RESEARCH ARTICLE

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Exploring Perspectives on Cancer Screening in People Aged 30-70: A Comparative Study of Those with and Without Type 2 Diabetes

ABSTRACT

Objective: The aim of the study was to assess attitudes and behaviors related to cancer screening using an attitude scale for cancer screening among individuals aged 30-70 with and without type 2 diabetes mellitus.

Materials and Methods: This prospective case-control study was conducted from March to May 2023 at a single center. A total of 197 participants, including 67 patients with type 2 diabetes mellitus and 130 participants without type 2 diabetes mellitus aged 30-70, were enrolled using simple random sampling. For the assessment, a sociodemographic form prepared through a literature review and the attitude scale for cancer screening were used. A statistical significance level of $p<0.05$ was considered.

Results: The study participants had an average age of 49.65±12.49 years. The attitude scale for cancer screening scores did not show a statistically significant difference between individuals with and without type 2 diabetes mellitus ($z=1.485$, $p=0.138$). Furthermore, the statistical analysis did not identify a significant difference with the total score of the attitude scale for cancer screenings among other variables. Positive correlation was found between the attitude scale for cancer screening total score and age (rho= 0.206, $p=0.004$).

Conclusions: In our study, statistically significant differences in attitudes and behaviors towards cancer screenings were not observed between individuals with and without type 2 diabetes mellitus. However, it is essential to be attentive to the elevated risk of cancer in patients with type 2 diabetes mellitus. Therefore, increasing awareness and screening rates for cancer in this group is crucial.

Keywords: Diabetes Mellitus Type 2, Diagnosis, Early Detection of Cancer, Hyperglycemia.

30-70 Yaş Aralığındaki Kişilerde Kanser Taraması Perspektiflerinin İncelenmesi: Tip 2 Diyabeti Olanlar ve Olmayanların Karşılaştırmalı Bir Çalışması

ÖZET

Amaç: Çalışmada tip 2 diyabetes mellitusu olan ve olmayan 30-70 yaş arası kişiler arasında kanser taramalarına yönelik tutum ölçeği kullanarak kanser taramalarına yönelik tutum ve davranışların değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntem: Prospektif vaka-kontrol tipte çalışma, Mart-Mayıs 2023 tarihleri arasında tek merkezde gerçekleştirilmiştir. 30-70 yaş aralığında tip 2 diyabetes mellitusu olan 67 hasta ve tip 2 diyabetes mellitusu olmayan 130 katılımcı olmak üzere toplamda 197 katılımcı, basit rastgele örnekleme yöntemiyle seçilmiştir. Değerlendirmenin yapılması amacıyla, literatür taraması yoluyla hazırlanan sosyodemografik form ve 'kanser taramalarına yönelik tutum ölçeği' kullanılmıştır. İstatistiksel anlamlılık düzeyi $p<0.05$ olarak kabul edilmiştir.

Bulgular: Çalışmaya katılan bireylerin yaş ortalaması 49.65±12.49 yıl olarak elde edilmiştir. Tip 2 diyabetes mellitus tanısı olan ve olmayan kişiler arasında kanser taramalarına yönelik tutum ölçeği puanları açısından istatistiksel olarak anlamlı bir fark yoktur ($z=1.485$, $p=0.138$). Diğer değişkenlerin de kanser taramalarına yönelik tutum ölçeği toplam puanıyla istatistiksel olarak anlamlı bir fark tespit edilmemiştir. Kanser taramalarına yönelik tutum ölçeği toplam puanı ile yaş arasında pozitif yönlü istatistiksel olarak anlamlı bir ilişki bulunmaktadır (rho= 0.206, $p=0.004$).

Sonuç: Çalışmamızda, tip 2 diyabetes mellitusu olan ve olmayan bireyler arasında kanser taramalarına yönelik tutum ve davranışlarında istatistiksel olarak anlamlı fark tespit edilmemiştir. Ancak, tip 2 diyabetes mellitus hastalarında kanser riskinin yüksekliğine dikkat etmek gereklidir. Bu nedenle, bu grupta kanser taramalarına yönelik farkındalığı artırmak ve tarama oranlarını yükseltmek önemlidir.

Anahtar Kelimeler: Diyabetes Mellitus Tip 2, Tanı, Kanserin Erken Tespiti, Hiperglisemi.

