

# ORIGINAL ARTICLE

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### Yazışma Adresi

Correspondence Address

### Cihat AKSOY

Antalya Atatürk State Hospital,  
Radiology Department,  
Antalya,Turkey  
caksoy007@gmail.com

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### Cihat AKSOY

Antalya Atatürk State Hospital,  
Radiology Department,  
Antalya,Turkey

ORCID ID: 0000-0001-8287-2547

### Koray KOC

Antalya Atatürk State Hospital,  
Radiology Department,  
Antalya,Turkey

ORCID ID: 0000-0001-6876-1998

### Kamil CIRA

Antalya Atatürk State Hospital,  
Radiology Department,  
Antalya,Turkey

ORCID ID: 0000-0002-7751-1461

### Emel EMİR YETİM

Antalya Atatürk State Hospital,  
Radiology Department,  
Antalya,Turkey

ORCID ID: 0000-0002-2847-6049

### Ozgur OZBILEK

Antalya Atatürk State Hospital,  
Radiology Department,  
Antalya,Turkey

ORCID ID: 0000-0002-3952-0842

### Sinem CIL GONULCU

Antalya Atatürk State Hospital,  
Pathology Department,  
Antalya,Turkey

ORCID ID: 0000-0002-4300-9027

### Can GUNHAN

Antalya Atatürk State Hospital,  
General Surgery Department,  
Antalya,Turkey

ORCID ID: 0000-0003-1584-2510

## Evaluation of the Effect of COVID-19 Pandemic on Breast Cancer Diagnosis

## COVID-19 Pandemisinin Meme Kanseri Tanısına Etkisinin Değerlendirilmesi

### ABSTRACT

#### Objective:

The COVID-19 pandemic has caused serious changes in our routine healthcare practices. With this study, we aimed to determine the effect of the pandemic on the diagnosis of breast cancer.

#### Material and Methods:

The medical records of patients who applied for breast imaging between March 2019 and January 2021 were retrospectively scanned. Among the patients diagnosed with BI-RADS category 4 and 5, those who had percutaneous ultrasound-guided core needle breast biopsy (CNBB) and excisional biopsy after ultrasound guided wire marking (UGWM) were included in the study. The study period was divided into two groups; March 2019-January 2020 was grouped as pre-pandemic and March 2020-January 2021 as post-pandemic.

#### Results:

A total of, 14200 breast imaging examinations were performed in 9378 patients in the pre-pandemic period, and 3778 breast imaging examinations were performed in 2375 patients in the post-pandemic period. The mean age of the patients was 48.98±14.11 years. While the number of lesions biopsied was 201 (1.4%) in the pre-pandemic period, it was 61 (1.6%) in the post-pandemic period. The number of malignant breast lesions was 97 before the pandemic and 30 after the pandemic.

After the pandemic, the number of patients undergoing breast imaging, the number of examinations, the number of biopsy, the number of malignant lesions decreased by 74%, 73%, 69% and 69%, respectively. The highest decrease in the number of examination was in April and May, with 97.55% and 96.35%.

**Conclusions:**

With the pandemic, the number of patients admitted to the hospital, the number of breast imaging, the number of biopsy and the number of malignant breast lesions detected decreased about 70%. It has been noticed that during the pandemic process, patients have been delaying their regular check-ups and the time to apply to the hospital has been prolonged.

**Key Words:**

COVID-19, Pandemic, Breast cancer

**ÖZ****Amaç:**

COVID-19 pandemisi, rutin sağlık uygulamalarımızda ciddi değişikliklere neden oldu. Bu çalışma ile pandeminin meme kanseri tanısına etkisini belirlemeyi amaçladık.

**Gereç ve Yöntemler:**

Mart 2019-Ocak 2021 tarihleri arasında meme görüntülenmesi için başvuran hastaların tıbbi kayıtları geriye dönük olarak tarandı. BI-RADS kategori 4 ve 5 olan hastalardan ultrasonografi eşliğinde perkütan meme iğne kor biyopsi ve ultrasonografi eşliğinde tel ile işaretleme sonrası eksizyonel biyopsi yapılanlar çalışmaya dahil edildi. Çalışma süresi iki gruba ayrıldı; Mart 2019-Ocak 2020 pandemi öncesi ve Mart 2020-Ocak 2021 pandemi sonrası olarak gruplandırılmıştır.

