

# Rate and reasons of missed screening mammography in the COVID-19 pandemic from Turkey

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## ABSTRACT

**Aim:** While screening mammography has been interrupted in many countries during the coronavirus disease (COVID-19) pandemic lockdowns, less is known about missed mammography screening and its reasons in the later periods of pandemic. In this study it was aimed to find out the rate and the reasons for missed mammography screening, and the associated factors in Turkey during the COVID-19 pandemic.

**Material and Method:** In this single center, cross-sectional observational study women who underwent mammography screening between September 1st to October 1<sup>st</sup> 2021 (15 months after the start of the COVID-19 pandemic) were recruited. A questionnaire developed for the purpose of this study was used to assess the participant characteristics, whether a screening mammography has been missed during pandemic and its reasons.

**Results:** The sample comprised of 144 women with a mean age of  $50.2 \pm 8.0$ . Most of the sample were married and had children, 34.0% had chronic diseases. Ninety women (62.5%) missed a screening mammography in the pandemic. Having equal or less than primary school education was associated with higher delay in mammography screening when compared to being having higher education (OR=2.26, 95%CI= 1.09- 4.69,  $p=0.027$ ). Fear of COVID-19 transmission (92.2%) was the most common reason for missed mammography screening.

**Conclusion:** This study firstly demonstrated that most of the women delayed their screening mammography after the lockdown periods in the COVID-19 pandemic in Turkey and having equal or less than primary school education was associated with higher missed screening rates than having higher education levels. Effective solutions are needed to address the reasons for missed mammography screening to reduce breast cancer related morbidity and mortality both for this pandemic and for regular times.

**Keywords:** Mammography, cancer screening, breast cancer, missed mammography screening, COVID-19 pandemic

## INTRODUCTION

Screening mammography is crucial in early diagnosis and prevention of advanced breast cancer and cancer related mortality (1). The World Health Organization announced that Coronavirus disease 2019 (COVID-19) outbreak had reached pandemic status on March 11, 2020 (2) and non-urgent cancer screening has become questionable and has been interrupted in many countries. The American College of Radiology recommended postponement of screening mammography as a form of non-urgent care (3).

As interruptions in cancer screening will lead to additional advanced diagnosed cancers and increase breast cancer related mortality (4); in different studies delay in breast imaging ranged between 87- 99% during the early stage of the pandemic (5-7). A study

from Canada demonstrated that without adequate strategies to accommodate individuals who missed their screening, a six-month interruption would lead to 40,000 life-years lost (8). Therefore, it is important to know the rates and reasons for postponing screening mammography. Nationwide data from Taiwan showed that the total number of mammography screenings decreased significantly in the later stages of the pandemic (9). It was reported that the impact of the pandemic for mammography screening should be assessed in different populations (10).

In Turkey, breast cancer screening mammography has been started on July 2004 by the organization of screening centers by the Turkish Ministry of Health. However, like many countries, screening mammography have

been temporarily suspended in the lockdown period during first months of the pandemic (11). After the first lockdown period, June 1st 2020, screening services were not shut down in Turkey while empirical knowledge shows that women still delay or postpone their screening mammography. However, the rates and reasons for missed mammography screening and its reasons in the later periods of pandemic is not reported in Turkey. This information is crucial to address the reasons and prevent late stage breast cancer and related death.

This study aimed to find out the rate and the reasons for missed mammography screening in Turkey during the late stages of the COVID-19 pandemic. It was hypothesized that the having low education would be associated with lower adherence to mammography screening program.

## MATERIAL AND METHOD

The study was carried out with the permission of Yildirim Beyazıt University Clinical Researches Ethics Committee (Date: 18.08.2021, Decision No: E-2021-46). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

### Study Design and Patients

In this single center, cross-sectional observational study patients who will undergo mammography at the Yildirim Beyazıt University Yenimahalle Training and Research Hospital Radiology Department between September 1<sup>st</sup> to October 1<sup>st</sup> 2021 (15 months after the lockdown period in Turkey) were included to this study. Inclusion criteria were being female, being  $\geq 40$  years, able to write and speak in Turkish and providing written informed consent for this study.