INTRODUCTION

Cancer and diabetes are two of the most significant global health challenges, leading to substantial mortality and morbidity (1). Epidemiological studies indicate that individuals with diabetes have a considerably higher risk of various cancers, including stomach, breast, and cervical cancers (2–5). Although not all aspects of the relationship between diabetes and cancer are fully understood, the most likely mechanisms involve insulin resistance and hyperinsulinemia. Given the higher incidence of cancer in individuals with diabetes, it may be reasonable to consider initiating screenings, especially for malignancies like breast, colon, and endometrial cancer, earlier than in healthy individuals, even though the benefits are not definitively established (6).

Cancer screenings are conducted to achieve the early detection of cancer or its precursor lesions in asymptomatic individuals. The primary goal is to reduce the morbidity and mortality associated with cancer (7). In Turkey, screening is conducted within national breast, cervical, and colorectal cancer standards. In this context, screening is carried out for breast cancer in women aged 40-69, cervical cancer in women aged 30-65, and colorectal cancer in individuals aged 50-70 (8). The significance of cancer screening and early diagnosis is particularly pronounced for individuals with diabetes. Given the relatively higher healthcare needs and the number of visits to the healthcare system by patients with type 2 diabetes mellitus (T2DM), it is reasonable to assume that their attitudes, behaviors, and awareness regarding cancer screenings may be higher than those without T2DM. In the conducted literature review, studies examining the relationship between attitudes and behaviors towards chronic diseases and cancer screenings have been identified. However, specifically, no studies investigating attitudes and behaviors towards cancer screenings in individuals with diabetes mellitus were found.

This study aims to assess the attitudes and behaviors towards cancer screenings in individuals aged 30-70 with and without T2DM.

MATERIAL AND METHODS

A single-center prospective case-control study was conducted between March 6, 2023, and May 6, 2023, with patients who presented to the Family Medicine Polyclinic and Family Medicine Clinic Diabetes Polyclinic at a training and research hospital, and were either diagnosed with or without T2DM. The study obtained medical ethics committee approval on February 6, 2023, under decision number 2023/23-4062.

In Turkey, within the scope of the national cancer screening program, individuals aged 30-70 undergo cancer screening. From the pool of 400 patient applications within the age range of 30-70, the minimum required sample size for the study was 197 individuals. Upon stratification, this number was further divided into a minimum of 67 patients with a T2DM diagnosis and 130 individuals without a T2DM diagnosis. Patients with any mental or psychological disorders, as well as those who have recovered from cancer or currently have active cancer, were not included in the study. Patients were selected through a simple random sampling method and subsequently categorized into two groups: those with a T2DM diagnosis and those without. The patients signed informed consent forms based on voluntariness after face-to-face meetings. A data collection form was completed, which included questions related to age, gender, educational background, duration of education, presence of T2DM, additional chronic illnesses, and smoking status. The Attitude Scale for Cancer Screening (ASFCS) was then administered. All procedures performed in studies involving human participants were by the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

ASFCS is a single-dimensional, 24-item scale developed by Öztürk and colleagues in 2019. It has undergone validation and reliability studies in the Turkish context. The scale uses a five-point Likert type format, with the following response options: '1: Strongly Disagree, 2: Disagree Somewhat, 3: Neither Agree nor Disagree, 4: Agree Somewhat, 5: Strongly Agree.' ASFCS does not have specific cut-off points. Participant scores approaching 24 indicate a negative attitude towards cancer screening, while scores nearing 120 suggest a positive attitude towards cancer screening (9).

Statistical Analysis: Demographic information, such as gender, educational background, smoking status, and the presence of chronic illnesses, was represented using number (n) and percentage (%) values to show the distribution of responses.

For continuous variables in the study, like age and ASFCS scores, their suitability for a normal distribution was assessed both graphically and through the Shapiro-Wilks test. It was determined that none of the continuous variables followed a normal distribution. Therefore, in the presentation of descriptive statistics, median (IQR-Interquartile Range) values were used.

In the comparison of individuals' ASFCS scores based on categorical variables with more than two categories, such as educational background and smoking status, the Kruskal-Wallis test was employed. For pairwise comparisons, the Mann-Whitney U non-parametric variance analysis was used.