**Bulgular:**

Pandemi öncesi dönemde 9378 hastaya toplam 14200 meme görüntüleme tetkiki, pandemi sonrası dönemde ise 2375 hastaya 3778 meme görüntüleme tetkiki yapıldı. Hastaların yaş ortalaması 48,98±14,11 yıl idi. Pandemi öncesi dönemde biyopsi yapılan lezyon sayısı 201 (%1,4) iken, pandemi sonrası dönemde 61 (%1,6) idi. Malign meme lezyonlarının sayısı pandemi öncesi 97, pandemi sonrası 30 idi. Pandemi sonrası meme görüntüleme yapılan hasta sayısı, tetkik sayısı, biyopsi sayısı, malign lezyon sayısı sırasıyla %74, %73, %69 ve %69 azaldı. Tetkik sayısında en fazla azalma %97,55 ve %96,35 ile Nisan ve Mayıs aylarında olmuştur.

**Sonuç:**

Pandemi ile birlikte hastaneye başvuran hasta sayısı, meme görüntüleme sayısı, biopsi sayısı ve tespit edilen malign meme lezyonlarının sayısı yaklaşık %70 oranında azaldı. Pandemi sürecinde hastaların düzenli kontrollerini aksattıkları, hastaneye başvuru sürelerinin uzadığı farkedilmiştir.

**Anahtar Kelimeler:**

COVID-19, Pandemi, Meme kanseri

**INTRODUCTION**

COVID-19 is a disease caused by the novel type of SARS-CoV-2 virus, first detected in Wuhan, China. It was considered a pandemic by the World Health Organization on March 11, 2020. The first COVID-19 case was detected on March 10, 2020 in Turkey. There were 228.3 million cases diagnosed with COVID-19 worldwide, while more than 4.6

million deaths were observed as of 21.09.2021 (according to World Health Organization data). Cancer imagings and routine examinations were postponed in Turkey as in many countries in the early stages of the pandemic; only urgent symptomatic cases were prioritized and patient follow-ups were performed using telemedicine as much as possible. Accordingly, there was a significant decrease in hospital admissions. The patient follow-up periods recommended by the guidelines were postponed by the joint decision of the physician and the patient. Cancer imagings data from 20 healthcare centres in the United States were compared to one year ago and a significant decrease was observed in new cancer diagnoses in April 2020; especially melanoma, prostate cancer, and breast cancer were the most affected types of cancer (-51.8%, -49.1%, and -47.7%, respectively) (1). Similarly, Patt et al., compared the clinical and follow-up characteristics of oncology patients between March and July 2019 and March and July 2020 and found that the number of patients diagnosed with cancer decreased compared to the previous year in 2020. The frequency of breast, colon, prostate, and lung cancer imagings was found to decrease by 85%, 75%, 74%, and 56%, respectively in April 2020 (2). Papautsky et al., evaluated the difficulties experienced by 609 patients receiving breast cancer treatment during the pandemic with a survey study and found that 44% of the participants delayed cancer treatments during the COVID-19 pandemic (3). It was determined that the delay in diagnosis and treatment was higher in elderly patients compared to young people (48.98 vs. 45.94, p<0.001); however, it has been found that the cancer stage, presence of social security, and race have no effect on delay (3). The time and severity of the pandemic vary from continent to continent and from country to country even though the COVID-19 pandemic affects the whole world. We aimed to evaluate the effect of the COVID-19 pandemic on the diagnosis of breast cancer.

**MATERIAL and METHODS**

Patients who applied to the Radiology Department of Atatürk State Hospital between March 10, 2019 and January 31, 2020 (before the pandemic) and March 10, 2020 and January 31, 2021 (during the pandemic) for breast imaging were included in the study. The records of patients who underwent one or more of the imaging tests (Ultrasound (USG), mammography, breast magnetic resonance imaging (MRI)) were reviewed retrospectively. Patients identified as BI-RADS category 4 (suspected malignancy) or category 5 (highly probable malignancy) were considered for the study (4). Patients with BI-RADS category 4a, 4b, 4c, and 5 lesions who underwent percutaneous core needle breast biopsy (CNBB) guided by ultrasonography and excisional biopsy after ultrasound guided wire marking (UGWM) were included in the study. Patients with BI-RADS category 1 (negative), 2 (benign), 3 (possibly benign), and patients whose medical records could not be reached were excluded from the study. Clinical characteristics and pathology results of the cases were obtained using the SARUS information network. Pathology results were classified using the classification system determined by the World Health Organization used in the diagnosis of breast cancer (5).

