

Research Article

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Frequency and Awareness of Diabetes Mellitus in Participants of Primary Healthcare in the Capital of Turkey

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Introduction: Awareness-based approaches are proven to reduce disease-related complications, depressive symptoms, anxiety during the disease process, economic losses due to disease, and improve quality of life in diabetes patients. This study aims to present the frequency and awareness of diabetes mellitus in patients who applied to a primary health care institution in the capital city of Turkey.

Materials and Methods: This cross-sectional study was conducted in the capital city of Turkey. In statistical analysis; descriptive statistics, Mann Whitney U, Kruskal Wallis and logistic regression analysis methods were employed for the statistical analysis part of this research.

Results: 24.4% of the participants had diabetes. Regarding diabetes awareness level, statistically significant differences were found in age, education level, marital status, income, attention to healthy nutrition, BMI and presence of chronic disease. Employment variable has been identified as the factor that affected the diabetes awareness score the most in multiple logistic regression analysis. When only the participants with diabetes were examined in the multiple logistic regression analysis, it was found that the factor affecting the diabetes awareness score the most was diabetes type. Other influencing factors were determined as diet for diabetes and receiving diabetes education, respectively.

Conclusion: Despite of many research that were carried out under the roof of diabetes awareness in the world and in Turkey, the desired level of knowledge and awareness is yet to be reached. Further research needs to be conducted in order to reach this goal.

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Received: May 08, 2022; **Accepted:** May 15, 2022; **Published:** May 20, 2023**Keywords:** Diabetes Awareness Level, Diabetes Mellitus, Awareness**Introduction**

Diabetes is a non-infectious chronic degenerative disease that occurs when the body cannot produce enough insulin or cannot use the existing insulin effectively, and hyperglycemia or uncontrolled blood sugar is observed in patients [1]. According to the data of the IDF, approximately 537 million people in the world between the ages of 20 and 79 were found to have diabetes in 2021. It is predicted that this number will exceed 783 million in 2045 [2]. The worldwide estimation of diabetes patients are as follows; 206 million in the Western Pacific region, 90 million in Southeast Asia, 73 million in the Middle East and North Africa, 61 million in Europe, 51 million in North America and the Caribbean, 32 million in South and Central America It is estimated that 32 million people in the United States and 24 million in other parts of Africa [3]. One out of every 10 diabetes patients worldwide is thought to have Type 1 diabetes and diabetes is considered responsible for 6.7

million deaths worldwide in 2021. In other words, once every five seconds, one person dies due to complications of diabetes [3, 4].

According to IDF data, in 2011, frequency of diabetes was 7.9% in Turkey. However, this number increased dramatically to 14.5% in 2021 [5]. Current estimations show that in 2020, 15% of the population aged 20-79 (approximately 7 million people) in Turkey will have diabetes [6]. The Centers for Disease Control and Prevention (CDC) National Diabetes Statistics Report indicates that 25% of people living with diabetes and 88.4% of people with diabetes inspidus are unaware of their disease [7]. The frequency of those who unknowingly have diabetes in Turkey in 2021 is thought to be 41.8% [5]. In addition, diabetes is considered to be one of the diseases with the lowest adherence to treatment [8]. Awareness-based approaches have been shown to reduce disease-related problems, depressive symptoms, anxiety during the disease process, and improve quality of life in diabetes patients [9]. Alongside awareness-based approaches, the economic burden caused by potential diabetes complications might be reduced

by providing diabetes education and awareness [10]. Primary health care institutions and family physicians are considered as an important point in raising awareness of diabetes.

In this context, prevention, awareness and control of diabetes before the progression of disease causes any organ damage is important in every aspect. Simple lifestyle measures are shown to be effective in preventing the development and delaying complications of type 2 diabetes. Actions which aim to reach individuals and families through community-based interventions, campaigns, education programmers, marketing and social media are of great importance for the adoption of lifestyle changes and in raising awareness of diabetes in societies.

Material and Method

The research was conducted with the participation of individuals over the age of 18 who applied to one of two family health centers in Gölbaşı, Sincan, Etimesgut and Yenimahalle districts located within the borders of Ankara province. The patients were recruited using the systematic sampling method. Three months before the initiation of research, the number of people over the age of 18 who applied to selected health institutions were determined 3359 people on average. By taking the unknown frequency of 50%, researchers aimed to reach 810 people with a deviation of 3% and a confidence interval of 95%; 950 people were reached. 44 people who did not attend the survey were excluded from the analysis and 906 people were included in the study. The population size was divided by the sample size (3359/810=4.147) and every fifth person who applied to the health institution was included in the study. In the cases where the fifth person did not want to participate in the research, the next person was selected and selection process continued with the next fifth person.