In a model constructed based on variables like gender, educational background, duration of education, T2DM diagnosis, hypertension, cardiovascular disease, hyperlipidemia,

hypothyroidism, and asthma or chronic obstructive pulmonary disease (COPD) status, the ASFCS score didn't exhibit a normal distribution. Therefore, generalized linear models (GLM) were utilized.

Statistical analyses and calculations were conducted using IBM SPSS Statistics 21.0 (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.) and MS-Excel 2007 programs. The statistical significance level was set at $p<0.05$.

RESULTS

The study revealed that the participants had an average age of 49.65±12.49 years, ranging from a minimum of 30.0 years to a maximum of 70.0 years. In diabetic patients, the average duration of diabetes was 9.82±5.92 years. Moreover, the mean total ASFCS score was 104.36±10.64. Notably, there was no statistically significant difference in ASFCS scores between individuals with and without T2DM (z=1.485, p=0.138). A weak, positive, and statistically significant relationship was identified between the ASFCS total score and age (rho: 0.206, p: 0.004). Importantly, this relationship was observed in patients without T2DM (rho: 0.256, p: 0.003) but not in those with T2DM (rho: -0.015, p: 0.903). Additionally, no statistically significant relationship was found between the ASFCS total score and the duration of diabetes (rho: 0.098, p: 0.432).

The study revealed no statistically significant differences in ASFCS scores between individuals with and without T2DM across all variable groups (p>0.05) (Table 1).

Table 1. Comparison of Demographic Characteristics and Attitude Scale for Cancer Screening Total Scores of Participants in Independent Variable Groups

		T2DM Diagnosed				T2DM Not Diagnosed			
			Test Statistic*				Test Statistic*		
		n (%)	Median (IQR)	Z ; $\chi 2$	p	n (%)	Median (IQR)	Z ; $\chi 2$	p
Gender	Female	35 (52.2)	108.0 (17.0)	z=0.710	0.478	81 (62.3)	104.0 (12.0)	z=0.613	0.540
	Male	32 (47.8)	109.5 (11.0)			49 (37.7)	105.0 (19.0)		
Education Level	Illiterate	3 (4.5)	101.0 (N/A)	$\chi 2$=4.563	0.471	2 (1.5)	101.0 (N/A)	$\chi 2$=5.300	0.380
	Primary School	25 (37.3)	107.0 (18.0)			19 (14.6)	111.0 (11.0)		
	Elementary School	8 (11.9)	110.5 (14.0)			8 (6.2)	104.5 (14.0)		
	High School	14 (20.9)	111.5 (11.0)			38 (29.3)	106.0 (13.0)		
	College	5 (7.5)	111.0 (20.0)			6 (4.6)	95.5 (29.0)		
	University	12 (17.9)	109.0 (17.0)			57 (43.8)	103.0 (12.0)		
Education Duration	12 years or less	50 (74.6)	108.5 (17.0)	z=0.195	0.846	67 (51.5)	107.0 (13.0)	z=1.452	0.146
	More than 12 years	17 (25.4)	109.0 (16.0)			63 (48.5)	103.0 (13.0)		
Hypertension	Absent	26 (38.8)	108.0 (18.0)	z=0.754	0.451	112 (86.2)	104.0 (14.0)	z=0.954	0.340
	Present	41 (61.2)	110.0 (15.0)			18 (13.8)	108.0 (12.0)		
Cardiovascular Disease	Absent	51 (76.1)	109.0 (18.0)	z=1.590	0.112	120 (92.3)	104.0 (14.0)	z=1.805	0.071
	Present	16 (23.9)	105.0 (14.0)			10 (7.7)	110.0 (15.0)		
Hyperlipidemia	Absent	50 (74.6)	108.5 (21.0)	z=1.132	0.257	123 (94.6)	104.0 (13.0)	z=0.996	0.319
	Present	17 (25.4)	110.0 (7.0)			7 (5.4)	108.0 (13.0)		
Hypothyroidism or Hyperthyroidism	Absent	59 (88.1)	109.0 (14.0)	z=0.019	0.985	121 (93.1)	105.0 (15.0)	z=0.427	0.670
	Present	8 (11.9)	108.0 (24.0)			9 (6.9)	102.0 (5.0)		
Asthma or COPD	Absent	62 (92.5)	109.0 (15.0)	z=0.406	0.702	128 (98.5)	105.0 (14.0)	z=0.454	0.650
	Present	5 (7.5)	109.0 (23.0)			2 (1.5)	100.5 (N/A)		
Other Diseases	Absent	59 (88.1)	108.0 (17.0)	z=1.704	0.088	126 (96.9)	105.0 (14.0)	z=0.128	0.898
	Present	8 (11.9)	113.0 (10.0)			4 (3.1)	103.5 (33.0)		
Smoking Use	No	41 (61.2)	108.0 (19.0)	$\chi 2$=2.995	0.224	70 (53.8)	105.0 (13.0)	$\chi 2$=4.645	0.098
	Yes	14 (20.9)	110.0 (14.0)			44 (33.8)	107.0 (12.0)		
	Quit	12 (17.9)	105.5 (17.0)			16 (12.4)	98.0 (15.0)		