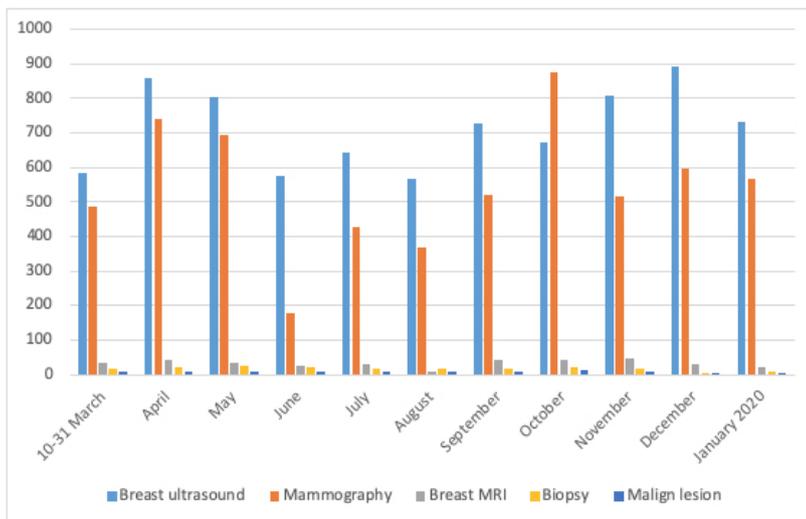
Clinical information, BI-RADS category, maximum diameter, localization, and pathology results of the patients admitted before and during the pandemic were compared. Our study was approved by the Ethics Committee of the Antalya Training and Research Hospital (decision number: 2/20, date:11.03.2021). The study was conducted in accordance with the Helsinki Declaration. Due to the retrospective nature of the study, informed consent was not obtained from the patients. As the effects of COVID-19 were investigated, Scientific Research Application approval was received from the Ministry of Health of the Republic of Turkey (Cihat Aksoy-2021-01-17T18\_01\_37) The results obtained in the study was analysed statistically using “SPSS (Statistical Package for Social Sciences) for Windows 21.0” software. Descriptive statistics such as frequency distribution, mean, and standard deviation were used to define the sample. Student’s t-test was used for the difference between the two independent group averages and Kruskal-Wallis test was used for more than two groups. Categorical data were examined with chi-square significance test. The results were evaluated using 95% significance level or 0.05 error margin.

## RESULTS

17978 breast imaging examinations were performed on 11753 patients during the 22-month period. There were 14200 breast imaging examinations of 9378 patients before the pandemic and 3778 breast imaging examinations of 2375 patients during the pandemic (Table I). The mean age of the patients evaluated in the study was  $48.98 \pm 14.11$  years.

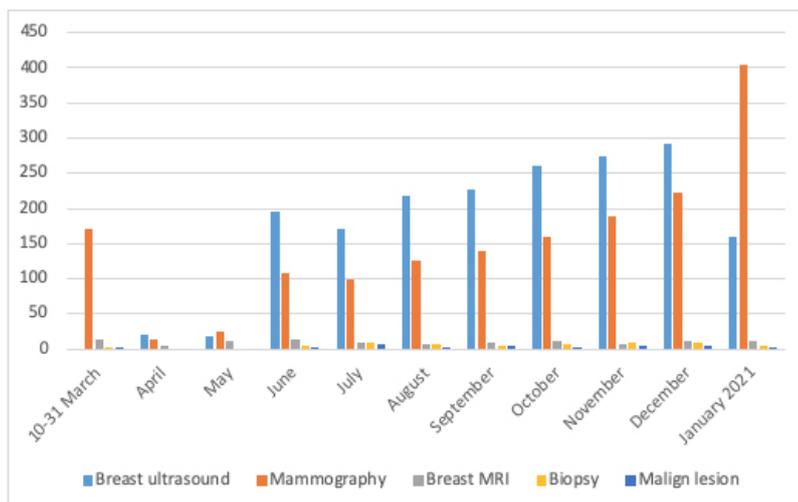
The majority of lesions evaluated in the study consisted of BI-RADS category 4a (52.2%). In addition, there were no differences between the BI-RADS category distributions of the lesions before and during the pandemic ( $p=0.176$ ). The lesions in the upper outer quadrant constituted the majority in the study population. Breast quadrants with pathological lesions detected before and during the pandemic were compared; there was no statistically significant difference ( $p=0.802$ ).