The questionnaire form prepared by the researchers, "The Presence and Awareness of Diabetes Mellitus in Those Applying to Some Family Health Centers in Ankara", was used as the data source. Before the start of the research, in order to ensure standardization, the doctors who would take part in the data collection were trained on the research, questionnaire form and application. A consent form with necessary explanations was placed on the front page of the questionnaire. Necessary information was verbally given to participants and their consent was obtained. The preliminary test of the questionnaire was done on 30 people and necessary corrections were made. Questionnaires were asked via face-to-face interview method and with 9-10 minutes of average application time of the survey.

The research is cross-sectional. For the statistical analysis of research data, Statistical Package for Social Sciences (SPSS), version 15.0 for Windows (SPSS Inc. Chicago, USA) was used. In the descriptive statistics section, categorical variables were presented as numbers and percentages, and continuous variables were presented as mean ± standard deviation and as medians (minimum-maximum value). Conformity of continuous variables to normal distribution was evaluated using mean and median values, visual (histogram, probability charts) and analytical methods (Kolmogorov-Smirnov and Shapiro-Wilk tests, Skewness and Kurtosis values, coefficient of variation). Mann-Whitney U and Kruskal-Wallis Tests were used for comparative analysis between groups for data that did not fit the normal distribution. In the determination of risk factors by multivariate analysis, possible independent predictors determined in previous analyzes were examined using logistic regression analysis. Variables compatible with the literature and variables with statistically

significant p values in univariate analyzes were included in the multiple regression analysis according to their fitness to the model. The Hosmer-Lemeshow test was used for model fit. Statistical significance value was accepted as p<0.05.

Each of the 25 questions evaluating the level of knowledge and awareness about diabetes were calculated as 4 points, and the total score was limited to 100. Considering that the median score of the participants were 52; Those with a score of less than 52 and those with a score of 52 and above were divided into 2 groups and analyzed accordingly. Age groups were included in the analysis by grouping the participants as 49 years old and under, 50 years old and over. Body mass index (BMI) was calculated from height and weight data provided and participants were grouped as underweight-normal (BMI<25) and overweight-obese (BMI≥25) and included accordingly in the analysis. In patients with diabetes mellitus, the duration of the disease was included in the analysis as 2 groups: 10 years and less, and 10 years and above.

Researchers applied to Gazi University Assessment and Evaluation Ethics Sub- Working Group for the research. The file was discussed at the meeting of the ethics commission dated 01.06.2021 and numbered 10, and it was unanimously decided (research code: 2021-646) that there was no ethical objection to the conduction of the study.

Results

Table 1: Distribution of Some Descriptive Characteristics of Individuals Participating in the Research, Ankara, 2021.

		Number (%)*
Sex (n=906)	Men	368(40.6)
	Women	538(59.4)
Age Groups (n=906)	18–29	243(26.8)
	30–49	336(37.1)
	50–64	228(25.2)
	65 and over	99(10.9)
	Employment Status (n=906)	Student
	Housewife	236(26.0)
	Unemployed	32(3.5)
	Worker	331(36.5)
	Retired	145(16.1)
Educational Status (n=906)	Illiterate	12(1.3)
	Literate	39(4.4)
	Pr. school graduate	98(10.8)
	Sc. school graduate	88(9.7)
	High school graduate	292(32.2)
	University graduate	377(41.6)
Household Income Status (n=877)	2020 TL or less	108(12.3)
	2021 TL – 4040 TL	348(39.7)
	4041 TL – 6060 TL	250(28.5)
	6061 TL and above	171(19.5)
Marital Status (n=906)	Married	612(67.5)
	Single	294(32.5)
Kinship Status (n=610)	Yes	109(17.9)
	No	501(82.1)

Smoking Status (n=906)	Never smoked	428(47.3)
	Smoked but quit	245(27.0)
	Smoker	233(25.7)
Alcohol Status (n=906)	No	697(76.9)
	Yes	209(23.1)
Regular Physical Activity (n=906)	Yes	743(82.0)
	No	163(18.0)
Attention to Nutrition (n=906)	Yes	453(50.0)
	No	453(50.0)
Chronic Disease (n=906)	No	529(58.4)
BMI Status (n=906)	Yes	377(41.6)
	Thin	14(1.5)
	Normal	408(45.1)
	Overweight	332(36.6)
	Obese	152(16.8)

*: Column Percentage

The median diabetes awareness score of the group aged 49 and under was 52 (40–68); and the median score of the group aged 50 and over was 48 (32–60). The difference between the groups is statistically significant ($p<0.001$). In addition, when age status and diabetes score were examined, it was found that diabetes awareness scores decreased as age increased and a statistically significant relationship ($r=-0.201$, $p<0.001$) was found. 24.4% of the participants had diabetes and 30.9% of the participants or their relatives did not have diabetes. 30.7% of diabetic patients had developed diabetes-related complications, 55.5% of them were on a diet for diabetes, 66.8% of them had regular check-ups. The frequency of receiving diabetes education among diabetic patients was found to be 46.1%. (Table 2).

