

## Research Article

# Impacts of COVID-19 Pandemic on Breast Imaging Examinations

 Halit Nahit Sendur,  Serap Gultekin,  Mahi Nur Cerit,  Emetullah Cindil,  Aydan Avdan Aslan,  Erencan Karakoc

Department of Radiology, Gazi University Faculty of Medicine, Ankara, Turkey

### Abstract

**Objectives:** To investigate breast imaging case number changes during the COVID-19 pandemic in comparison to same time periods in the years of 2019 and 2020 in our tertiary referral hospital.

**Methods:** Between April 2019 to July 2019 and between April 2020 to July 2020, total numbers for mammography, breast ultrasound and breast MRI cases that were obtained in breast imaging center of our hospital were noted for each month. Descriptive statistics of the data consisted of monthly case numbers for each breast imaging modality. Percentage changes of overall cases numbers and monthly case numbers for each breast imaging modality were calculated for the determined time periods (April to July) between the years of 2019 and 2020.

**Results:** In April to July 2020, there was an apparent decline in case numbers for each breast imaging modality when compared to same timespan in 2019. The percentage decreases in overall case numbers for breast imaging modalities varied between 41.7% to 64.4%. Among breast imaging modalities, the sharpest decline in case numbers was detected on mammography.

**Conclusion:** The current study revealed that COVID-19 pandemic caused a marked decrease in all breast imaging case volumes particularly in the first two months of the pandemic.

**Keywords:** COVID-19, breast ultrasound, breast MRI, mammography

**Cite This Article:** Sendur HN, Gultekin S, Cerit MN, Cindil E, Avdan Aslan A, Karakoc E. Impacts of COVID-19 Pandemic on Breast Imaging Examinations. *EJMI* 2020;4(4):529–533.

Breast cancer is the most common newly diagnosed cancer among women.<sup>[1]</sup> Although therapeutic advancements improved the outcomes of breast cancer patients, early diagnosis of breast cancer is still one of the major determinants for survival. Nationwide implementation of screening programs in many countries, awareness of the population about breast cancer and advancements in breast imaging have contributed to the early diagnosis of breast cancer. The evidences revealed that mammography screening is indispensable for women health as it reduces the advanced and fatal breast cancer cases.<sup>[2]</sup>

The coronavirus disease 2019 (COVID-19) is named as pandemic by World Health Organization and affected the health care applications unprecedentedly all around the world. Similarly, radiology practices were also affected dramatically in the era of COVID-19 pandemic.<sup>[3-5]</sup> In terms of breast imaging, several published articles demonstrated sizable decreases in imaging volumes, particularly in mammography examinations, due to stay at home recommendations by governments, concerns of patients for the potential virus exposure at hospitals and delaying non-mandatory screening examinations in vast majority of facilities.<sup>[4-7]</sup>

**Address for correspondence:** Halit Nahit Sendur, MD. Department of Radiology, Gazi University Faculty of Medicine, Mevlana Bulvarı No: 29, 06560 Yenimahalle, Ankara, Turkey  
**Phone:** +90 312 202 51 51 **E-mail:** hsendur@gazi.edu.tr

**Submitted Date:** October 20, 2020 **Accepted Date:** December 05, 2020 **Available Online Date:** December 07, 2020

©Copyright 2020 by Eurasian Journal of Medicine and Investigation - Available online at [www.ejmi.org](http://www.ejmi.org)

**OPEN ACCESS** This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.



In Turkey, The Ministry of Health reported the first COVID-19 case on March 11, and afterwards several measures and restrictions were applied by the government to limit spread of the outbreak. Depending on decrease on reported daily new cases and achieved relative success about the spread of the disease in Turkey, restrictions and measures other than mask-wearing and social-distancing were relieved by the government at the beginning of June 2020. In this study, we aimed to document breast imaging case number changes during the COVID-19 pandemic in comparison to same periods of the years of 2019 and 2020 in our tertiary referral hospital, and to discuss the potential affects of these imaging volume changes.

