological diagnoses and age distribution (n=220)

Pathological diagnosis	**Mean age**	**Median (min-max)**	**Frequency**	**%**
Benign lesions	**44.97**	**44.00 (13-79)**	**110**	**50.0**
Breast tissue within normal limits	51.40	53.00 (42-59)	5	2.3
Inflammation				
Acute				
Abscess	42.25	43.50 (44-61)	4	1.8
Chronic idiopathic granulomatous mastitis	35.71	36.50 (20-52)	14	6.4
Fibrocystic changes	49.08	48.00 (32-77)	13	5.9
Fibrosis/fibroadipose tissue	54.29	49.00 (37-79)	7	3.2
Proliferative changes				
Usual epithelial hyperplasia	41.00	41.00 (35-47)	2	0.9
Atypical ductal hyperplasia	52.50	52.50 (44-61)	2	0.9
Papillary neoplasia	63.00	63.00 (52-74)	2	0.9
Tubular adenoma	60.00	60.00	1	0.5
Lactation adenoma	35.50	35.50 (31-40)	2	0.9
Fibroepithelial lesion				
Fibroadenoma	41.70	41.00 (16-76)	40	18.2
Juvenile fibroadenoma	13.00	13.00	1	0.5
Complex fibroadenoma	32.00	32.00	1	0.5
Phyllodes	25.00	25.00 (20-30)	2	0.9
Other benign tumours hamartoma	44.00	44.00	1	0.5
Other benign lesions				
Galactocele	58.00	58.00	1	0.5
Irregular ductal structure	44.00	44.00	1	0.5
Previous bleeding signs	75.00	75.00	1	0.5
Fat necrosis	57.50	58.00 (41-72)	10	4.6
Malign lesions	**54.99**	**53.00 (21-87)**	**110**	**50.0**
Epithelial origin	54.31	53.00 (21-87)	101	45.9
Invasive breast carcinoma				
Invasive ductal				
Invasive lobular	58.33	54.00 (50-71)	3	1.4
Mucinous carcinoma	81.00	81.00	1	0.5
Neuroendocrin carcinoma	49.00	49.00	1	0.5
Ductal carcinoma in situ (DCIS)	57.67	60.00 (42-71)	3	1.4
Other cell origin				
Lymphoma	86.00	86.00	1	0.5

According to BIRADS 2 and 3, no malignancies were observed in the pathology results. Out of the 71 lesions classified as BIRADS 4, 42 (59.1%) were reported as malignant masses, and out of the 70 lesions categorized as BIRADS 5, 68 (97.1%) were identified as malignant (Figure 1).