Table 2: Presence of Diabetes in Individuals Participating in the Study and Distribution of Some Descriptive Characteristics of Diabetes, Ankara, 2021.

		Number (%)*
Diabetes in the household (n=906)	Yes, I have diabetes	221(24.4)
	Yes, I am a first degree relative of a diabetic patient	321(35.4)
	Yes, I am a second degree relative of a diabetic patient	178(19.6)
	No	280(30.9)
Patients' Own Diabetes Type (N=143)	Type 1	20(9.0)
	Type 2	201(91.0)
Diabetes Duration (n=205)	Under 10 years	113(55.1)
	10 years and above	92(44.9)
Complication Development Status (N=215)	Yes	66(30.7)
	No	149(69.3)
Diet Status (n=218)	Yes	121(55.5)
	No	97(44.5)
Regular Diabetes Check-up Status (n=217)	Yes	145(66.8)
	No	72(33.2)

Presence of Diabetes Education Status (N=816)	Yes	196(24.0)
	No	620(76.0)

*: Column Percentage

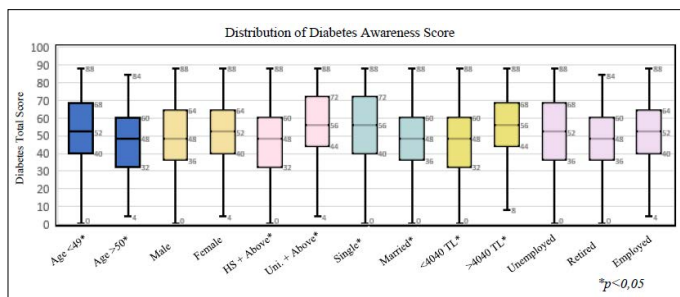


Figure 1: Distribution of Diabetes Awareness Knowledge Scores by Demographic Characteristics of Individuals Participating in the Study, Ankara, 2021

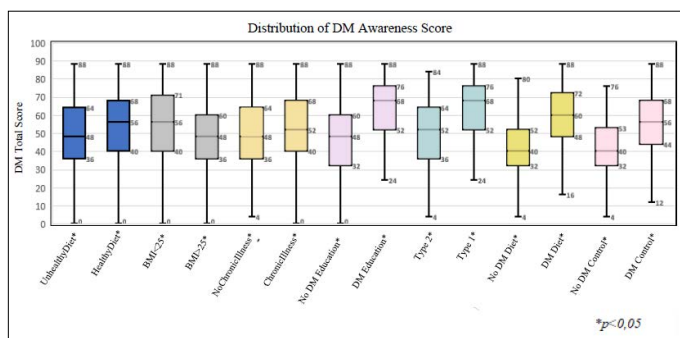


Figure 2: Distribution of Diabetes Awareness Knowledge Scores According to Some Other Characteristics of Individuals Participating in the Research, Ankara, 2021

In multiple logistic regression analysis, the variable that most affected the diabetes awareness score on all participants is found to be the working status (OR: 2.016) ($p<0.001$). Other influencing factors were being female (OR: 1.797, $p<0.001$), non-diabetic (OR: 1.756, $p=0.005$), university degree and/or higher education (OR: 1.739, $p=0.001$), income above 4040 TL (OR: 1.552, $p=0.003$), respectively (Table 3). Model fit was achieved in the Hosmer-Lemeshow test (0.288).

Table 3: Multiple Logistic Regression Analysis of Factors Affecting Diabetes Awareness Knowledge Scores in Individuals Participating in the Study, Turkey, 2021

	β	SE	OR*	95% CI**	p
Over 4040 TL Income	0,440	0,150	1,552	1,156–2,083	0,003
Female Gender	0,586	0,151	1,797	1,338–2,414	<0,001
University or Higher Education	0,553	0,161	1,739	1,269–2,382	0,001
Having Diabetes Mellitus	0,563	0,199	1,756	1,190–2,593	0,005
Be an Active Worker or Student	0,701	0,162	2,016	1,467–2,770	<0,001

*: Odds ratio

** : %95 confidence interval

When only the participants with diabetes were examined in the multiple logistic regression analysis, the variable that most affected the diabetes awareness score was found to be the diabetes type (OR: 5.196) ($p=0.008$). Other influencing factors were diet status for diabetes mellitus (OR:4.139, $p<0.001$) and diabetes education status (OR: 2.462, $p=0.004$) (Table 4). Model fit was achieved in the Hosmer-Lemeshow test (0.589).