With the pandemic, the number of patients with breast imaging, the number of breast imaging, the number of biopsy and the number of malignant lesions decreased by 74%, 73%, 69% and 69%, respectively, compared to the pre-pandemic period. The highest decrease in the number of examinations was observed in April and May 2020, and reduction rates were 97.5% and 96.3%, respectively (Figure 1-2).



**Figure 1:**

According to the months in the pre-pandemic; the number of breast imaging examinations, the number of lesions biopsied and the number of malignant lesions detected.



**Figure 2:**

According to the months in the post-pandemic; the number of breast imaging examinations, the number of lesions biopsied and the number of malignant lesions detected.

Biopsy was performed in 201 lesions (1.4%) in the pre-pandemic period and in 61 lesions (1.6%) in the post-pandemic period. The mean age of the patients who underwent biopsy was similar before and during the pandemic (48.81±14.00 vs. 49.52±14.54, p=0.736) (Table I).

**Table I:** The number of patients with breast imaging, number of breast imaging examinations, number of lesions biopsied before and during the pandemic in the study population.

	Pre-pandemic period	Post-pandemic period	p
Mean age (years)	48.81±14.00	49.52±14.54	0.73
The number of patients with breast imaging	9378	2375	NA
Number of breast imaging examinations	14200	3778	NA
Number of lesions biopsied (%)	201 (1.4%)	61 (1.6%)	NA

NA: Not available

While 90.5% of the pathological samples were obtained with CNBB and 9.5% with UGWM before the pandemic, these rates were 98.3% and 1.4%, respectively, during the pandemic. The median diameter of breast lesions leading to the biopsy was 21 mm (IQR=14.0-30.0). The median diameter of benign lesions was 22.37 mm and the median diameter of malignant lesions was 25.90 mm. The difference was not significant even though the mean diameter of malignant lesions was observed to be higher than the mean diameter of benign lesions (p=0.052). The median diameters of the lesions detected before and during the pandemic were similar [22.00 (IQR=15.0-30.00) mm vs 20.00 (IQR=15.0-30.75) mm, p=0.995]. 46.4% of the lesions detected in the right breast were malignant whereas 53.6% of the lesions detected in the left breast were malignant (p=0.066). Biopsy results during the pandemic were compared with pre-pandemic results, and the rate of benign lesions was similar in both time periods (51.7% vs. 50.8%, p=0.12). There were 127 malignant lesions, 62 in the right breast and 65 in the left breast. 76.3% of malignant lesions (n=97) were diagnosed before the pandemic and 23.7% (n=30) during the pandemic period. The diagnosis of breast cancer decreased by 69.0% during the pandemic compared to the pre-pandemic period (Table II).

**Table II:** Pathology Results of lesions before and during the pandemic in the study population.

	Pre-pandemic period	Post-pandemic period	p	Delta*
Benign lesion	%51.7 (n=104)	%50.8 (n=31)	0.12	%70
Malignant lesion	%48.2 (n=97)	%49.1 (n=30)	0.62	%69

\*Delta represents the difference between the two periods.

The mean age of patients with malignant lesions was higher than the mean age of patients with benign lesions (56.12±13.01 vs. 42.62±11.86, p<0.001).

The distribution of 104 benign lesions detected before the pandemic was as follows: 51 fibroepithelial tumours, 22 fibrocystic changes, 14 benign epithelial proliferation, nine inflammatory lesions, three papillary lesions, three adenomas, one adenosis and benign sclerosing lesions, one vascular tumour. The distribution of 31 benign lesions detected during the pandemic was as follows: 18 fibroepithelial tumours, six fibrocystic changes, two benign epithelial proliferation, two inflammatory lesions, two papillary lesions, one adenosis and benign sclerosing lesion. Of the 97 malignant lesions detected before the pandemic, 82 were found as invasive carcinoma, seven as lobular carcinoma, four as mucinous carcinoma, two as ductal carcinoma in situ, and two as metastasis. Of the 30 malignant lesions detected during the pandemic, 28 were detected as invasive carcinoma, one as neuroendocrine carcinoma, and one as recurrent lesion in the operation site.

