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Comparison of Mobile Scanning Tool and Cancer Early Diagnosis, Screening and Training Centers

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ABSTRACT

Objectives: Cancer Early Diagnosis, Screening and Training Centers (CEDSTCs) have been established to make cancer screenings easier and more common. In this study, it was aimed to compare the cancer screening data made in CEDSTC and the mobile screening tool in Kayseri.

Methods: This retrospective study was performed in CEDSTCs and on a mobile screening tool in Kayseri. The mobile screening tool served in the central, rural, and semi-rural areas of Kayseri within the mentioned period of time. Mammography examinations and cervical cancer screenings performed in that period were compared with the screenings performed in seven CEDSTCs in the central districts.

Results: A total of 3080 individuals were included in the study. The mean age of the participants applying to the mobile screening tool was 52.2±6.8 years, and the mean age of those applying to CEDSTCs was 54.1±6.3 years ($p<0.001$). While human papillomavirus-deoxyribonucleic acid (HPV-DNA) analysis was performed on 417 (27.3%) people in the mobile scanning tool, CEDSTCs were performed on 1415 (90.8%) people ($p=0.005$). While the number of those who were positive for HPV-DNA in the mobile screening tool was 72 (4.7%), the number of those who were positive in the CEDSTCs was 172 (11.0%).

Conclusion: The use of methods such as mobile scanning devices enables people living in rural areas to have easy access to mammography devices. This method may increase the number of people being screened for at least breast cancer. Cervical cancer screening in mobile services needs to be increased.

Keywords: Breast cancer, cancer screening, cervical cancer, mammography

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INTRODUCTION

Malignant diseases are a group of diseases characterized by uncontrolled cell division and cause the most deaths in the world. They may end with the loss of organs, and their clinics and treatment differ from each other. They account for about one-sixth of all deaths.[1] This situation in Turkey is similar to world data.[2]

Breast cancer and cervical cancer are the most common cancers, and their mortality rates are quite high.[3] Breast cancer, among the cancers seen in women, is the most common cancer type in the world and in Turkey. Although it is less common in developing countries compared with developed countries, its mortality rates and annual incidence in these countries are higher. The incidence of breast cancer increases with age. It is a progressive disease and is more likely to be treated if diagnosed early.[2] Therefore, life expectancy is high. It has been revealed that the 5-year survival rate with the early diagnosis and treatment methods in patients diagnosed with breast cancer is about 90–95% in developed countries.

Cervical cancer is a type of cancer common among women and can be cured 95% if diagnosed early; however, its mortality rate is quite high when it is late.[4] Thanks to the screenings, the opportunity for the early diagnosis and treatment possibilities has increased.

Cancer Early Diagnosis, Screening and Training Centers (CEDSTCs) have been established to make cancer screenings easier and more common.[5] However, these centers are located mostly in the city centers and people in rural areas cannot access these centers, which have caused some inequalities. It is more difficult for people in rural areas to access screening tools. If mobile cancer screening tools are used for that purpose, the opportunity to access screenings will increase in rural areas.

In this study, it was aimed to compare the cancer screening data made in CEDSTC and the mobile screening tool in Kayseri.

METHOD

In this study, the scanning results of CEDSTC and a mobile scanning tool in Kayseri between January 1, and March 31, 2020, were examined retrospectively. Female patients aged between 30 and 69 who underwent breast and cervical cancer screenings in the CEDSTCs and on the mobile screening tool were included in the study. The mobile screening tool served in the central, rural, and semi-rural areas of Kayseri within the mentioned period of time. The districts are classified into six groups according to their level of socioeconomic development in Kayseri. According to this classification, the level of development decreases from the first group to the sixth group.[6] There are no districts with development level 2, 5, and 6 in this study. Mammography examinations and cervical cancer screenings performed in that period were compared with the screenings performed in seven CEDSTCs (four of them had mammography devices) in the central districts.

People who were previously diagnosed with cancer, who did not volunteer to participate in the study, and who were in pregnancy or lactation were excluded from the study.

The Statistical Package for the Social Sciences 21.0 software program was used for calculations. Descriptive statistics were calculated as mean and standard deviation values for continuous variables and as frequency and percentile for categorical variables. One sample Kolmogorov–Smirnov test was used to determine whether the numerical data of the variables were normally distributed or not. The relationship between the groups and categorical variables was determined with Chi-square test. Student-t test was used in two group comparisons of normally distributed numerical data. A $p<0.05$ was considered statistically significant.

