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The Impact of COVID-19 Pandemic on Cancer Screening Program Applications: A Descriptive Study

COVID-19 Pandemisinin Kanser Tarama Programı Uygulamalarına Etkisi: Tanımlayıcı Çalışma

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Abstract

In this study, it was aimed to evaluate the frequencies of participation of adults to cancer screening in the National Cancer Screening Program and the reasons for not participating. This descriptive survey study was carried out with adults in family medicine outpatient clinics, between March 2021 and June 2021, in Turkey. The questionnaire contained 43 questions; in the first part, the participants were asked to provide some sociodemographic data; the second part consisted of questions about current smoking status, presence of chronical disease, presence of any type of cancer, history of cancer in family, taking information about cancer screening program in their country, history of getting any cancer screening before and during the COVID-19 pandemic and the third part of the survey focused on questions related to national cancer screening program (colorectal cancer, cervix cancer, breast cancer). One hundred and ninety-one people participated, 54.2% of them stated that the pandemic affects the frequency of having occult blood test in stool, 47.4% stated that the pandemic affects the frequency of colonoscopy, 37.7% stated that the pandemic affects the frequency of taking mammography, 37.1% stated that the pandemic affects the frequency of taking pap smear test. The mostly stated reason for these delays were being afraid of going to the health center for worry of getting an infection. Interruptions in cancer screening will lead to late diagnosis of current cancers, additional cancer deaths. Until screening rates return to pre-COVID levels, these interruptions could have a large impact. Our results were shown the negative effects of pandemic on screening programs and the mostly emphasized reason was being afraid of going to the health center for worry of getting an infection.

Keywords: COVID-19, Pandemic, Cancer screening programs.

Özet

Bu çalışmada, Ulusal Kanser Tarama Programı kapsamında yetişkinlerin kanser taramasına katılma sıklıkları ve katılmama nedenlerinin değerlendirilmesi amaçlanmıştır. Bu tanımlayıcı anket çalışması, Türkiye'de Mart 2021 ve Haziran 2021 tarihleri arasında aile hekimliği polikliniklerinde yetişkinlerle yürütülmüştür. Anket 43 soru içeriyordu; ilk bölümde katılımcılardan bazı sosyodemografik verileri sağlamaları istendi; ikinci bölümde ise mevcut sigara içme durumu, kronik hastalık varlığı, herhangi bir kanser türünün olup olmadığı, ailede kanser öyküsü, ülkesindeki kanser tarama programı hakkında bilgi alma durumu, COVID-19 salgını

öncesinde ve sırasında herhangi bir kanser taraması yaptırma öyküsü anketin üçüncü bölümü ise ulusal kanser tarama programı (kolorektal kanser, serviks kanseri, meme kanseri) ile ilgili sorulara odaklandı. Ankete katılan 191 kişiden %54.2'si pandeminin dışkıda gizli kan testi yaptırma sıklığını etkilediğini, %47.4'ü pandeminin kolonoskopi sıklığını etkilediğini, %37.7'si pandeminin mamografi çekme sıklığını etkilediğini ve %37.1'i pandeminin pap smear testi yaptırma sıklığını etkilediğini belirtti. Bu gecikmelerin en çok belirtilen nedeni enfeksiyon kapma endişesiyle sağlık ocağına gitmekten korkmaktı. Kanser taramasındaki kesintiler, mevcut kanserlerin geç teşhisine, kanserle ilişkili ek ölümlere yol açacaktır. Tarama oranları COVID öncesi seviyelere dönene kadar bu kesintilerin büyük bir etkisi olabilir. Sonuçlarımız pandeminin tarama programları üzerine olumsuz etkilerini gösterdi ve en çok vurgulanan neden enfeksiyon kapma endişesiyle sağlık ocağına gitmekten korkmaktı.

Anahtar Kelimeler: COVID-19, Pandemi, Kanser tarama programları.

Introduction

The COVID-19 (Coronavirus disease 2019) infection, which was declared as a "pandemic" on March 11, 2020, by the World Health Organization (WHO) as it spread to more than 200 countries, has seriously affected public life, the global economy and health services [1].

