

## Cancer screening in the COVID-19 pandemic; Development of early diagnostic strategies

Suleyman Ozsari 

Department of Family Medicine, Bolu Abant Izzet Baysal University, Faculty of Medicine, Bolu, Turkey

### ABSTRACT

**Aim:** Early diagnosis is very important in some cancers such as breast, cervical and colorectal. However, the COVID-19 pandemic has severely disrupted cancer screening programmers in many countries. In this study, it is aimed to contribute to the literature on this subject by reviewing the status of local cancer screenings during the pandemic period.

**Methods:** This retrospective study includes the 114.727 people in the risky group for cancer screening determined in Bolu, Turkey as two groups. During 2017-2019 years was determined as pre-pandemic group while the year of 2020 was the pandemic group. Data about patients' results of smear / HPV (Human Papilloma Virus), fecal occult blood test (FOBT) and mammography had analyzed and compared with chi-square test.

**Results:** For all of the screening strategies, smear / HPV, FOBT and mammography, mean of screening cases, positive cases and biopsies had significantly decreased ( $p<0.05$ ), but there was no statistically difference for mean of definitive diagnoses about all of these cancers even if it has been decreased between two groups.

**Conclusion:** The results of our study show that cancer screening processes are significantly disrupted during the pandemic period. Therefore, it is important to develop new screening strategies for the uninterrupted execution of cancer screening programs, especially during pandemic periods. However, we believe in the necessity of supporting studies with larger patient groups.

**Key words:** Cancer screening, early detection of cancer, primary health institution, COVID -19.

✉ Dr. Suleyman Ozsari

Department of Family Medicine, Bolu Abant Izzet Baysal University, Faculty of Medicine, Bolu, Turkey

E- mail: [beyhekim06@gmail.com](mailto:beyhekim06@gmail.com)

Received: 2021-08-20 / Revisions: 2021-09-29

Accepted: 2021-10-25/ Published: 2022-03-15

### Introduction

One of every sixth deaths in the world and every fifth deaths in our country is due to cancer [1,2]. Today, 30-50% of cancer can be prevented by avoiding risk factors and applying evidence-based prevention strategies. Many cancers are more likely to be cured if diagnosed early and treated appropriately by the help of screening methods [3].

According to the current periodic guidelines in our country, three cancer types as breast, cervical and colorectal tumors are being recommended for screening by World Health Organization (WHO). While mammography is being used every 2 years for the breast cancer screening program in women between the ages of 40-69, smear / HPV testing every 5 years for women aged 30-65 as cervical cancer screening. About colorectal cancers for men and women aged 50-70 years, a FOBT every 2 years, a rectosigmoidoscopy every 5 years or a colonoscopy every 10 years are being recommended [4]. However, the COVID-19 pandemic has interrupted the cancer screening

programmers in many countries [5-7]. To need using of health care resources correctly and immediately, many cancer organizations have advocated discontinuing cancer screening services to patients. [8-9] Also during the pandemic, people in the risk group of cancer avoided going to health institutions to get this service. [10]

In this study, it is aimed to contribute to the literature on this subject by reviewing the status of local cancer screenings during the pandemic period. For this purpose, we compared the cancer screenings made through the cancer early diagnosis center for 4 years between 2017-2019 before the pandemic and the cancer screenings in 2020, when the pandemic was effective, and discussed the solutions for the problems that emerged.

### Materials and methods

This retrospective study includes 114,727 people in the risk group who are included in the cancer screening programs determined by the Ministry of Health and applied to the cancer early diagnosis center and family health centers

in Bolu within the last 4 years. The years 2017-2019 were determined as the pre-pandemic group, and the year 2020 as the pandemic group. The researches were carried out in the cancer unit of Bolu Provincial Health Directorate, Public Health Services Presidency. The study was approved by the local ethics committee (decision number: 2021/70).

The patients' smear/HPV (Human Papilloma Virus), fecal occult blood test (FOBT) and mammography results were analyzed and compared between the groups.

The analysis of the data obtained as a result of the research was performed with the SPSS statistical package program (PSS 15.0; IBM Inc., Chicago, IL, USA). Descriptive data were given as frequency, arithmetic mean, standard deviation, median, and crosstabs. Categorical data were analyzed with chi-square.  $p < 0.05$  was considered statistically significant.