## Methods

This retrospective study was approved by Gazi University Clinical Research and Ethics Committee (Approval number and date: 2020-606, 09.21.2020). Our hospital database was used to search breast imaging case volumes. To evaluate the impact of COVID-19 pandemic on breast imaging case volumes at our breast imaging center, same time periods in the years of 2019 and 2020 were used for comparison. Between April 2019–July 2019 and between April 2020 and July 2020, total numbers for mammography, breast ultrasound and breast MRI were noted for each month. All data was obtained from the statistics department of the hospital. The numbers of finalized cases within the determined time periods were included in the study. All cases not finalized for any reasons were excluded from the study.

## Statistical Analysis

The statistical analyses were performed using SPSS 22.0 software (IBM Corporation, Armonk, NY). Descriptive statistics of the data consisted of monthly case numbers for each breast imaging modality. Percentage changes of overall cases numbers and monthly case numbers for each breast imaging modality were calculated for the determined time periods (April to July) between the years of 2019 and 2020.

## Results

In April to July 2020, due to response to COVID-19 pandemic, there was an apparent decline in case numbers for each breast imaging modality when compared to same timespan in 2019. The percentage decreases in overall case numbers for breast imaging modalities varied between 41.7% to 64.4%. This decline was more prominent at the first two months (April and May) of the pandemic for all modalities. Table 1 represents the monthly case numbers and percentage changes for each breast imaging modality between 2019 and 2020.

**Table 1.** Total numbers of cases and percentage changes for each breast imaging modality between April to July in the years of 2019 and 2020

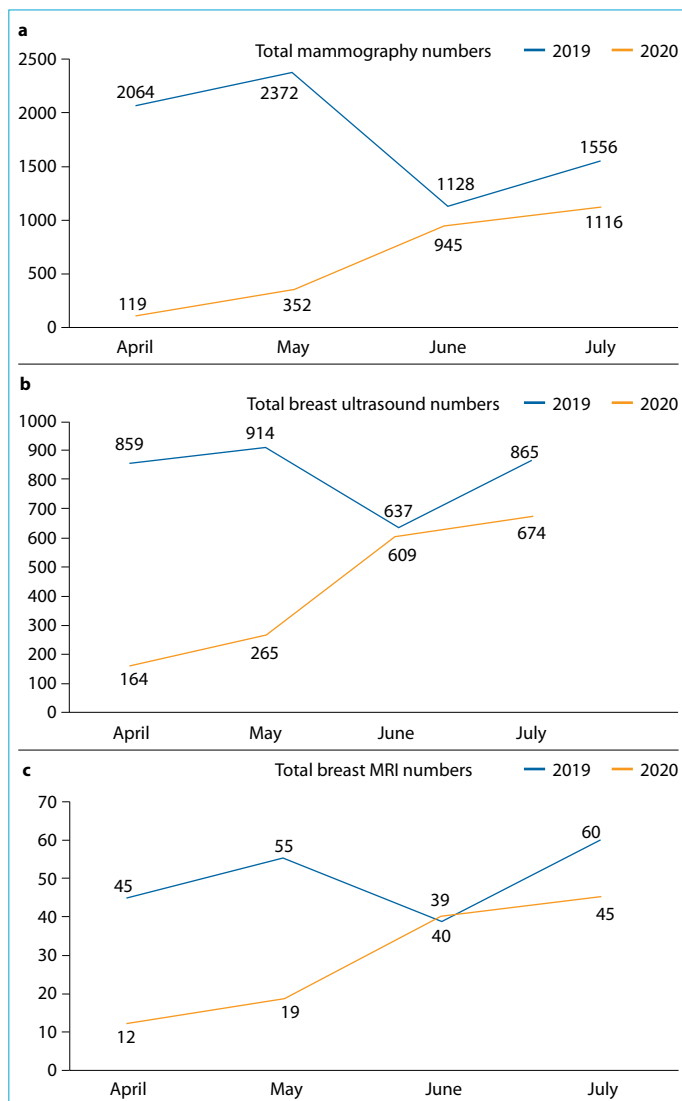
Imaging Modality	2019	2020	Percentage Change (%)
Mammography			
April	2064	119	-94.2
May	2372	352	-85.2
June	1128	945	-16.2
July	1556	1116	-28.3
Total	7120	2532	-64.4
Breast Ultrasound			
April	859	164	-80.9
May	914	265	-71
June	637	609	-4.4
July	865	674	-22.1
Total	3275	1712	-47.7
Breast MRI			
April	45	12	-73.3
May	55	19	-65.5
June	39	40	2.6
July	60	45	-25
Total	199	116	-41.7