During the COVID-19 pandemic, each country has taken measures to reduce the burden on healthcare systems and reduce the transmission of SARS-CoV-2 [2]. Various arrangements have been made in the health system during the pandemic also in Turkey [3]. In addition to the regulations made in health systems, the "Guide for Working in Health Institutions and Infection Control Precautions" were published and within the scope of this regulation, guidance has been made for non-COVID patients who do not require emergency and advanced treatment were directed to meet their medical needs from primary health care institutions, primarily family health centers [4]. Suspending or deferring non-emergency diagnostic procedures and interventions while maintaining procedures for emergency or oncological cases are among the first strategies adopted to reduce the workload in healthcare facilities [4]. Routine health care for non-COVID-19 diseases will be restricted or interrupted by the COVID-19 patient load, which will have a negative impact on many of the ongoing efforts regarding early cancer detection services and cancer care.

Cancer constitutes an important public health problem through the world. It ranks second after cardiovascular diseases in the list of all known deaths. Due to the injuries, it causes and the high costs of its treatment, it causes heavy losses in the workload and the country's economy. Early diagnosis and screening are recommended for some cancer types, but not for some others.

The WHO recommends population-based screening programs for the detection of cases in breast, cervical and colorectal cancers in the early stages [5]. Screening is the approximate determination of unknown diseases that have not yet been diagnosed by applying some tests and examinations to people who are apparently healthy. For this purpose, screening programs are applied. Screening is an important component of preventive health practices that can reduce death from cancer and is one of the most effective methods in fighting cancer [6]. In our country, screening is carried out for three types of cancer (Figure 1) [7].

In the literature review, it was reported that the follow-up of cancer patients was delayed during the pandemic, and applications for occult blood in stool from cancer screening programs decreased [8-11]. However, in the literature review, no national or international study was found in which the frequency of application to cancer screenings during the pandemic period and the opinions of individuals on this issue.

In this study, it was aimed to evaluate the frequencies of participation of adults to cancer screening in the National Cancer Screening Program and the reasons for not participating during pandemic.

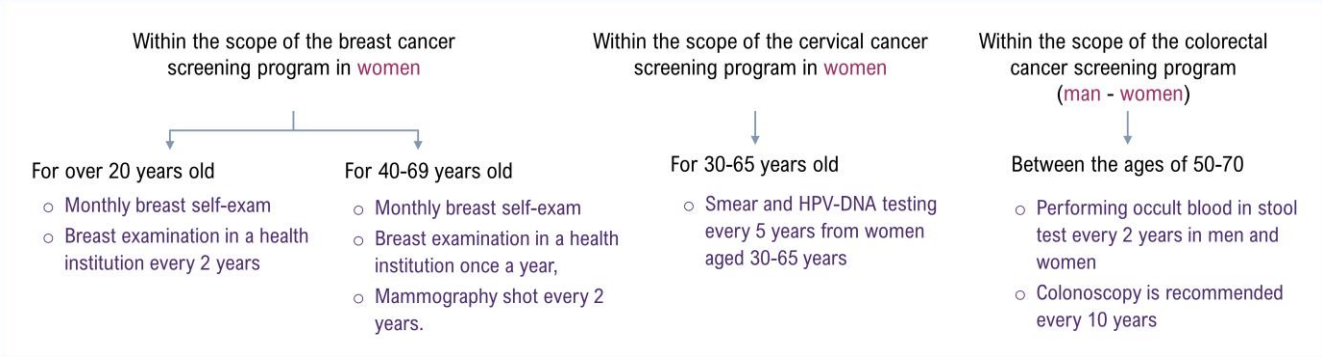


Figure 1. National Cancer Screening Programs in Turkey.

Material and Method

The descriptive study was carried out in family medicine outpatient clinics of a University Hospital, between March 2021 and June 2021. The universe of the study consisted of adults (18 age and above) who agreed to participate in the study after reading informed consent. When the sample size was calculated with 5% margin of error and 95% confidence interval, it turns out to be 381.

Ethical approval was obtained from the Clinical Research Ethics Committee of Hacettepe University (Approval No: GO 21/371-16.03.2021). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

The questionnaire (43 questions) was prepared by researchers by screening related literature and cancer screening guidelines. In the first part of the questionnaire, the participants were asked to provide some sociodemographic data including: gender, age, marital status, educational status, occupation. The second part consisted of questions about current smoking status, presence of chronical disease, presence of any type of cancer, history of cancer in family, taking information about cancer screening program in their country, history of getting any cancer screening before and during the COVID-19 Pandemic. The third part of the survey focused on questions related to national cancer screening program (colorectal cancer, cervix cancer, breast cancer).