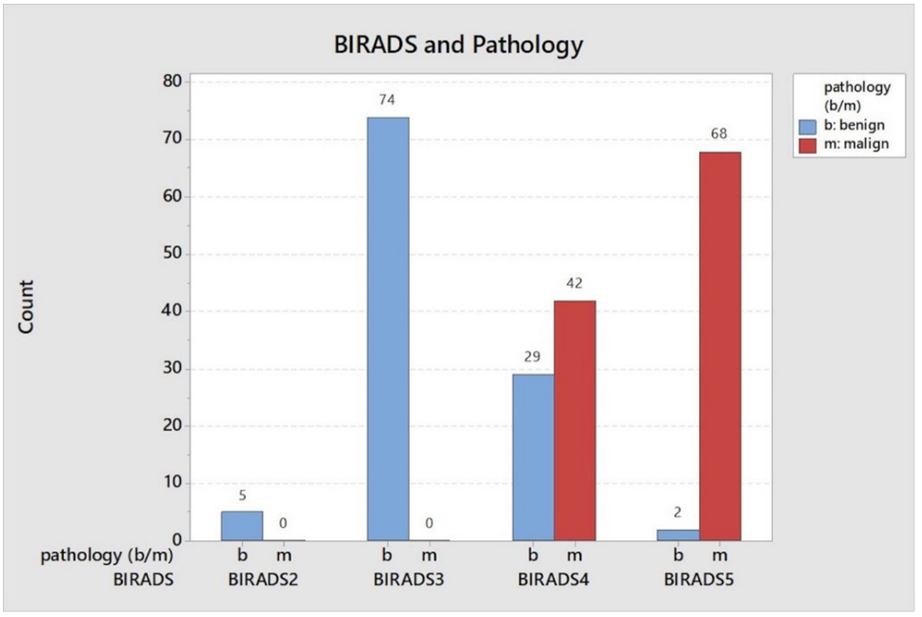

Figure 1. Comparison of BIRADS assessment with pathology results
BIRADS: Breast Imaging Reporting and Data Systems

The lesions in 34 patients could not be clearly demarcated from the surrounding fibroglandular tissue on US and were grouped separately (Figure 2). According to the BIRADS assessment of these patients, the pathological diagnosis of four BIRADS 3 lesions were benign, 13 of BIRADS 4 lesions were benign, and six were malignant. All 11 BIRADS 5 lesions were confirmed as pathologically malignant. Table 3 shows the classification of these masses according to histopathological diagnoses.

Table 3. Classification of lesions that cannot be clearly demarcated from the surrounding fibroglandular tissue on US, according to histopathological diagnoses (n=34)

Pathological diagnosis	**Frequency**	**%**
Benign		
Breast tissue within normal limits	2	5.9
Inflammation		
Acute		
Abscess	1	2.9
Chronic		
Idiopathic granulomatosis mastitis	3	8.8
Fibrocystic changes	3	8.8
Fibrosis	2	5.9
Proliferative changes		
Usual epithelial hyperplasia	1	2.9
Atypical ductal hyperplasia	1	2.9
Fibroepithelial lesion		
Fibroadenoma	2	5.9
Other benign lesion		
Fat necrosis	2	5.9
Malignant		
Epithelial origin		
Invasive breast carcinoma		

Table 3. Continued		
Invasive ductal	15	44.1
Invasive lobular	1	2.9
Ductal carcinoma in situ (DCIS)	1	2.9