### Procedures

In the mammography waiting room, the researcher provided information about the study to the participants. After obtaining the informed consent form, the participants were given the written study form to fill in the waiting room. The study form was a questionnaire and included information on sociodemographic data and reasons for delays in screening mammography examinations. The reasons were asked as close ended questions and with yes or no checking boxes where participants were able to choose more than one reason. The reasons in the study form to check yes or no were: fear of COVID-19 transmission in the hospital, during the public transport, fear of pain in mammography, fear of radiation in the mammography, not being able to take leave from work, having COVID-19 infection at the time of screening in self or other family members, lack of

knowledge on repeating mammography screening every year and being ashamed of mammography screening. There was also an open ended question at the end of the close ended questions for any other reasons that the participants want to express. The women were able to check multiple reasons in the study questionnaire. A missed mammography screening was defined as a delay in mammography screening after the lockdown period during the pandemic.

### Data Analysis

Statistical analyses were done using IBM SPSS 20.0 (SPSS Inc., Chicago, IL, USA) package program. The Shapiro-Wilk test was used to determine whether the data were normally distributed. Numerical values were expressed as mean and standard deviation (SD) if distributed normally; median and interquartile range (IQR) values if not distributed normally. Categorical variables were given as numbers and percentages. The association between having chronic disease and not having any chronic disease, working versus not working (retired or housewife), having lower education ( $\leq$ primary school) versus higher education ( $>$ primary school) (12) and missed mammography screening was done using the Chi-Square Test. These hypotheses were based on previous research of barriers to mammography screening and empirical knowledge of the author (13). The difference between ages of women who delayed and not delayed their screening mammography was tested with Student-t test if distributed normally, with Mann Whitney-U test if the distribution was not normal. The results were considered statistically significant using Odd's Ratios (OR), 95% Confidence Intervals (CI) and  $p < 0.05$ .

## RESULTS

Totally, 188 patients were considered for eligibility in the study period. Of these, 39 (20.7%) did not provide consent for the study and 5 (2.7%) could not write in Turkish. Remaining 144 (76.6% of the recruited sample) patients comprised the study sample. The mean age of the sample was  $50.2 \pm 8.0$  years. All participants were women.

Sociodemographic and medical characteristics of the sample are summarized in **Table 1**. Most of the sample were married and had children. Median number of children was 2 (IQR: 2-3). Most women (70.1%) had more than primary school education. Forty-nine women (34.0%) had chronic disease including hypertension, diabetes mellitus, thyroid disease, asthma, cardiac disease, larynx cancer, thyroid cancer, Crohn's disease, chronic hepatitis and familial Mediterranean fever. Twenty-nine (20.1%) women had breast cancer family history and 54 (37.5%) had other cancers in the family history. Forty-one (28.5%) women had a friend with breast cancer.

**Table 1.** Sociodemographic and clinical characteristics of the sample (N= 144)

Sociodemographic characteristics	
<b>Marital status (n, %)</b>	
Married	122 (84.7)
Single	22 (15.3)
Have at least one child	136 (94.4)
<b>Education (n, %)</b>	
No education	3 (2.1)
Primary school	40 (27.8)
Secondary school	12 (8.3)
High school	45 (31.3)
University	39 (27.1)
Higher than university	5 (3.5)
<b>Working status (n, %)</b>	
Not working (housewife)	82 (56.9)
Working on a job	44 (30.6)
Retired	18 (12.5)
<b>Clinical characteristics</b>	
Chronic disease (any)	49 (34.0)
Hypertension	19 (13.2)
Diabetes mellitus	13 (9.0)
Thyroid disease	9 (6.3)
Asthma	4 (2.8)
Cardiac disease	5 (3.5)
Cancer	3 (2.1)
Other	6 (4.2)

Ninety women (62.5%) missed a screening mammography in the pandemic after the lockdown period. There was no difference in terms of having chronic disease versus not having any chronic disease ( $p=0.749$ ), working versus not working ( $p=0.852$ ) and mean age in women who delayed and have not delayed their screening mammography ( $50.8\pm 7.8$  vs  $49.2\pm 8.2$  respectively,  $p=0.245$ ). Having  $\leq$  primary school education was associated with higher delay in mammography screening when compared to being having higher education (OR=2.26, 95%CI=1.09- 4.69,  $p=0.027$ ).

The reasons for delay in screening mammography during the pandemic that the women provided information for this study is given in **Table 2**. Fear of COVID-19 transmission (in the hospital (92.2%) and during public transport (35.6%)) was the most common reason for missed mammography screening. Five women provided other reasons to the open-ended questions including self-neglect, general dislike in being in hospitals, lack of permission by husband for the screening mammography, having more important life events, and having no health insurance.