The statistical analysis of the study has been done by using SPSS 23.0 (SPSS Inc., Chicago, IL, USA) and Microsoft Office Excel (Microsoft Corp., Redmond, VA, USA). Descriptive statistics are presented as mean (±) standard deviation, median (min-max), frequency distribution, and percentage. Chi-Square Test or Fisher's Exact Test was used to compare categorical variables. When a significant difference was detected in comparisons with at least one variable having more than 2 categories (comparisons other than 2x2), the groups were compared in pairs to determine the source of the difference, and Bonferroni correction was applied to identify the groups with difference. Conformity of continuous variables to normal distribution was examined using visual (histogram and probability charts) and analytical methods (if $n \geq 50$; Kolmogorov-Smirnov Test, if $n < 50$; Shapiro-Wilk Test). For the variable found to fit the normal distribution; Student T Test was used for statistical significance between two independent groups. A p value of <0.05 was considered as statistically significant.

Results

One hundred and ninety-one people participated, the mean age of them was 36.86±10.77 (min=18; max=66), 40.8% of the participants were between 18-29 age old, 73.2% of them were female. Only two of them have any type of the cancer history, 36.1% of their family had any type of the cancer history. The sociodemographic and health related features of the participants are presented in Table 1.

Table 1. The sociodemographic and health related features of the participants.

	n	%		n	%
Age			History of cancer in family		
18-29	78	40.8	Yes	69	36.1
30-39	50	26.2	No	112	58.6
40-49	29	15.2	Do not know	10	5.2
50<	34	17.8	Relatives who had any type of cancer		
Gender			Mother	7	3.7
Female	140	73.2	Father	6	3.1
Male	51	26.8	Sister/Brother	2	1
Education			Husband/Wife	1	0.5
High school and below	19	9.9	Child/Children	0	0
Associate / undergraduate	113	59.2	Aunt	18	9.4
Postgraduate / Doctorate	59	30.9	Uncle	19	9.9
Occupation			Grandmother	12	6.3
Unemployed	16	8.4	Grandfather	18	9.4
Doctor	80	41.9	Taking information about cancer screening program in country		
Teacher	23	12	Yes	129	67.5
Other	72	37.7	No	62	32.5
Working during pandemic			To know the centers that provide cancer screening, consultancy and training activities		
Full time working	121	63.4	Yes	144	75.4
Part time working	17	8.9	No	47	24.6
Administrative leave / not working	53	27.7	Thinking that an early detected cancer will respond more easily to treatment		
Marital status			Yes	186	97.4
Married	118	61.8	No	5	2.6
Widow	73	38.2	Getting any cancer screening before the COVID-19 Pandemic		
Current smoking status			Yes	30	15.7
Smoking	61	31.9	No	161	84.3
Not smoking	130	68.1	Having any cancer screening during the COVID-19 pandemic		
Presence of chronical disease			Yes	12	6.3
Yes	31	16.2	No	179	93.7
No	160	83.8			
Presence of any type of cancer					
Yes	2	1		**n**	**%**
No	189	99	Total	191	100

n: Number of patients; %: Column percentage

Of the participants 7.9% (n=15) had colorectal cancer history, 3.1% (n=6) had breast cancer history, 7.3% (n=14) had cervical cancer history in their family.

The relation of the socio-demographic features of the patients with the participation frequencies to National Cancer Screening Program during pandemic were evaluated and it was not found any relationship (0.05<p).

Results about colorectal cancer screening

Of the participants 41.6% (n=79) had any information about colorectal cancer. 17.8% (n=34) of them had occult blood test in stool at least once a time, 64.7% (n=11) of them took it

for regular health checks, 11.8% (n=2) of them took it for cancer screening program with doctor's request. 54.2% (n=13) of them stated that the pandemic affects the frequency of having occult blood test in stool, for the reason, 61.5% stated that they were afraid to go to the health center because of the fear of getting an infection. 8.4% (n=16) of them had colonoscopy, 75% (n=12) of them had it because of the request of the doctor for a complaint. 47.4% of them stated that the pandemic affects the frequency of colonoscopy, for the reason, 50% stated that they were afraid to go to the health center because of the fear of getting an infection, 37.5% of them stated that they didn't know which center they should go to during the pandemic.

Participants of other age groups (other than screening age interval) were stated more than others that pandemic affected their frequency of having stool occult blood tests (p=0.044) and colonoscopy (p=0.005). The detailed information about colorectal cancer screening during pandemic and the distribution of people according to screening age is presented in Table 2.

Table 2. The distribution of some features of the participants according to colorectal cancer screening age interval.