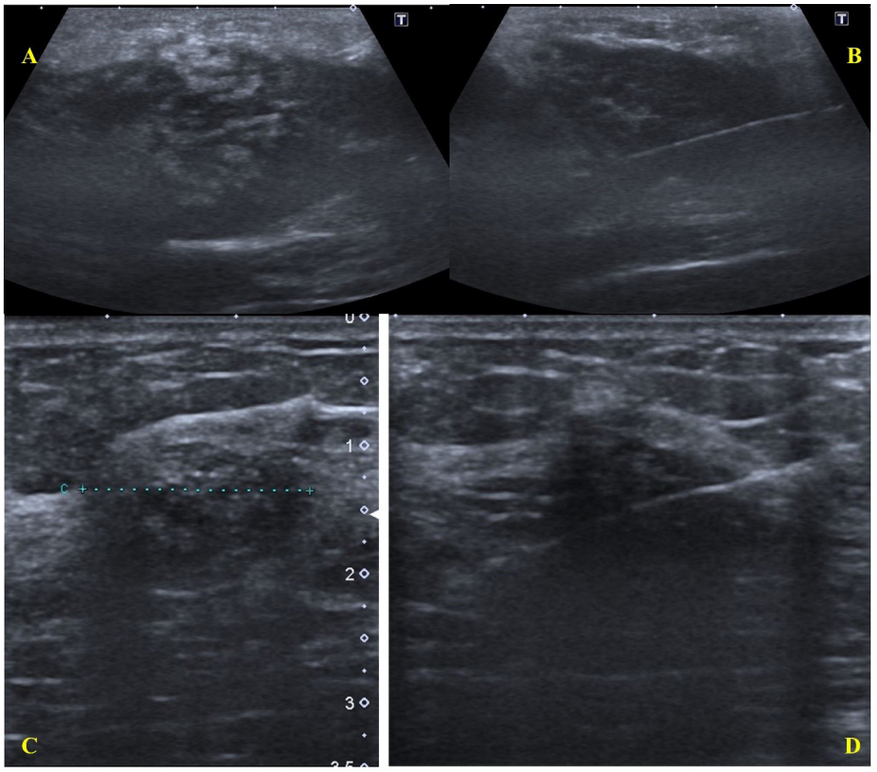

Figure 2. A, B). In a 40-year-old patient, a hypoechoic-heterogeneous lesion that cannot be clearly demarcated from the surrounding fibroglandular tissue in the upper outer quadrant of the left breast was reported as BIRADS 4 before the biopsy. The lesion was diagnosed as granulomatous mastitis histopathologically. C, D) A 41-year-old patient had a heterogeneous lesion with microcalcifications that cannot be clearly demarcated from the surrounding fibroglandular tissue in the upper outer quadrant of the left breast. The lesion was diagnosed as invasive ductal carcinoma

BIRADS: Breast Imaging Reporting and Data Systems

The result of the Cohen's Kappa coefficient for the agreement between the BIRADS system and pathological findings is 0.718 (sensitivity: 1, specificity: 0.71, positive predictive value: 0.78, negative predictive value: 1, accuracy rate: 0.85) (p<0.05) (Table 4).

The contribution of patient parameters, including age, diameter, lateralization, contour of the mass, presence of microcalcification, and axillary LAP, to the LR model is presented in Table 5. A statistical significance level of p<0.05 was achieved, with an accuracy rate of 91.3% (x^2=7.068, df=8) using these parameters. These results revealed a statistically significant relationship with malignancy for the parameters of age, contour, microcalcification, and axillary LAP, while the parameters of diameter and lateralization showed a marginal relationship in the LR analysis.

Table 4. Consistency between ultrasonography (US) findings based on BIRADS system and pathology findings						
		Pathology				
US diagnosis		**Benign**	**Malignant**	**Total**	**Kappa**	**p**
BIRADS						
2, 3	Benign or probably benign	79	0	79	**0.718**	**<0.001**
4,5	Malignant or probably malignant	31	110	141		
Total		110	110	220		
(*p<0.001)						

Table 5. Contribution of parameters to the likelihood ratio of the model in logistic regression

Parameters	B (coefficient)	S.E.	Confidence interval (%95)	Odds rate	p
Constant	-8.218	1.723		0.000	**<0.001**
Age	0.054	0.018	1.020 - 1.093	1.056	**0.002***
Diameter	0.012	0.022	0.970 - 1.055	1.012	0.593
Quadrant (lower inner)	1.616	0.846	0.960-26.415	5.035	0.056
(Diffuse)	-3.564	2.329	0-2.717	0.028	0.126
(Multiple)	-18.914	28059.003	0	0.00	0.999
(Retroareolar)	0.635	0.959	0.288-12.372	1.887	0.508
(Upper outer)	0.747	0.653	0.587-7.592	2.111	0.253
(Upper inner)	0.911	0.795	0.524-11.810	2.488	0.251
Contour (irregular)	4.857	1.104	14.817-1122.114	128.944	**<0.001**
(Lobulated)	3.795	1.121	4.943-400.423	44.489	**0.001***
Microcalcification	1.842	0.552	2.139-18.625	6.312	**0.001***
Axillary lymphadenopathy	2.026	0.657	2.095-27.470	7.585	**0.002***

S.E.: standard error, *p<0.05

Discussion

In this study, which evaluated 220 lesions that underwent breast biopsy, pathology results revealed an equal distribution of benign and malignant lesions. Among benign lesions, fibroadenoma was the most prevalent, with a significant proportion (36.4%). Following fibroadenoma, the most frequently observed lesions were idiopathic granulomatous mastitis (12.8%), fibrocystic changes (11.8%), and fat necrosis (9.2%). Invasive ductal carcinoma (91.8%) was found to have the highest rate among malignant masses with a clear difference.