Among breast imaging modalities, the sharpest decline in case numbers was detected on mammography followed by breast ultrasound cases. In April 2020, there was a 94.2%, 80.9% and 73.3% decrease for mammography, breast ultrasound and breast MRI cases, respectively compared to April 2019. Figure 1 illustrates the graphics of imaging case volume changes for each breast imaging modalities in the years 2019 and 2020.

## Discussion

This study demonstrates changes in numbers of examinations in breast imaging during COVID-19 pandemic at a tertiary referral hospital in Turkey. Case numbers for all breast imaging modalities demonstrated steep decline at first period of the pandemic and afterwards as lockdown measures were relieved gradually, imaging case numbers showed increment. Our findings provides an actual data about breast imaging services during this pandemic, and since it is not possible to estimate when the pandemic will end it may be useful for preparedness of breast imaging centers to potential next peaks of the first wave or the other waves of the pandemic.

Naidich et al.<sup>[4]</sup> quantified the imaging case volumes during the COVID-19 pandemic. They compared the case numbers of different imaging modalities between the years 2019 and 2020. In that study, the authors reported that in comparison to 2019, there was an overall 28% decrease in total



**Figure 1.** Graphical illustration of mammography (a), breast ultrasound (b), and breast MRI (c) case numbers between April to July in the years of 2019 and 2020.

imaging case volumes during the pandemic. Furthermore, this study revealed that the mammography is the imaging modality which showed greatest percent change (-58.42%) in case numbers. In another study, Parikh et al.<sup>[5]</sup> reported 55% imaging volume decrease in 8 week time period during the COVID-19 pandemic. Furthermore, they reported that mammography is the imaging modality which demonstrated the greatest decline (93%) in case volumes due to the impact of the COVID-19 pandemic. In our study, when compared the mammography case numbers between the years of 2019 and 2020, there was an overall 64.4% decline for 4 months time period during the pandemic, and April is the month which showed the most percentage change (94.4%). Our findings can be considered in line with the previous studies.

Collado-Mesa et al.<sup>[6]</sup> reported the effects of COVID-19 pandemic on breast imaging services. Their observational study revealed that all breast imaging examinations showed a substantial decrease during the pandemic, and screening mammography is the imaging technique which had the steepest decrease in case numbers and it was followed by breast ultrasound. In our study, volume decreases across breast imaging modalities were mammography, breast ultrasound and breast MRI, respectively. Relative differences between the results may be due to potential regional variabilities on imaging service utilizations and COVID-19 prevalences. However, our study further provides volume changes during a longer timespan which may be considered as useful to understand how the response to pandemic differs by time. Conversely, Collado-Mesa et al only included the case numbers in April in their study.

In year 2019, there was an obvious decline in case numbers of all breast imaging modalities between the months May and June. This decline was due to a national holiday in June 2019, and there was only 15 work days at that month. Nevertheless, although there were 22 work days in June 2020, the numbers of mammography and breast ultrasound examinations could not reach the previous year's examination numbers.