	Total % (n)	Between 50-70 age old % (n)	Other age groups % (n)	p
Getting information about colorectal cancer (n=190)				
Yes	41.6 (79)	35.3 (12)	42.9 (67)	0.412
No	58.4 (111)	64.7 (22)	57.1 (89)	
Stool occult blood test (n=191)				
Yes	17.8 (34)	17.6 (6)	17.8 (28)	0.979
No	82.2 (157)	82.4 (28)	82.2 (129)	
The stool occult blood test taking time (n=18)				
In last 1 year	33.3 (6)	66.7 (2)	26.7 (4)	0.35
Between 1-2 year	22.2 (4)	0 (0)	26.7 (4)	
More than 2 years ago	44.4 (8)	33.3 (1)	46.7 (7)	
Has the pandemic affected your frequency of having stool occult blood tests? (n=24)				
Yes	54.2 (13)	0 (0)	61.9 (13)	**0.044**
No	45.8 (11)	100 (3)	38.1 (8)	
Taking a colonoscopy (n=190)				
Yes	8.4 (16)	11.8 (4)	7.7 (12)	0.438
No	91.6 (174)	88.2 (30)	92.3 (144)	
The colonoscopy taking time (n=14)				
In last 10 years	85.7 (12)	100 (4)	80 (8)	0.334
More than 10 years ago	14.3 (2)	0 (0)	20 (2)	
Has the pandemic affected your frequency of colonoscopy? (n=19)				
Yes	47.4 (9)	0 (0)	69.2 (9)	**0.005**
No	52.6 (10)	100 (6)	30.8 (4)	

n: Number of patients; %: Column percentage; Chi square test was used.

Results about breast cancer screening

Of the women 77.7% (n=73) had information about breast cancer. 29.8% (n=28) of them stated that they regularly go to gynecologist. 60.0% (n=54) of them stated that they do self-breast-examination as remember. 5.7% of the women had it every year because 50 or older aged; 6.4% of them had it every two years because 40 and over aged. 55.6% (n=15) of them took it for regular health checks. 37.7% of them stated that the pandemic affected the frequency of taking mammography, for reason, 75% of them stated that they were afraid to go to the health center because of the fear of getting an infection.

The detailed information about breast cancer screening during pandemic and the distribution of people according to screening age is presented in Table 3.

Results about cervix cancer screening

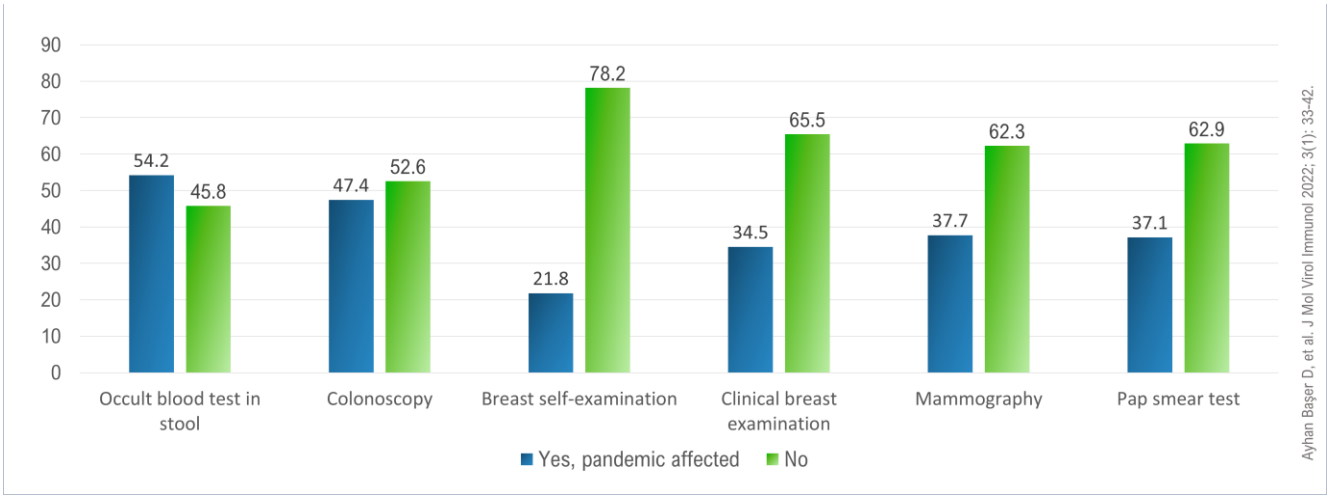
Of the women 72.1% (n=101) had information about cervix cancer. 56.4% (n=79) of them stated that they have never took pap smear test. 52.3% (n=23) of them took it for regular health checks. 37.1% of them stated that the pandemic affected the frequency of taking pap smear test, for reason, 74.1% of them stated they were afraid to go to the health center because of the fear of getting an infection. The detailed information about cervix cancer screening during pandemic and the distribution of people according to screening age is presented in Table 4.