### Results

The mean of screening, positive cases and biopsy done during the pandemic were significantly lower than the pre-pandemic

**Table 1.** Analysis of pre-pandemic and pre-pandemic cancer screening tests of the groups.

Parameters	Smear/HPV	FOBT	Mammography	<i>p</i> value <sup>a</sup> / Chi-square value
Mean of screening cases Pre-pandemic <sup>1</sup> Pandemic <sup>2</sup>	19570 (%40.4) 13.158 (%67.2) 6.412 (%32.8)	14.726 (%30.4) 10.091 (%68.5) 4.635 (%31.5)	14.174 (%29.2) 9.879 (%69.7) 4.295 (%30.3)	<b>0.000* / 23.349</b>
Mean of positive cases Pre-pandemic <sup>1</sup> Pandemic <sup>2</sup>	232 (%35.3) 156 (%67.2) 76 (%32.8)	133 (%20.2) 109 (%82.0) 24 (%18.0)	293 (%44.5) 170 (%58.0) 123 (%42.0)	<b>0.000* / 23.594</b>
Mean of biopsies Pre-pandemic <sup>1</sup> Pandemic <sup>2</sup>	178 (%72.1) 124 (%69.7) 54 (%30.3)	42 (%17.0) 39 (%92.9) 3 (%7.1)	27 (%10.9) 22 (%81.5) 5 (%18.5)	<b>0.005* / 10.422</b>
Mean of definitive diagnosis cases Pre-pandemic <sup>1</sup> Pandemic <sup>2</sup>	29 (%65.9) 18 (%62.1) 11 (%37.9)	5 (%11.4) 5 (%100) 0 (%0)	10 (%22.7) 8 (%80.0) 2 (%20.0)	<b>0.173 / 3.514</b>

\*  $p > 0.05$ . <sup>a</sup> Chi-square test. <sup>1</sup> Pre-pandemic: during years of 2017-2019. <sup>2</sup> Pandemic: 2020.

period ( $p < 0.05$ ). On the other hand, there is no significant difference between the mean of people diagnosed with definitive cancer before and after the pandemic ( $p > 0.05$ ) (Table 1).

The average of cancer screening in the last 3 years (2017-2019) before the pandemic; in 2020 while smear/HPV cancer screenings decreased by 51.2%; positive referral mean 51.2%; the person who had a biopsy decreased

by 56.5%. And while the number of cancer screenings performed in primary care decreased by 71.9%. About FOBT while its cancer screenings decreased by 54.1%; positive referral mean 77.9%; the person who had a biopsy decreased by 92.3%. The number of FOBT performed in primary care decreased by 64.2%. While mammography scans decreased by 56.5%; positive referral mean 27.6%; the

**Table 2.** Annual overall cancer screening rates in the study (2017-2020).

Years	Parameters	1*	%	2**	%	TOTAL	%
2017	Smear/HPV	7457	54,20	7172	52,13	14629	106,33
	FOBT	6737	20,46	1893	5,75	8630	26,21
	Mammography	5245	19,97	5568	21,20	10813	41,16
2018	Smear/HPV	7462	53,40	5519	39,50	12981	92,90
	FOBT	7666	22,92	2203	6,59	9869	29,50
	Mammography	4106	15,31	5163	19,25	9269	34,56
2019	Smear/HPV	6479	45,15	5385	37,53	11864	82,68
	FOBT	8957	25,67	2818	8,08	11775	33,74
	Mammography	4276	15,36	5279	18,97	9555	34,33
2020	Smear/HPV	2010	13,77	4402	30,16	6412	43,94
	FOBT	2792	7,80	1843	5,15	4635	12,96
	Mammography	1299	4,58	2996	10,57	4295	15,15

\*Primary Health Care Institutions and Organizations. \*\*Second and Third Level Health Institutions and Organizations. HPV: Human papilloma virus. FOBT: Fecal occult blood test.

**Table 3.** The number of applications to the diagnosis center after the screening of the patients whose 1st stage screening results were positive.