## DISCUSSION

The number of breast imaging examinations, the number of biopsy and the number of malignant lesions decreased by 73%, 69%, and 69%, respectively, compared to the pre-pandemic period in our study. The highest decrease was observed in April and May 2020. The number of breast imaging examinations decreased by 85% in April 2020 and the number of biopsies performed for breast lesions decreased by 71% and 31% in April and July 2020, respectively, compared to one year ago in a similar study conducted in the United States of America (2). In addition, the results of a study including data from 20 healthcare centres in the United States showed that breast imaging and breast cancer decreased by 89.2% and 47.7%, respectively, compared to the pre-pandemic period in April 2020 (1). Postponement of elective procedures and lack of adequate personal protective equipment against infection were shown as reasons for the decrease in examinations in a survey conducted with radiologists working in different states to determine the cause of the decrease in imaging methods due to the pandemic. In addition, 16% of the radiologists surveyed in the same study were found to be COVID-19 PCR positive in this process (6). Similarly, it was observed in a survey of 2136 radiologists in Italy that approximately 30% of healthcare professionals in the radiology department were infected (7).

Early diagnosis and treatment of breast cancer is known to improve patient survival and patient quality of life (8). The effect of quarantine on breast cancer imaging was evaluated with the imperial college model in a study conducted by Vanni et al. In Italy; it is estimated that the quarantine period of 3 months will cause 10.000 breast cancer patients not to be diagnosed and the number of patients with delayed breast cancer diagnosis will reach 16.000 if the quarantine period is prolonged to 6 months (9). The diagnosis of breast cancer decreased by 69.0% during the pandemic compared to the pre-pandemic period in our study. We think that the survival rates and quality of life of the patients will be negatively affected due to the cases that we could not detect.

The European Society of Breast Imaging (EUSOBI) published recommendations for breast care provision and procedural prioritisation during the COVID-19 pandemic (10). The summary of medical decisions aimed at the safety of health workers was as follows; a) Patients with a lesion suspected of breast cancer (newly developing palpable nodule in the breast, skin or nipple retraction, orange peel appearance on the skin, unilateral discharge from the nipple) should be evaluated as soon as possible, b) Needle biopsy should be performed immediately in patients with BI-RADS 4 or 5 lesions, c) Evaluations of patients who are scheduled for neoadjuvant therapy should not be delayed, d) Asymptomatic women at high risk of breast cancer should be re-examined 1 year after the previous evaluation if their appointment is delayed, e) Women who are asymptomatic after breast cancer treatment are advised to make an appointment within one year and three months from the previous check-up, f) In the COVID-19 pandemic, control of asymptomatic women who do not respond to a mammography invitation should be scheduled according to local institutional requirements, preferably within three to six months.

This study have some limitations. First of all, it does not reflect the entire country because it is a single centre experience. In addition, the rate of patients diagnosed with breast cancer is not reported to be missed or delayed since the study is not based on community-based screening data. Finally, the difficulties experienced by patients after the diagnosis of breast cancer due to the pandemic are not mentioned. We think that this study will contribute to the literature as it evaluates the effect of the COVID-19 pandemic on breast cancer diagnosis in our country. Despite its limitations, we believe that it will be a supportive resource for future studies.

## CONCLUSION

The number of hospital admissions, the number of breast imaging examinations and the number of malignant lesions decreased due to anxiety and restrictions that occurred with the onset of the pandemic. We think that the decrease in the number of breast imaging examinations is related to the intense anxiety of the patients during the pandemic process and, accordingly, the disruption of routine controls during the pandemic period. After adequate and necessary precautions are taken, regular and effective imaging examinations of the group at risk of breast cancer will contribute to the long-term survival of these patients.

### Ethics Committee Approval:

Ethics committee approval was received from Ethics Committee of the Antalya Training and Research Hospital for this study (decision number: 2/20, date:11.03.2021). The study was conducted in accordance with the Helsinki Declaration.

### Informed Consent:

Since the data used in the study were obtained from retrospective medical data, written informed consent was not obtained.

### Author Contributions:

Concept – C.A.; Design – K.K.; Supervision – K.Ç.; Funding - no.; Materials – E.E.Y. Data Collection and/or Processing -E.E.Y., S.Ç.G.; Analysis and/or Interpretation – Ö.Ö.; Literature Review – G.C.; Writing – C.A.; Critical Review – K.K.

### Conflict of Interest:

The authors have no conflicts of interest to declare.

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