The histopathological result of 15 (44.1%) out of 34 lesions that could not be clearly demarcated from the surrounding fibroglandular tissue on US (non-mass lesions) was determined as invasive ductal carcinoma. It was concluded that the rate of malignancy increased in patients aged 40 years and older who underwent biopsy. The presence of microcalcification, irregular contour, and axillary LAP involvement support malignancy. LR analysis yielded an accuracy rate of 91.3% using parameters that exhibited a significant relationship with malignancy. In this study, it was concluded that BIRADS and pathological outcomes were very consistent.

Oflazoğlu et al. (8) stated that the most common breast malignancy is invasive ductal carcinoma. In a study (9) involving 13,240 patients, the research reported an incidence rate of 79% for invasive ductal carcinoma. Several studies in the literature support this finding, similar to the results in this study (10-12). In this study, the most common benign breast lesion is fibroadenoma. Literature includes studies both supporting (13) and contradicting (14) this result. The highest benign lesion type is not clear, as the study that contradicts this result lists benign lesions under the title of benign combinations. We believe that the results of this study may be influenced by the high proportion of BIRADS 2 and 3 lesions included in the study.

In a study that examined 91 non-mass lesions, Bartels et al. (15) reported 63 cases of DCIS and 14 cases of IDC. Newburg et al. (16) found 33 cases of DCIS and 22 cases of IDC among 104 malignant non-mass lesions, while Jabbar et al. (11) identified 13 cases of IDC and 12 cases of DCIS among 31 non-mass lesions. In this study, we observed that 15 out of 34 non-mass lesions (44%) were diagnosed as IDC, with only 1 (2.9%) found to be DCIS. Given these findings, we believe it is crucial to be vigilant in diagnosing conditions like idiopathic granulomatous mastitis and fibrocystic changes, both of which have an 8.8% incidence rate and can present with similar characteristics on US, and that the diagnosis should be confirmed by biopsy.

Zheng et al. (13) reported a significant difference in the size of benign and malignant masses in their study. Conversely, studies by Dratwa et al. and Soytürk et al. found that lesion size was not predictive of malignancy (17,18). In this study, diameter parameter results align with those reported by Dratwa et al. and support the findings of Soytürk et al. However, it is important to note that in our study, a cut-off value for lesion diameter could not be determined due to the lack of statistical significance.

In a study involving 109 biopsied patients, where BIRADS evaluations were performed in conjunction with hormone findings, it was reported that the average age of patients with 98 benign lesions was 49 years, while it was 54 years in the group of 11 malignant lesions (19). In this study, we found the mean age of patients with benign lesions to be 44.97 years, and the mean age of patients with malignant lesions was 54.99 years. Consistent with the literature, we observed that the malignancy rate increased with advanced age (20,21).

Celik et al. (21) evaluated the radiology and pathology

correlations of intraductal papilloma cases under the age of 40 and over the age of 40 Özmen evaluated breast cancer's clinical and histopathological features and divided patients into two groups under 40 years old and over 40 years old (9). In this study, patients were divided into two groups: under 40 years of age and over 40 years of age, in order to determine whether routine mammography screenings begin around the age of 40 and whether histopathological types differ between age groups. Benign lesions were found to be dominant under the age of 40, and malignant lesions were found to be dominant in those over 40 years of age. Evaluation of masses as BIRADS 2 and 5 in patients over the age of 40 and as BIRADS 3 in patients under 40 was found to be significant ($p<0.001$). However, the most common histopathological diagnoses did not differ according to age.

In this study, no significant difference in lesion lateralization (right-left breast) was observed. However, findings from the existing literature are diverged. A study reported a higher prevalence of lesions on the left side as compared to the right, and this was not associated with malignancy (22). Conversely, Çelik et al. found a slightly higher occurrence of lesions noted on the right side (21). Another study indicated no bilateral cases (23). In a study conducted by Zheng et al., it was revealed that 14 out of 104 cases presented with bilateral lesions (13). However, this study identified only one case of bilateral malignancy.