Years	Parameters	Number of scans	Positive number	Patient undergoing biopsy	Patient with a definitive cancer diagnosis
2017	Smear/HPV	14629	151	133	8
	FOBT	8630	105	40	13
	Mammography	10813	164	26	16
2018	Smear/HPV	12981	154	111	33
	FOBT	9869	44	25	0
	Mammography	9269	144	15	4
2019	Smear/HPV	11864	163	129	12
	FOBT	11775	177	52	1
	Mammography	9555	202	24	4
2020	Smear/HPV	6412	76	54	11
	FOBT	4635	24	3	0
	Mammography	4295	123	5	2

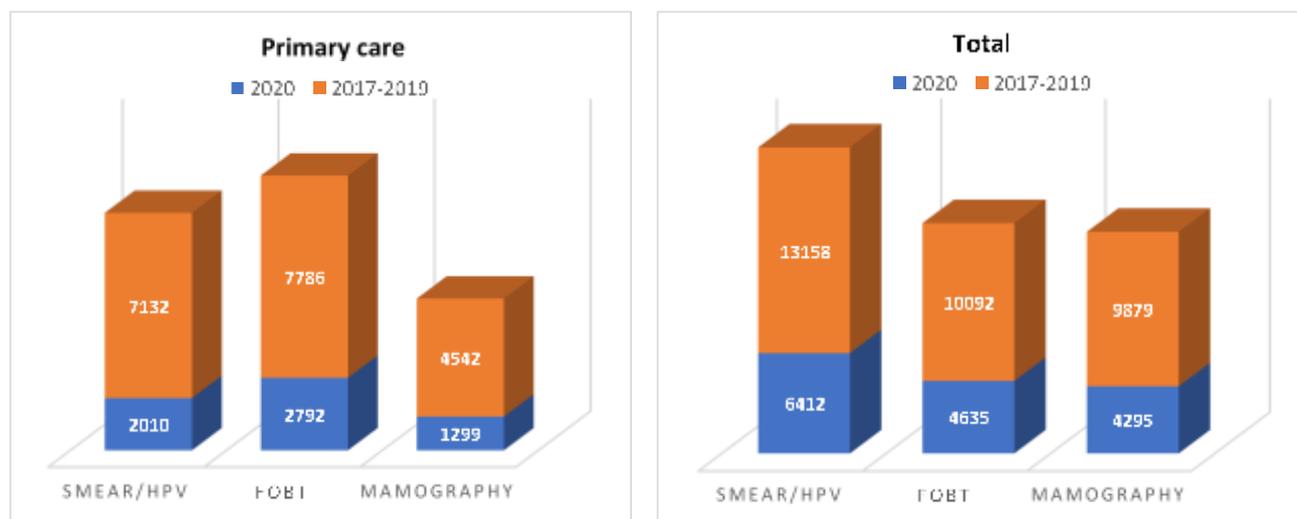
HPV: Human papilloma virus. FOBT: Fecal occult blood test.

person who had a biopsy decreased by 77.3%. The number of mammography in primary care decreased by 71.4% (Table 2, 3).

We also compared the average numbers of primary care cancer screening and total cancer screening in the pandemic period (2020) with the pre-pandemic period (2017-2019) as box graphics (Figure1).

etc.[17] This study revealed that the mean of screening case, positive cases and biopsies during the pandemic were significantly lower than pre-pandemic period.

The temporary cessation of national cancer screening programs and the redirection of all health care providers to the pandemic, as well as the fact that patients are less likely to go to



**Figure 1.** Comparison of the average numbers of cancer screening between pandemic (2020) and the pre-pandemic years (2017-2019). FOBT: Fecal occult blood test; HPV. Human papilloma virus.