z=Mann Whitney U Test Statistics, χ^2=Kruskal Wallis Test Statistics, N/A: Not Available

The results of the generalized linear model (GLM) established with the ASFCS total score as the dependent variable and independent variables such as gender, educational background (below high school, high school and above), duration of education, T2DM diagnosis, hypertension, cardiovascular disease, hyperlipidemia, hypothyroidism, asthma or COPD, and other chronic illnesses are presented in Table 2.

The table includes the coefficients of the parameters, standard error values, and p-values. In the established model, the variable "hyperlipidemia" has a statistically significant contribution (p=0.014).

Table 2. Generalized Linear Model for Predicting the Attitude Scale for Cancer Screening

	B Coefficient	Std. Error	p
Constant	102.711	1.846	**<0.001**
Gender	-1.216	1.548	0.432
Education Level	2.614	2.035	0.199
Education Duration	-2.100	1.866	0.260
T2DM Diagnosis	-0.189	1.860	0.919
Hypertension	1.684	2.045	0.410
Cardiovascular Disease	-3.467	2.979	0.245
Hyperlipidemia	7.321	2.975	**0.014**
Hypothyroidism or Hyperthyroidism	1.757	2.826	0.534
Asthma or COPD	-0.140	4.140	0.973
Other Chronic Diseases	3.780	3.160	0.232

DISCUSSION

In our study, no statistically significant differences were found in ASFCS scores across groups of individuals with and without T2DM concerning variables such as gender, educational level and duration, the presence of chronic illnesses, and smoking.

In a study conducted by Öztürk et al. in 2019, it was observed that as age increased, attitudes towards cancer screenings became more positive (9). Sevinç et al. showed in their study that as age increases, the recognition of cancer screening tests also increases (10). Similarly, a study by Tekpınar et al. in 2017 indicated that as age increased, attitudes towards cancer screenings became more favorable (11). However, a different perspective was presented by Onitilo et al. in their study on the relationship between diabetes and cancer. They found that younger individuals with higher education levels had a higher rate of undergoing mammography screenings and exhibited more positive behaviors towards cancer screenings (12). Furthermore, in a study conducted by McBean et al. in 2007, it was noted that diabetic women used screening services less as they grew older (13). In our study, a statistically significant positive relationship between age and ASFCS scores was found among individuals without T2DM. This suggests the need for greater awareness and education about the importance of cancer screenings and preventive healthcare among younger individuals.

Bynum et al. conducted a study in the United States, which revealed that individuals with lower levels of education were less likely to undergo cancer screenings. This observation led to the suggestion that participants' reluctance might stem from a lack of belief in the life-saving benefits of these screenings (14). In a study where 79% of the participants had received education below the high school level, it was observed that the level of knowledge and awareness about cancer types, screening methods, and screening programs was quite low (15). In 2008, Zhao et al. reported an increased rate of mammography, cervical, and colorectal cancer screenings with higher levels of education (16). Conversely, a 2017 study by Tekpınar and colleagues found that as education levels increased, attitudes toward cancer screenings became more negative (11). Additionally, a 2016 study by Wools and associates noted that lower education levels were associated with higher participation in cancer screenings (17). However, in our study, no statistically significant difference was observed between education levels and ASFCS scores. This lack of difference may be attributed to the accessibility and recommendation of cancer screenings in primary healthcare centers, irrespective of individuals' educational backgrounds.