RESULTS

A total of 3080 individuals were included in the study. The mean age of the participants was 53.2±6.6 years. During the study period, 1522 (49.4%) people preferred the mobile scanning tool, while 1558 (50.6%) people preferred CEDSTCs. All the participants underwent a mammography exam. The sociodemographic and screening features of the participants are summarized in Table 1.

Table 1. Sociodemographic and screening features of the participants

	n (%)
Age groups	
Below 50 years	1148 (37.3)
Above 50 years	1932 (62.7)
Distribution of districts by level of development	
Level 1	1595 (51.8)
Level 3	1026 (33.3)
Level 4	459 (14.9)
Type of screening center	
Mobile	1522 (49.4)
Normal	1558 (50.6)
BI-RADS	
Incomplete	7 (0.2)
BI-RADS 0	213 (6.9)
BI-RADS1-2	2829 (91.9)
BI-RADS 4	21 (0.7)
BI-RADS 5	10 (0.3)
HPV-DNA test	
Yes	1832 (59.5)
No	1248 (40.5)
HPV result	
Negative	1588 (86.7)
Positive	244 (13.3)
HPV types	
Negatives	1588 (86.7)
HPV16	59 (3.2)
HPV18	8 (0.4)
HPV31	21 (1.1)
HPV33	10 (0.6)
HPV35	6 (0.3)
HPV39	9 (0.5)
HPV45	7 (0.4)
HPV51	16 (0.9)
HPV52	7 (0.4)
HPV56	10 (0.6)
HPV58	5 (0.3)
HPV59	8 (0.4)
HPV68	13 (0.7)
Other	65 (3.5)

BI-RADS: Breast imaging-reporting and data system; HPV: Human papilloma virus; HPV-DNA: Human papilloma virus-deoksiribonükleik acid.

The mean age of the participants applying to the mobile screening tool was 52.2±6.8 years, and the mean age of those applying to CEDSTCs was 54.1±6.3 years (p<0.001). The sociodemographic and screening features according to screening centers are summarized in Table 2.

The mean age of the human papillomavirus-deoxyribonucleic acid (HPV-DNA) negative individuals was 54.0±6.2 years and that of HPV-DNA positive individuals was 52.8±6.5 years (p=0.008). Sociodemographic and screening features according to the development level of the districts are summarized in Table 3. When HPV positivity is evaluated according to districts, HPV positive was in 172 (12.3%) in

Table 2. Sociodemographic and screening features according to screening centers

	Mobile (n=1522)	CEDSTC (n=1558)	p
Age groups			
Below 50 years	667 (43.8)	481 (30.8)	<0.001
Above 50 years	855 (56.2)	1077 (69.2)	
Development level of districts			
Level 1	63 (4.1)	1532 (98.4)	<0.001
Level 3	1019 (67.0)	7 (0.4)	
Level 4	440 (28.9)	19 (1.2)	
Making HPV-DNA test	417 (27.3)	1415 (90.8)	0.005
Positive HPV result	72 (4.7)	172 (11.0)	0.007
BI-RADS			
BI-RADS 0	111 (7.3)	102 (6.6)	0.890
BI-RADS 1-2	1394 (91.7)	1435 (92.2)	
BI-RADS 4	9 (0.6)	12 (0.8)	
BI-RADS 5	5 (0.4)	5 (0.4)	

BI-RADS: Breast imaging-reporting and data system, CEDSTC: Cancer Early Diagnosis, Screening and Training Centers, HPV: Human papilloma virus, HPV-DNA: Human papilloma virus-deoxyribonucleic acid.

Data are presented as n (%).

Chi-square test.

Table 3. Sociodemographic and screening features according to the development level of the districts

	Level 1 (n=1595)	Level 3 (n=1026)	Level 4 (n=459)	p
Age Groups				
Below 50 years	498 (31.2)	454 (44.2)	196 (42.7)	<0.001
Above 50 years	1097 (68.8)	572 (55.8)	263 (57.3)	
BI-RADS				
Incomplete	3 (0.2)	4 (0.4)	0 (0.0)	0.972
BI-RADS 0	107 (6.7)	75 (7.3)	31 (6.8)	
BI-RADS 1-2	1469 (92.1)	935 (91.1)	425 (92.6)	
BI-RADS 4	11 (0.7)	8 (0.8)	2 (0.4)	
BI-RADS 5	5 (0.3)	4 (0.4)	1 (0.2)	
Tested for HPV-DNA				
Yes	1397 (87.5)	341 (33.2)	94 (20.4)	<0.001
No	198 (12.5)	685 (66.8)	365 (79.6)	

BI-RADS: Breast imaging-reporting and data system, CEDSTC: Cancer Early Diagnosis, Screening and Training Centers, HPV: Human papilloma virus, HPV-DNA: Human papilloma virus-deoxyribonucleic acid.