## Discussion

Screening programs for especially breast, cervical and colorectal cancers which are most common ones can be controlled by cancer screening strategies [11]. If any retardation about treatment like six months, that may be caused a progression to an incurable state for many cancers [12-14]. Also, many simulation model studies predict that the death rates due to the cancer may be higher than expected in future [6]. COVID 19 pandemic interrupted many cancer screening programs like lung cancer about decrease of screening cases and increase of nodule detection with a high probability of malignancy [15,16]. However, a huge number of patients did not go to the hospital because of the curfew, fear of infection

primary care due to the pandemic, may be some reasons of the interruption [18,19]. Also, the redirection of most routine health services to COVID-19 has led to disruption of non-COVID primary care services and even the complete cessation of some screening programs [20]. In our study, it was shown that the number of cancer screenings decreased by half compared to the previous three years. When the patients who were diagnosed with definite cancer by biopsy were evaluated, although the number of those who underwent biopsy in Smear/HPV decreased by 50%, with its correlation about FOBT and mammography, those with a definite cancer diagnosis showed a decrease by one third. The main reason for this may be that patients apply to non-primary care centers

especially in the presence of symptoms. Also, we thought that the evaluation of patient in these applications leads to more effective biopsies and diagnosis.

The rescan start strategy needs a very capacity in a short time. If screening capacity is increased by 33%, the 6-month accumulation will still take 18 months to clear, but this will significantly reduce the overall number diagnosing of cancers [21]. In cases where screening programs are interrupted, it is important that participation rates return to expected rates as soon as possible and catch-up screening strategies are in place to reduce negative results [6]. Therefore, the capture scans that will start during the normalization period will increase the screening capacities and spread the screening load over time.

Strengthening the counseling service of family physicians can speed up diagnosis without burdening secondary care services and saving time by coordination between primary care and tertiary hospitals [20]. On the other hand, screening centers to be established in institutions providing 2nd and 3rd level health services as a part of catching screening will provide the opportunity for early diagnosis for patients in the risk group who apply for any reason. We should also perform a priority assessment to identify patients at risk of inadequate or delayed diagnosis of cancer [22]. This group may include those who are more likely to cancel or postpone their screening program visits, or those who are in the risk group. Moreover, our visits will raise awareness about screening and provide an opportunity to direct patients correctly.

Reducing the cancer screening upper limit age will lead to a reduction in the population to be screened and to the screening of the effective treatment age at which the surveillance will be extended [23]. In addition, prolonging the

screening intervals to remain at an effective level will facilitate screening and increase the effectiveness of screening by reducing the number of people per time in the population.

Our study is limited to the Bolu as a local country so these findings should be confirmed in other regions where pandemic responses may be different.

### **Conclusion**

The results of our study show that cancer screening processes deteriorate significantly during the pandemic period. For this reason, it is important to develop new strategies to minimize cancer cases that are likely to increase in the future due to the COVID-19 pandemic and to conduct cancer screening programs uninterrupted. In addition, we believe it is necessary to support the results of our study with larger patient groups.

**Funding:** *The author(s) received no financial support for the research, authorship, and/or publication of this article.*

**Conflict of Interest:** *The authors declare that they have no conflict of interest.*

**Ethical statement:** *The study was approved by the local ethics committee (decision number: 2021/70).*

### **Open Access Statement**

*Experimental Biomedical Research is an open access journal and all content is freely available without charge to the user or his/her institution. This journal is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/). Users are allowed to read, download, copy, distribute, print, search, or link to the full texts of the articles, or use them for any other lawful purpose, without asking prior permission from the publisher or the author.*