Table 3: The distribution of some features of the participants according to breast cancer screening age interval.

	Total % (n=140)	Between 40-69 age old % (n=13)	Other age groups % (n=127)	p
Getting information about breast cancer				
Yes	80.7 (113)	30.8 (4)	85.8 (109)	**<0.001**
No	19.3 (27)	69.2 (9)	14.2 (18)	
Do you go to the gynecologist regularly every year for an examination?				
Yes	27.1 (38)	23.1 (3)	27.6 (35)	0.729
No	72.9 (102)	76.9 (10)	72.4 (92)	
Do you do breast self-examinations?				
Every week	7.9 (11)	15.4 (2)	7.1 (9)	
Every month	12.9 (18)	0 (0)	14.2 (18)	**<0.001**
As I remember	60.0 (84)	15.4 (2)	64.6 (82)	
No	19.3 (27)	69.2 (9)	14.2 (18)	
Has the COVID-19 Pandemic affected how often you do breast self-examinations? (n=115)				
Yes, more often	12.2 (14)	50.0 (1)	11.5 (13)	0.274
Yes, less	9.6 (11)	0 (0)	9.7 (11)	
No, did not affect	78.3 (90)	50.0 (1)	78.8 (89)	
Had a clinician performed you a clinical breast examination?				
No	63.6 (89)	76.9 (10)	62.2 (79)	
Only with detection of abnormality	18.6 (26)	0 (0)	20.5 (26)	0.105
Every year	7.1 (10)	0 (0)	7.9 (10)	
1 in 2 years	10.7 (15)	23.1 (3)	9.4 (12)	
Has the COVID-19 Pandemic affected the frequency of clinical breast examinations by the physician? (n=55)				
Yes	34.5 (19)	0	34.5 (19)	-
No	65.5 (36)	0	65.5 (36)	
The mammography taking time				
Yes, I have it every year since I'm 50 and over.	5.7 (8)	0	6.3 (8)	
Yes, I have it every year since I'm 40 and over.	6.4 (9)	0	7.1 (9)	0.476
Yes, but not regularly	12.1 (17)	7.7 (1)	12.6 (16)	
No	75.7 (106)	92.3 (12)	74.0 (94)	
Has the pandemic affected your frequency of mammography? (n=53)				
Yes	37.7 (20)	0	37.7 (20)	-
No	62.3 (33)	0	62.3 (33)	

n: Number of patients; %: Column percentage; Chi square test was used.

Table 4: The distribution of some features of the participants according to cervix cancer screening age interval.				
	Total % (n=140)	Between 30-65 age old % (n=63)	Other age groups % (n=77)	p
Getting information about cervix cancer				
Yes	72.1 (101)	55.6 (35)	85.7 (66)	**<0.001**
No	27.9 (39)	44.4 (28)	14.3 (11)	
Pap smear test				
Never done	56.4 (79)	95.2 (60)	24.7 (19)	**<0.001**
Not regularly, I get it done once in a while	25.0 (35)	1.6 (1)	44.2 (34)	
Every year	9.3 (13)	0 (0)	16.9 (13)	
1 in three years	5.0 (7)	0 (0)	9.1 (7)	
1 in five years	4.3 (6)	3.2 (2)	5.2 (4)	
Has the pandemic affected your frequency of having a pap smear test? (n=70)				
Yes	37.1 (26)	0 (0)	37.1 (26)	-
No	62.9 (44)	0 (0)	62.9 (44)	
n: Number of patients; %: Column percentage.				



Graphic 1. The distribution of the opinions of the participants about the effects of the pandemic to the related cancer screening frequencies.

Discussion

The routine preventive healthcare and cancer screening programs are very important to maintain the public health. But in our study nearly half of the participants stated that pandemic negatively affected the colorectal cancer screening frequency, one third of the participants stated that pandemic negatively affected the cervix and breast cancer screening frequencies.

In order to combat with increasing cancer ratios, rising public awareness and information about cancers and cancer screening programs are very important. In a report of Turkey Household Health Research (2017), it was stated that 37% of the women and 46% of the men were aware about cancer screening tests [12].

In our study, 41.6% of the participants (both women and men) had information about colorectal cancer, of the women 77.7% had information about breast cancer, 72.1% had information about cervix cancer. In recent studies, the awareness ratios were changed between 6-90% [13-17]. The results of our study were not high, it should be affected from various factors. The awareness programs should be developed. It is not possible to talk about a successful cancer screening program without raising the awareness of people.