**Table 2.** The reasons provided by the participants with delay in screening mammography during the pandemic (N=90)

The reasons of delay in mammography	n	%
Fear of COVID-19 transmission in the hospital	83	92.2
Fear of COVID-19 transmission during the public transport	32	35.6
Due to the fear of pain in mammography	18	20.0
Not being able to take leave from work	14	15.6
I had COVID-19 infection at the time of my screening	13	14.4
One of my family members had COVID-19 infection at the time of screening	11	12.2
I did not know that I have to repeat mammography screening every year	11	12.2
I believe that the radiation in the mammography has harmful effects	10	11.1
I do regular self physical exams so I do not need mammography screening	9	10.0
I am ashamed of mammography	4	4.4
Other	5	5.6

## DISCUSSION

As the rate and reasons for missed mammography screening and its reasons in the later periods of pandemic has not been reported from Turkey, this study demonstrated the rate and reasons for missed screening mammography. Most of the women delayed their screening mammography and having equal or less than primary school education was associated with higher missed screening rates than having higher education levels. This information is crucial to address the reasons and prevent late stage breast cancer and related death. This research conducted in Turkey, firstly provided evidence for the reasons for delayed mammography screening during the pandemic. These reasons may be applicable for COVID-19 pandemic and possible future crises.

Tsai et al. (9) from Taiwan showed that although breast cancer screening program has continued during the COVID-19 pandemic, total number of screenings decreased by 22% . In our study the delay in screening mammography rate was much higher. It may be explained by higher accessibility to mammography screening in Taiwan where most of the women do not have to go the hospital and community services also provided screening. While the authors did not investigate the reasons, they discussed possible reasons such as restriction on hospital visits, triage of patients with COVID-19 infection risks, and fear of going to the hospital (9). In the United States of America where health insurance does not cover screening mammography for every citizen; poverty, lack of health insurance and being minority were key barriers to breast cancer screening different from our study (14,15). The most common reason for missed mammography screening in our study was fear of COVID 19 transmission in the hospital. It is important that one fifth of the study sample provided reasons for missed screening which were not related to the COVID-19 pandemic. These reasons included lack of information or misinformation of yearly screening mammography and



misinformation on radiation hazards. Three studies before the COVID-19 pandemic investigated the barriers and reasons for missed mammography screening (13,16). Two studies of Ozmen et al. (13, 16) investigated the rates and associates of mammography screening from a rural and an urban area of Turkey. Mammography screening rate was only 35% (16) similar to our study (37.5%). Widowhood, being illiterate, not reading newspapers regularly, unemployment, a monthly income lower than the hunger threshold, limited insurance were associated with missed mammography screening (13,16). Supporting our findings; women who had knowledge on regular mammography screening program and about little to none harmful effects of radiation during mammograms, screening rates were higher (16). Another study from Turkey found lack of mammography screening in 5 years as 37% in an urban population (17). It seems that missed screening rate has not been changed before and after the pandemic while fear of COVID-19 transmission was added to other reasons that were present before the pandemic.

Another aspect of this study is that 4 women were ashamed of their mammography screening, and 1 woman delayed the screening because her husband did not allow the screening. While these causes seem rare in this example from the Turkish capital, they can be much higher in rural areas. These reasons should be seen as preventable etiology of breast cancer mortality and morbidity, and should be addressed as soon as possible by the health care system.

This study has important implications for practice. United Nations Sustainable Development Goals and the World Health Organization's Global Monitoring Framework commits to reduce the burden of breast cancer in low- and middle-income countries (18). Turkey as a middle income country needs effective interventions based on an education model for increasing regular mammography screening rates (19).

The main strength of this study is the low refusal rate by the participants which lessens bias. The urban, single center setting is an important limitation of the study. Further research, therefore, is needed to investigate the rates and reasons of missed mammography screening in multiple, preferably international settings, including women with different education levels.

## CONCLUSION

The results of this study showed that the missed screening mammography rate is high from the capital of Turkey. Studies are needed to investigate breast cancer outcomes after the COVID-19 pandemic. Effective solutions are needed to address the reasons for missed mammography screening to reduce breast cancer related morbidity and mortality both for this pandemic and for regular times.

## ETHICAL DECLARATIONS

**Ethics Committee Approval:** The study was carried out with the permission of Yıldırım Beyazıt University Clinical Researches Ethics Committee (Date: 18.08.2021, Decision No: E-2021-46).

**Informed Consent:** All patients signed the free and informed consent form.

**Referee Evaluation Process:** Externally peer-reviewed.

**Conflict of Interest Statement:** The authors have no conflicts of interest to declare.

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**Author Contributions:** All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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