The findings of this study can be useful for future perspectives. A conservative analyses estimated that approximately additional 1% deaths are expected for breast and colorectal cancer patients in next decade due to measures related to COVID-19 pandemic.<sup>[8]</sup> Although therapeutic advancements contribute to improved outcomes of breast cancer patients, one recent study revealed that women who participated in mammography screening programs had a 41% risk reduction in breast cancer mortality regardless of treatment regimens.<sup>[2]</sup> Because this pandemic affected the numbers of mammography examinations dramatically, it is very likely to face more numbers of advanced stage breast cancers in next years. On the other hand, as the breast imaging education for radiology residents mainly depends on case volumes, the impact of this pandemic on case volumes may subsequently have a negative effects on the diagnostic skills of future radiologists. Therefore, radiology residents who completed their breast imaging rotation during the pandemic may need additional rotation time to avoid potential future malpractices due to insufficient experience on breast imaging.

The major limitation of this study is that it only demonstrates the experience of a single center breast imaging case volume changes during the pandemic. Potential variabilities in COVID-19 prevalences may lead different out-

comes. Therefore, multicentric nationwide studies will be more valuable. Moreover, since the current study covers only a time frame during the ongoing pandemic, when the pandemic ends, the studies which cover the whole pandemic time period will allow us to understand the exact changes in breast imaging case volumes.

## Conclusion

In conclusion, our study revealed that COVID-19 pandemic caused a marked decrease in all breast imaging case volumes particularly in the first two months of the pandemic. As lockdown measures were relieved imaging case numbers showed increment gradually.

## Disclosures

**Ethics Committee Approval:** This retrospective study was approved by Gazi University Clinical Research and Ethics Committee (Approval number and date: 2020-606, 09.21.2020).

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** None declared.

**Authorship Contributions:** Concept – H.N.S.; Design – H.N.S., S.G., M.N.C.; Supervision – H.N.S., S.G., E.C.; Materials – H.N.S., M.N.C., A.A.A.; Data collection &/or processing – H.N.S., A.A.A.; Analysis and/or interpretation – H.N.S., E.C., M.N.C.; Literature search – H.N.S., E.K.; Writing – H.N.S.; Critical review – H.N.S., S.G., M.N.C., E.C., A.A.A., E.K.

## References

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2020. *CA Cancer J Clin.* 2020;70:7-30.
2. Duffy SW, Tabar L, Yen AMF, Dean PB, Smith RA, Jonsson H et al. Mammography screening reduces rates of advanced and fatal breast cancers: results in 549,091 women. *Cancer.* 11 May 2020. <https://doi.org/10.1002/cncr.32859>
3. Malhotra A, Wu X, Fleishon HB, Duszak Jr R, Silva III E, McGinty GB et al. COVID-19 Initial Impact on Radiology Practices: Survey from ACR/RBMA. *J Am Coll Radiol.* 4 August 2020. <https://doi.org/10.1016/j.jacr.2020.07.028>
4. Naidich JJ, Boltyenkov A, Wang JJ, Chusid J, Hughes D, Sanelli PC. Impact of the COVID-19 pandemic on imaging case volumes. *J Am Coll Radiol.* 2020;17:865-872.
5. Parikh KD, Ramaiya NH, Kikano EG, Tirumani SH, Pandya H, Stovicek B et al. COVID-19 pandemic impact on decreased imaging utilization: a single institutional experience. *Acad Radiol* 2020. doi:10.1016/j.acra.2020.06.024.
6. Collado-Mesa F, Kaplan SS, Yepes MM, Thurber MJ, Behjatnia B, Kallos NPL. Impact of COVID-19 on breast imaging case volumes in South Florida: A multicenter study *Breast J* 2020. DOI: 10.1111/tbj.14011
7. Chou CP, Pan HB, Yang TL, Chiang CL, Huang JS, Tsai MY. Impact of the COVID-19 pandemic on the volume of mammography examinations in Southern Taiwan *Breast J* 2020. DOI: 10.1111/tbj.14019
8. Sharpless NE. COVID-19 and cancer. *Science.* 2020;368(6497):1290.