Previous studies reported that masses are predominantly situated in the upper outer quadrant of the breast (24,25). This study also observed this predominance; however, this location alone did not exhibit a significant association with benign or malignant characteristics. In this study, our results confirmed that irregular contours were associated with malignancy, while regular contours were indicative of benign lesions, consistent with prior studies (13,17).

Zheng et al. (13) reported microcalcifications in 39 out of 45 malignant lesions in their study. In another investigation involving vacuum biopsy on 119 patients with mammographic microcalcifications, approximately 50% of these cases were found to be malignant (26). In our study, we observed 44 cases of microcalcifications among 110 malignant lesions, which is consistent with another research. Furthermore, a previous study documented the presence of microcalcifications in all types of DCIS (27). In our study, we also identified microcalcifications in all DCIS lesions.

In a study investigating axillary staging in breast cancer patients, axillary lymph nodes were examined in 95 patients, and malignancy was detected in 14 cases (25). Another study that evaluated locally advanced breast cancers found lymph node metastases in 33 out of 46 patients (28). In this study, axillary LAP was identified in a total of 50 masses, with 44 being malignant and 6 benign, and it was found to be associated with malignancy.

In this study, a significant agreement was observed between the BIRADS system and pathological findings (K=0.718). Similarly, another study reported a high level of concordance (K=0.907) (4). We assume that the disparity in agreement between these two studies may be attributed to the substantial sample size in the latter study, encompassing 330 participants. In Özgür's study, a correlation analysis between pathology and Magnetic Resonance Imaging findings yielded significant results (29). In this study, we used the LR analysis to classify benign and malignant cases based on radiological findings and achieved an accuracy rate of 91.3%. In a study, it was observed that the LR accuracy rate was 98.9 with 5 parameters (texture, perimeter, area, concavity, symmetry) (30). In this study, only age and these radiological findings (diameter, quadrant, contour, microcalcification, axillar LAP) were used. Therefore, we believe that the difference occurs because the parameters are different, and the ready data is used. As far as we know, this study is the first to employ LR analysis with these radiological findings.

Idiopathic granulomatous mastitis (IGM) is a chronic inflammatory clinical picture of the breast and has a variable etiology that includes infectious and non-infectious causes. It often causes a diagnostic challenge as it can mimic breast carcinoma radiologically and clinically. Although studies have been conducted for differential factors in the literature, it has been concluded that a definitive diagnosis is possible with histopathology (31-34). Therefore, this study's relatively high rate of histopathologically detected IGM may have contributed to the decrease in the correlation between radiology and pathology.

This study found a primary breast lymphoma case in an 86-year-old patient (0.5%). Furthermore, no involvement was found anywhere other than the breast. Primary breast lymphoma accounts for merely 0.5% of all breast malignancies and approximately 1% of all non-Hodgkin lymphomas (35). In their study, Sabate et al. (36) highlighted distinctive radiological features that set primary breast lymphoma apart from breast carcinoma. These features include variations in lesion size (4-5 cm in lymphoma, as opposed to 2-3 cm in carcinoma) and the absence of calcification and structural deterioration in the surrounding tissue (36). The radiological characteristics of our patient also support this result. Therefore, we would like to emphasize the importance of radiologists considering the possibility of lymphoma when they encounter such a mass.

Since the study was single-center, the number of patients was relatively limited. Due to the study's retrospective design, the clinical findings, treatment processes, and follow-ups of the patients could not be included. Information on operations could not be accessed because many patients went to other centers after cancer diagnosis. Since it is planned to compare with patients under 40 years of age, mammography findings were not mentioned, and primarily US findings were emphasized.

The results of this single-centre study showed that half of the breast lesions biopsied were diagnosed as cancer, and IDC was the most common. Although the radiological and pathological correlation was achieved at a high rate, benignity was found to occur in 14% of the BIRADS 4 and 5 breast lesions as a result of biopsy. Histopathological diagnosis is recommended for suspicious lesions that cannot be clearly demarcated from the surrounding fibroglandular tissue on US, since they show sonographic similarities with invasive breast carcinoma, granulomatous mastitis, and fibrocystic changes.

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