Colorectal cancer is a worldwide problem and affects both genders. In our study, we found the colorectal cancer screening test ratios very low (occult blood test in stool 17.8% and colonoscopy 8.4%). These results were in accordance with studies from Turkey; in a study of Bayçelebi et al., the test ratios were 10.8% (occult blood test in stool) and 5% (colonoscopy) [18]; in a study of Yılmaz et al., colonoscopy ratio was 8.7% and occult blood test in stool ratio was 19.2% [19]; in a study of Pirincci et al., it was seen that 18.3% of the participants took any of the colorectal cancer tests [20]. According to the National Cancer Control Plan, 20-30% of population were within the scope of the screening program for colorectal cancer [21]. In literature a lot of factors (sociodemographic, cultural, and local) were stated for these low ratios. In our study, 54.2% of participants stated that the pandemic affects the frequency of taking occult blood test in stool, 61.5% stated that afraid to go to the health center because of the fear of getting an infection and 47.4% of them stated that the pandemic affects the frequency of colonoscopy and 50% stated that because of being afraid of going to the health center for worry of getting an infection, 37.5% of them stated that they didn't know which center they should go to during the pandemic. McBain et al. stated that colonoscopy rates declined by over 90% [8]. Screenings for colon dropped by 75% according to Patt et al. [9]. According to Patel et al., routine outpatient visits were converted to telehealth and with the decrease of in person visits, reduction in colorectal cancer screening tests were seen during pandemic [22]. As stated from participants in our study, being afraid of going to the health center for worry of getting an infection was the most important reason for these low ratios.

All over the world, breast cancer is still one of the most common types of cancer among women. The most accurate way to reduce mortality in breast cancer is early diagnosis and treatment. According to 2018 Turkey Health Statistics Yearbook data, of the women aged 15 and over, 39.4% had at least one breast self-examination, 28.9% had a mammogram at least once [23]. According to the National Cancer Control Plan, 30-35% of the target female population within the scope of the screening program were screened for breast cancer [21]. In our study, 60.0% of participants stated that they do self-breast-examination as remember, 36.4% of the participants said that a physician performs a clinical breast examination at least ones a time in their life, 24.3% of the participants took mammography at least once and these results were in parallel with literature. 34.5% of participants stated that the pandemic affects the frequency of clinical breast examination, 37.7% of them stated that the pandemic affects the frequency of taking mammography, 75% of them stated that the pandemic affects the frequency of mammography because of being afraid of going to the health center for worry of getting an infection. The COVID-19 pandemic led many countries to suspend cancer screening services and reduced all kind of cancer screening test frequencies like breast cancer [10]. In our study, nearly one third of the participants stated pandemic negatively affected the breast cancer screening frequencies. McBain et al. stated that mammography rates declined by over 90% [8]. Screenings for breast dropped by 85% according to Patt et al. [9]. The rates were lower in our study, which may be related to the low awareness rates of people in our study. It cannot be expected that people who are unaware of cancer and screening programs apply for screening.

Cervical cancer screening program is another important program of Turkey. In our study, 56.4% of participants stated that they have never took pap smear test, 37.1% of them stated that the pandemic affects the frequency of taking pap smear test, 74.1% of them stated that the pandemic affects the frequency of it because of being afraid of going to the health center for worry of getting an infection. According to 2018 Turkey Health Statistics Yearbook data, of the women aged 15 and over, 30.7% had a smear and Human papillomavirus-DNA (HPV-DNA) test at least once [23]. According to the National Cancer Control Plan, 20% of the target female population within the scope of the screening program were screened for cervix cancer [21]. In different studies from Turkey, the pap smear and HPV-DNA test ratios were between 10%-34% [18,24-26]. Our test results were higher than national studies. In our

study, nearly one third of the participants stated pandemic negatively affected the cervix cancer screening frequencies, this was in accordance with ratios of breast cancer. Breast and cervix cancer screening programs target same population, so the similarity in ratios is a reflection of the same people were affected for cancer screenings from pandemic.