Data are presented as n (%).

Chi-square test.

districts with developmental level 1, 62 (18.2%) in districts with developmental level 3, and 10 (10.6%) of the participants in districts with developmental level 4 (p=0.012).

Of the individuals who tested HPV-DNA analysis, 1238 (67.6%) were above the age of 50, and 594 (32.4%) were below the age of 50 (p<0.001). Of the individuals with positive HPV-DNA analysis, 150 (61.5%) were above 50 years old, and 94 (38.5%) were below 50 years old (p=0.029).

DISCUSSION

Cancer is one of the most important health problems in Turkey, like in the world. The incidence of cancer is gradually increasing all around the world.[7] Cancer screenings can be opportunist-and society-based. The prevalence of mortality caused by cancer is decreased with these screenings. However, it is also necessary to provide individuals to have a quality life as well as decrease mortality.[8,9]

In studies performed in rural areas, the prevalence of undergoing mammography examinations was reported as 23% in Spain, 70% and 42% in two different studies in the USA and 80% in Australia.[10-13] Gözüm et al. reported the prevalence of undergoing mammography examinations in rural areas as 23.1% in the studies performed in Turkey.[5] Discigil et al. reported that the prevalence of those who underwent mammography examinations in urban areas was about 2 times higher compared with the rural areas.[14] The data of the screening centers where the society-based screenings were performed were analyzed in this study. It is known that the frequency of participation in cancer screenings is lower in rural areas compared with urban areas.[15] The numbers of individuals undergoing mammography examinations in seven CEDSTCs in the city center and one mobile screening tool serving in rural areas were very close to each other in this study. The mobile screening device could increase breast cancer screening numbers in rural areas.

Although the mammography examination takes place in the standards of the national screening program and it is free for women above the age of 40 to undergo mammography examinations in CEDSTCs in Turkey, the prevalence of undergoing mammography examinations among all women is still under the desired rate.[16] To increase the frequency of screenings in rural areas, it is necessary to bring individuals to the CEDSTCs in the city center or ensure that they receive service in their region. The problems regionally experienced in cancer screenings can be prevented by providing more planned and more frequent mobile screening services in rural areas.

According to the studies performed in the USA and Brazil, the prevalences of undergoing cervical cancer screening in rural areas are low.[12,17] The number of HPV-DNA tests performed on the mobile screening tool that was lower compared with CEDSTCs in this study. This may be because it is possible to undergo cervical cancer screening in the district hospitals in rural areas and women have hesitancy in undergoing gynecologic examination on the mobile device.

HPV-DNA positivity was reported as 10.3% in the study performed in a rural area of India, 36% in a study in Mozambique and 16% in a study in Costa Rica.[18-20] The frequency of HPV-DNA positivity was 13.3% and consistent with the frequency in the literature in this study. The frequency of HPV-DNA positivity in our study was found to be consistent with the literature data. The most common genotypes were HPV 35 and then HPV 16 in the study in Mozambique and HPV 16 and 18 in the study in Costa Rica.[19,20] HPV 16 and 31 were the most frequently detected genotypes in this study.

Studies have revealed that HPV positivity increases as the level of development and status of living in urban areas increase.[21,22] In this present study, positivity frequencies differed according to the districts' level of development. While the lowest positivity was in the least developed districts, the frequency of positivity was the highest in the third-level districts. As the individuals living in rural areas delay undergoing screenings, especially those in doubt may have applied to the mobile screening device at high frequencies. The least developed districts are the more closed communities. Therefore, the frequency of monogamists and the status of having suspected sexual intercourse may have been lower.

The limitations of the study are that it was conducted in a single center and retrospectively.

CONCLUSION

There are differences between rural and urban areas in requests for cancer screenings due to some reasons such as difficulty in transportation, hesitancy in being examined, and not having any knowledge. The use of methods such as mobile scanning devices enables people living in rural areas to have easy access to mammography devices. Cervical cancer screening in mobile services needs to be increased.

Disclosures

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