Table 4: Multivariate Logistic Regression Analysis of Factors Affecting Diabetes Awareness Knowledge Scores in Individuals with Diabetes Who Participated in the Study

	β	SE	OR*	95% CI**	p
Type 1 Diabetes Mellitus	1,648	0,626	5,196	1,524–17,712	0,008
Doing Dieting For Diabetes	1,420	0,313	4,139	2,239–7,652	<0,001
Getting Diabetes Education	0,901	0,311	2,462	1,338–4,531	0,004

*: Odds ratio

** : %95 confidence interval

Discussion

One-fourth of the individuals participating in our study had diabetes. 30.9% of the participants stated that they or their relatives did not have diabetes. In a study conducted in Jordan, 73.4% of individuals had stated that they had a family history of diabetes [8]. People with genetic predisposition are known to be affected from many environmental factors and develop diabetes; therefore, the existence of familial clusters on diabetes was an expected result.

It has been shown that 53.4% of our participants have diabetes awareness. In a similar study conducted in Singapore, individuals are reported to score higher than 60% in each part of the survey [9]. Another study conducted in Pakistan reports 43% of the participants had diabetes awareness [10]. However, in a study conducted in India, it was reported that only half of the participants had heard of diabetes [11]. Diabetes awareness is closely related to the health literacy of the society in which participants live. In this regard, adequate health literacy and therefore high awareness of diabetes is observed in countries with higher education. However, individuals living in rural areas or immigrants and refugees; whose education level is subpar, quality of life is low, access to health services are more limited expectedly have a lower level of health literacy and diabetes awareness. Therefore, inconsistency in results is expected due to different community structures and said differences in population groups within the same community. The striking insufficiency of diabetes awareness in literature should urge researchers to improve and aid the efforts of raising diabetes awareness around the world.

In our study, and in a study by Caliskan et al., it was determined that the awareness of diabetes increases as the age decreases [12]. However, in another study conducted in Switzerland, it was reported that awareness of diabetes increases with age [13]. Regarding age, literature includes both studies claiming awareness of diabetes decline with age due to physical and mental limitations; and studies claiming as patients live for a longer period of time with diabetes, the psychosocial adjustments are better.

Participants with high school or lower education had lower awareness of diabetes compared to the group with university or higher education, and univariate and multivariate analyzes were

significant between the 2 groups. At the same time, it was observed in our study that single people had better diabetes awareness than married people. A research conducted in South India reports that as the education level increases, the awareness increases and the diabetes awareness of married people are higher than that of single [14]. The difference in educational status observed between studies is thought to be affected by differences in socioeconomic status dependent on the country, city and district and the effect of the novelties of the local culture thereupon. It is thought that the increase in educational status has a positive effect on both healthy behavior and health status in individuals, and diabetes awareness levels are thought to also be positively affected by the higher quality of life in the married population. In our study, the limitation in reaching single people is considered to have affected our results.

In the univariate and multivariate analyzes, it was observed that individuals with better income status had higher diabetes awareness compared to individuals with lower income status. In another study conducted in Dubai, it was shown that as the income level increases, the level of diabetes knowledge increases [15]. Since income is a factor that directly affects access to health services, quality of life and educational status; it is possible to extrapolate that higher income also raises the awareness of diabetes.

It was determined in our univariate and multivariate analyzes that the working population and students had higher diabetes awareness scores than the non-working group. In a study conducted in a primary health care institution in Jordan, it was reported that there was no significant difference between the working and non-working groups, but the diabetes awareness scores of the working population were slightly higher [16]. Higher education of students and the working group is thought to have affected this result. However, the fact that the study group is surrounded by a variety of different groups might have positively affected their opportunities on learning about diabetes.

In our participants, it was observed that the group with chronic diseases had lower scores than the group without chronic diseases. A study conducted by Selçuk and Ünal reports that the frequency of diabetes increases in individuals with concomitant chronic diseases and awareness of diabetes decreases [17]. Sedentary life, obesity, increase in tobacco and alcohol use, environmental pollution, increased stress factor with modern lifestyle, decrease in the use of salt and fruit and vegetables in nutrition, widespread consumption of ready-made foods, which are the common problems of societies, are the common etiological factors of many chronic degenerative diseases frequency of which increases on a daily basis.