In general, in our study, we noticed that nearly half of the participants stated that pandemic negatively affected the colorectal cancer screening frequency, one third of the participants stated that pandemic negatively affected the cervix and breast cancer screening frequencies. According to a report (to assess the effects of the first wave of the COVID-19 pandemic on cancer screening) from the International Cancer Screening Network (ICSN), it was stated that the first wave of the COVID-19 pandemic has had important negative effects on cancer screening worldwide [10]. According to a Network (EHRN) Report, breast, cervical and colon cancers in March 2020 decreased by 86 to 94 percent compared with previous years [11]. Preventive cancer foundation stated that 43% of patients missed routine preventive appointments because of COVID-19 [27]. There is no national data for the cancer screening rates during pandemic. The cancer screening drop rates of our study were low than international studies, however in our study we asked with a survey to participants, we did not know the exact reports and statistics of our country. In addition, we think that the statements of the participants may not be very different from the general statistics. Large scale studies and analysis of national records are needed to clarify this statement.

Limitations of our study include its design, being cross-sectional. Thus, the findings of this study may not be representative for the population. In this study the health records could not be reached, analysis was done according to participants statements on survey form.

Conclusion

Interruptions in cancer screening will lead to late diagnosis of current cancers, additional cancer deaths. Until screening rates return to pre-COVID levels, these interruptions could have a large impact. Our results were shown the negative effects of pandemic on screening programs and the mostly emphasized reason was being afraid of going to the health center for worry of getting an infection.

The solution proposals of us according to our results are as follows: Cancer epidemiologist and primary care academicians should develop guidelines on how to approach cancer screening during pandemic, organized health system should be developed by governments for pandemic situations, such as invitation of people via e-mail or posts to screening programs to screening centers where measures are taken in terms of pandemic.

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References

1. World Health Organization (WHO), Geneva, Switzerland. World Health Organization Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020. Available at: https://www.who.int/dg/speeches/detail/who-director-general-sopening-remarks-at the-media-briefing-on-covid-19---11-march-2020 [Accessed July 27, 2021].

2. Er AG, Ünal S. 2019 Coronavirus Pandemic in Turkey and Across the World. Flora 2020; 25(1): 1-8. [Crossref]

3. Khan Z, Karataş Y. COVID-19 in Turkey: An urgent need for the implementation of preparedness and response strategies. Health Sci Rep 2020; 3(2): e153. [Crossref]

4. Republic of Turkey Ministry of Health, Ankara, Turkey. Guide for Working in Health Institutions and Infection Control Precautions. Available at: https://covid19.saglik.gov.tr/Eklenti/40982/0/covid19-toplumdasalginyonetimirehberipdf.pdf [Accessed July 27, 2021].

5. World Health Organization (WHO), Geneva, Switzerland. Cancer - 3 March 2021. Available at: https://www.who.int/news-room/fact-sheets/detail/cancer [Accessed July 27, 2021].

6. National Cancer Institute (NCI), Maryland, US. Tumor Markers. Available at: https://www.cancer.gov/about-cancer/diagnosis-staging/diagnosis/tumor-markers-fact-sheet [Accessed July 27, 2021].

7. Halk Sağlığı Genel Müdürlüğü Kanser Dairesi Başkanlığı, Ankara, Türkiye. Ulusal Kanser Tarama Standartları. Available at: https://hsgm.saglik.gov.tr/tr/kanser-tarama-standartlari [Accessed July 27, 2021].

8. McBain RK, Cantor JH, Jena AB, Pera MF, Bravata DM, Whaley CM. Decline and Rebound in Routine Cancer Screening Rates During the COVID-19 Pandemic. J Gen Intern Med 2021; 36(6): 1829-31. [Crossref]

9. Patt D, Gordan L, Diaz M, Okon T, Grady L, Harmison M, et al. Impact of COVID-19 on Cancer Care: How the Pandemic Is Delaying Cancer Diagnosis and Treatment for American Seniors. JCO Clin Cancer Inform 2020; 4: 1059-71. [Crossref]

10. Puricelli Perin DM, Elfström KM, Bulliard JL, Burón A, Campbell C, Flugelman AA, et al. International Cancer Screening Network. Early assessment of the first wave of the COVID-19 pandemic on cancer screening services: The International Cancer Screening Network COVID-19 survey. Prev Med 2021; 151: 106642. [Crossref]

11. Mitchell EP. Declines in Cancer Screening During COVID-19 Pandemic. J Natl Med Assoc 2020; 112(6): 563-64. [Crossref]

12. Kanser Tarama Testleri. In: Üner S, Balcılar M, Ergüder T (eds), Türkiye Hanehalkı Sağlık Araştırması: Bulaşıcı Olmayan Hastalıkların Risk Faktörleri Prevalansı 2017 [STEPS]. 2018, Dünya Sağlık Örgütü Türkiye Ofisi, Ankara. pp:72-3.