**Copyright (c) 2021:** Author (s).

## References

- [1]Cancer Key Facts 12 September 2018. WHO. <https://www.who.int/en/news-room/factsheets/detail/cancer>.
- [2]TÜİK. Ölüm Nedeni İstatistikleri, 2016. [http://tuik.gov.tr/PreTablo.do?alt\\_id=1083](http://tuik.gov.tr/PreTablo.do?alt_id=1083)
- [3]Jemal A, Bray F, Center MM, et al. Global cancer statistics. CA Cancer J Clin. 2011;61(2):69-90.
- [4]Sağlık Bakanlığı Halk Sağlığı Genel Müdürlüğü Kanser Dairesi Başkanlığı. Kanser Taramaları. <https://hsgm.saglik.gov.tr/tr/kanser-taramalari>
- [5]Waterhouse DM, Harvey RD, Hurley P, et al. Early Impact of COVID-19 on the Conduct of Oncology Clinical Trials and Long-Term Opportunities for Transformation: Findings from an American Society of Clinical Oncology Survey. JCO Oncol Pract. 2020;16(7):417-21.
- [6]de Jonge L, Worthington J, van Wifferen F, et al. COVID-19 and Cancer Global Modelling Consortium working group 2. Impact of the COVID-19 pandemic on faecal immunochemical test-based colorectal cancer screening programmes in Australia, Canada, and the Netherlands: a comparative modelling study. Lancet Gastroenterol Hepatol. 2021;6(4):304-14.
- [7]J Lee. Thousands of cancer screening tests halted during pandemic restart in Alberta CBC Canada, Toronto, ON (May 27, 2020) <https://www.cbc.ca/news/canada/calgary/alberta-cancer-screening-resumes-after-pandemic-suspension-1.5586513>
- [8]Degeling K, Baxter NN, Emery J, et al. An inverse stage-shift model to estimate the excess mortality and health economic impact of delayed access to cancer services due to the COVID-19 pandemic. Asia Pac J Clin Oncol. 2021;17(4):359-67.
- [9]Sharpless NE. COVID-19 and cancer. Science. 2020; 368(6497):1290.
- [10]Falco M. Common questions about the new coronavirus outbreak. American Cancer Society. 2020 Oct 12. URL: <https://www.cancer.org/latest-news/common-questions-about-the-new-coronavirus-outbreak.html>
- [11]Morrison DS. Recovering cancer screening in the pandemic: strategies and their impacts. Br J Cancer. 2021;124(9):1465-66.
- [12]Dinmohamed AG, Visser O, Verhoeven RHA, et al. Fewer cancer diagnoses during the COVID-19 epidemic in the Netherlands. Lancet Oncol. 2020;21(6):750-51.
- [13]Kaufman HW, Chen Z, Niles J, Fesko Y. Changes in the Number of US Patients With Newly Identified Cancer Before and During the Coronavirus Disease 2019 (COVID-19) Pandemic. JAMA Netw Open. 2020;3(8):e2017267.
- [14]Sud A, Torr B, Jones ME, et al. Effect of delays in the 2-week-wait cancer referral pathway during the COVID-19 pandemic on cancer survival in the UK: a modelling study. Lancet Oncol. 2020;21(8):1035-44.
- [15]Tanoue LT, Tanner NT, Gould MK, et al. Lung cancer screening. Am J Respir Crit Care Med. 2015;191(1):19-33.
- [16]Van Haren RM, Delman AM, Turner KM, et al. Impact of the COVID-19 Pandemic on Lung Cancer Screening Program and Subsequent Lung Cancer. J Am Coll Surg. 2021;232(4):600-605.
- [17]IJzerman M and Emery J. Is a delayed cancer diagnosis a consequence of COVID-19? <https://pursuit.unimelb.edu.au/articles/is-a-delayed-cancer-diagnosis-a-consequence-of-covid-19> First published on 30 April 2020 in [Health & Wellbeing](#).
- [18]Gurney JK, Millar E, Dunn A, et al. The impact of the COVID-19 pandemic on

cancer diagnosis and service access in New Zealand-a country pursuing COVID-19 elimination. *Lancet Reg Health West Pac.* 2021; 10:100127.

- [19]Hiom S. How coronavirus is impacting cancer services in the UK. *Cancer Research UK-Science blog.* (April 21, 2020). <https://news.cancerresearchuk.org/2020/04/21/how-coronavirus-is-impacting-cancer-services-in-the-uk/>
- [20]Helsper CW, Campbell C, Emery J, et al. Cancer has not gone away: A primary care perspective to support a balanced approach for timely cancer diagnosis during COVID-19. *Eur J Cancer Care (Engl).* 2020;29(5):e13290.
- [21]Castanon A, Rebolj M, Pesola F, et al. Recovery strategies following COVID-19 disruption to cervical cancer screening and their impact on excess diagnoses. *Br J Cancer.* 2021;124(8):1361-65.
- [22]Jefferson L, Atkin K, Sheridan R, et al. Non-attendance at urgent referral appointments for suspected cancer: a qualitative study to gain understanding from patients and GPs. *Br J Gen Pract.* 2019;69(689):e850-e859.
- [23]Kregting LM, Kaljouw S, de Jonge L, et al. Effects of cancer screening restart strategies after COVID-19 disruption. *Br J Cancer.* 2021;124(9):1516-23.