Suh et al. conducted a study and found that cancer screening rates among diabetic individuals were significantly lower than those of non-diabetic individuals, emphasizing the need for recommended cancer screenings suitable for age and gender for all diabetic patients to support primary prevention and early diagnosis (18). Onitilo et al. reported in their study that diabetic women had lower rates of clinical breast examination, pap smears, breast self-examination, and breast skin checks compared to non-diabetic women, and that colorectal cancer screening rates were lower in diabetics compared to non-diabetics. The exact reasons for lower cancer screening rates in diabetic patients were noted to be not fully clear (12). Limpscombe et al. also conducted a study in which they noted that diabetic women, despite having more visits to primary care physicians and specialist consultations, had a significantly lower probability of getting a mammogram within a 2-year period compared to non-diabetic women. The study suggested that the presence of diabetes posed a barrier to regular mammography screenings and that in patients with chronic conditions, preventive care might be relatively neglected. It was further stated that as the complexity of diabetes care increased, developing more standardized strategies would be crucial to ensure the continuity of comprehensive care (19). In a study by McDaniel et al. in the United States in 2021, examining the rates of HPV testing among women with and without diabetes, it was noted that even after adjustments for other factors, diabetic women had lower rates of undergoing HPV tests compared to non-diabetic women (20).

Miller et al. reported in their study that overall adherence to cervical cancer screening was lower in diabetic women compared to non-diabetic women, but emphasized that this might not be primarily due to diabetes but could be attributed to differences in sociodemographic characteristics and access to healthcare services. It was also pointed out that due to lower cervical cancer survival in diabetic women and the increasing prevalence of diabetes, cervical cancer screening should be increased in this population (21).

In the studies we reviewed, it is generally observed that individuals with diabetes exhibit less favorable behaviors related to cancer screenings, and their screening rates are lower compared to those without diabetes. In our study, when we compared individuals with and without T2DM based on their ASFCS total scores, no statistically significant difference was found in terms of attitudes and behaviors related to cancer screenings. Given that some cancer types have a higher incidence in individuals with T2DM, efforts can be made to increase awareness of cancer screenings. Providing the necessary information and guidance

regarding cancer screenings can contribute to improving screening rates and awareness.

Among the participants in our study, 29.4% reported being smokers, 14.2% had quit smoking, and 56.4% were non-smokers. A study by Jimenez-Garcia and colleagues found that smoking was significantly less prevalent among diabetic women compared to non-diabetic women (22). In the study conducted by Öztürk et al., it was noted that individuals who smoke exhibited a more positive attitude towards cancer screenings (9). However, in our study, it was observed that the ASFCS scores of individuals who smoked were higher than those who didn't, but this difference was not statistically significant.

Yegenler et al. found that the presence of a chronic illness was a factor that positively affected the attitude toward cancer screening (23). In contrast, a study conducted by Erkal in 2022 found no significant difference in attitudes towards cancer screenings in relation to the presence of chronic diseases, similar to our study (24). Öztürk et al.'s study also did not reveal a significant relationship between the presence of chronic diseases and attitudes towards cancer screenings (9). In our study, no statistically significant difference was found in the relationship between the presence of chronic diseases and ASFCS scale scores. However, according to the generalized linear model established in our study, only hyperlipidemia contributes statistically significantly to the model. The reason for the lack of a relationship between the presence of chronic diseases in our study and attitudes and behaviors towards cancer screenings may be explained by the psychological impact on individuals with chronic diseases. They may avoid cancer screenings out of fear of being diagnosed with serious and life-threatening illnesses such as cancer.

The study we conducted is a single-center study, and due to the fact that the participants consisted of individuals seeking care at a tertiary healthcare institution, the results may not reflect the general population. This circumstance can be considered a limitation of our study. Additionally, the low sample size can be regarded as another constraint.

In conclusion, although it is established that certain cancers are more prevalent in diabetic patients, our study did not reveal a statistically significant difference in attitudes and behaviors toward cancer screenings between individuals with and without T2DM. However, considering the higher cancer risk in diabetic patients, increasing awareness and improving cancer screening rates among these patients is necessary and important. In our study, it was observed that as age increased, patients had a more positive attitude and behavior towards cancer screenings. However, this relationship was not observed in diabetic patients. Therefore, it is recommended that all healthcare professionals, especially primary care physicians, provide more information and guidance about cancer screenings in diabetic patients. Conducting studies to improve cancer attitudes and behaviors, particularly among younger individuals and newly diagnosed T2DM patients, may be appropriate.

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