13. Guvenc G, Seven M, Kilic A, Akyuz A, Akcan G. Breast, cervical, and colorectal cancer screening status of a group of Turkish women. Asian Pacific J Cancer Prev 2012; 13(9): 4273-9. [Crossref]

14. Gök Uğur H, Aksoy Derya Y, Yılmaz Yavuz A, Şılbır MF, Öner A. Aile sağlığı merkezlerine başvuran 30-70 yaş grubu kadınların ulusal kanser taramalarına yönelik bilgi tutum ve davranışları: Karadeniz Bölgesi'nde bir il örneği. STED 2019; 28(5): 340-52. [Crossref]

15. Yılmaz M, Dereli F, Yelten G. Elli yaş ve üzerindeki bireylerin bazı sosyodemografik özellikleri, sağlıklı yaşam biçimi davranışları ve sağlık inançlarının kolon kanserine ilişkin tarama davranışlarına etkisi. Hemşirelikte Eğitim ve Araştırma Derg 2017; 13(3): 226-34. [Crossref]

16. Genç Z, Yalçınöz Baysal H. Birinci basamağa başvuran bireylerin kolorektal kansere yönelik sağlık inançlarının gaitada gizli kan testi yaptırma durumlarına etkisi. Sağlık ve Toplum Derg 2020; 30(2): 90-7.

17. Emiral G, Işıktekin Atalay B, Önsüz MF, Zeytin AM, Küçük YS, et al. Yarı kırsal alanda yaşayan kişilerde gaitada gizli kan taraması ve tarama programları hakkında farkındalıkları. Türk Dünyası Uygul ve Araştırma Merk Halk Sağlığı Derg 2018; 3(1): 42-55.

18. Bayçelebi G, Aydın F, Gökosmanoğlu F, Tat TS, Varım C. Trabzon'da Kanser Tarama Testleri Farkındalığı. J Hum Rhythm 2015; 1(3): 90-4.

19. Yılmaz S, Emre N. Evaluation of knowledge, attitude and behavior for the colorectal cancer risk factors and early diagnosis in persons between 50-70 years. Pamukkale Tıp Dergisi 2021; 14(3): 726-33. [Crossref]

20. Pirincci S, Benli C, Okyay P. Patients admitted to tertiary health care center colorectal cancer screening program awareness study. TAF Prev Med Bull 2015; 14: 209-14.

21. T.C. Sağlık Bakanlığı, Türkiye Halk Sağlığı Kurumu Kanser Daire Başkanlığı. Ulusal Kanser Kontrol Planı 2013- 2018. Available at: https://hsgm.saglik.gov.tr/depo/birimler/kanser-db/yayinlar/Kitaplar/TURKIYE_KANSER_KONTROL_PROGRAMI_2016.pdf [Accessed July 27, 2021].

22. Patel S, Issaka RB, Chen E, Somsouk M. Colorectal Cancer Screening and COVID-19. Am J Gastroenterol 2021; 116(2): 433-4. [Crossref]

23. T.C. Sağlık Bakanlığı, Sağlık Bilgi Sistemleri Genel Müdürlüğü. Sağlık İstatistikleri Yıllığı 2019. Available at: https://sbsgm.saglik.gov.tr/Eklenti/40564/0/saglik-istatistikleri-yilligi-2019pdf.pdf [Accessed July 27, 2021].

24. Öztürk Y, Gürsoy E. An evaluation of the awareness of women about pap smear test and cervical cancer and the reasons for not having the pap smear test. Int Ref J Gynaecol Matern Child Heal 2018; (14): 1-19.

25. Büyükkayacı Duman N, Yüksel Koçak D, Albayrak SA, Topuz Ş, Yılmazel G. Kırk yaş üstü kadınların meme ve serviks kanseri taramalarına yönelik bilgi ve uygulamaları. JAREN 2015; 1(1): 30-8. [Crossref]

26. Oran NT, Can HO, Senuzun F, Aylaz RD. Health promotion lifestyle and cancer screening behavior: a survey among academician women. Asian Pac J Cancer Prev 2008; 9(3): 515-8. [PubMed]

27. Prevent Cancer Foundation, Virginia, US. Prevent Cancer Foundation announces "Back on the Books" — A lifesaving initiative in the face of COVID-19, August 6, 2020. Available at: https://www.preventcancer.org/2020/08/prevent-cancer-foundation-announces-back-on-the-books-a-lifesaving-initiative-in-the-face-of-covid-19/ [Accessed July 27, 2021]