In our study, it was shown that the group with BMI ≥ 25 had less awareness of diabetes. A study conducted in South Korea reports that diabetes awareness decreases in obese patients [18]. Evident by the increasing numbers of obesity worldwide, societies are moving away from healthy lifestyles. BMI increase and obesity is one of the important risk factors for many diseases such as diabetes, cardiovascular diseases, cancer and musculoskeletal diseases. The fact that obese individuals have less awareness about healthier lifestyles and decrease in diabetes awareness is also compatible with the literature. Hence, local, regional and global studies and public education on the importance of healthy nutrition and being physically active for general health are of great importance.

In our study, it was shown with the univariate and multivariate analyzes that the population with diabetes education had higher

awareness of diabetes and responded better to our diabetes-related questions. Studies have shown that providing diabetes patients with disease education improves both the level of knowledge about the disease and the outcomes of clinical tests [19, 20]. Education has an undisputed place in preventing the development of chronic diseases, complications and in diabetes self-care. It should also be noted that diabetes education rates are generally insufficient in studies conducted in the literature.

In multivariate analyzes, diabetes mellitus was found to be one of the factors affecting diabetes awareness. In logistic regression analysis used in a study conducted in Malaysia, the variable that most affected diabetes awareness was a family history of diabetes [21]. In a cross-sectional study conducted in rural China, 25% of the participants were reported to have diabetes and only 40.3% of the participants with diabetes priorly knew diabetes [22]. In a study conducted in Russia, 72.8% of diabetes patients had priorly known about their disease [23]. In our study, the awareness level of the group with diabetes being higher than the group without diabetes was expected. However, it should be noted that the desired level of diabetes knowledge and awareness in diabetes patients is yet to be reached.

Among our participants, the diabetes awareness of the group with type 1 diabetes is found to be better than those with type 2 diabetes. In a study conducted in Ireland, type 1 diabetes patients had a higher level of knowledge than type 2 diabetes patients [24]. The fact that type 1 diabetes patients are diagnosed at a younger age and grow up with the disease is thought to be a facilitating factor in education of the disease. In addition, provision of a higher quality diabetes education to Type 1 diabetics is thought to have affected their results in a positive manner and enabled type 1 patients to score higher.

In our participants, the group that pays attention to healthy nutrition is found to have better awareness of diabetes than the group that does not pay attention to their nutrition. In a study conducted on African American population in Carolina, populations that pay attention to low calorie and fruit/vegetable consumption are found to have higher awareness of diabetes risk factors [25]. Since making nutritional choices require the ability to assess chronic diseases and risk factors, higher awareness in those who pay attention is an expected result.

Univariate and multivariate analyzes also show that among our participants who had diabetes, those who followed the diet according to the limitations of their disease had higher diabetes awareness scores than the group that did not follow any diet. In a study conducted by Gun et al., 59.5% of the participants reported that they were on a diet for diabetes [26]. In the International Diabetes Education Standards guide published by the IDF (International Diabetes Federation) in 2009, it was stated that nutrition education should be provided to diabetic patients [27]. The implementation of diet and exercise program, which is the first-line treatment of diabetes, shows the orientation and awareness of the disease in individuals. Dieting in diabetes both prevents the development of complications that the disease will bring and reduces the financial losses of countries.

Going to regular diabetes check-ups is one of the main indicators of diabetes knowledge, self-management and glycemic control. Among our participants, the group who regularly went to their check-ups had higher diabetes awareness scores than the group that did not. Also, in a study conducted in Saudi Arabia, it was

reported that the group that regularly went to the doctor had higher diabetes awareness scores than the group that did not [28]. This can also be interpreted as patients with improved awareness of diabetes do not neglect their check-ups. In our study, the fact that the habit of going to check-ups may either indicate awareness of the disease or the success of health service providers.

Conclusion

As is noted in both our study and literature, there is a clear need for studies about raising diabetes awareness in our society and around the world. For the adoption of regular physical activity and healthier lifestyle in all means, more multisectoral and multidisciplinary studies that aim to increase public awareness needs to be conducted. All health institutions, wellness centers, mass media and social media should be used actively; Municipalities, governments, educational institutions and community leaders and health service providers should collaborate to increase public health knowledge and awareness of diabetes.

Limitations of the Research

- Since the surveys were conducted during work hours, reach to employed population may have been below the expected level.
- Among survey takers, there were people who left the survey unfinished or those who did not want to participate due to having applied to the selected health care facility for a short procedure.

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