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ARAŞTIRMA MAKALESİ

Investigation of Type 2 Diabetes Risk, its Symptoms and Knowledge Levels in Society

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Abstract

Background: The risk of Type 2 diabetes is increasing. **Objectives:** The study aims to identify Type 2 Diabetes risk, its symptoms and knowledge levels of the adults living in city centres. **Methods: T**he population of this descriptive study consisted of individuals living in a city centre (30 neighborhoods) in 2015, and the sample consisted of individuals living in six neighborhoods (n=1000) randomly selected from the numbers table. The data were obtained by "Personal Information Form, Diabetes Risk Diagnosis Form (DRDF), Diabetes Symptom Diagnosis Form (DSDF) and Diabetes Knowledge Level Form (DKLF)" prepared by the researchers after a literature search. **Results:** Ages of participants were 33±30, 51.3% of them were male, 35.3% of them were high school graduates and 51.6% of them were married. DRDF=18.50±2.0, DSDF=25.14±4.22 DKLF=25.28±5.68, which were below the mean score. There was a statistically significant difference between DRDF, DSDF and DKLF scores and age, gender, marital status, educational status, body mass index and waist circumference ($p<0.05$). There was a statistically significant difference between the number of meals consumed per day and the scores of DM symptoms and knowledge level ($p<.05$), however, there was no statistically significant difference between the number of meals consumed per day and the score of DM risk. It was detected that as the waist circumference of the articipants enlargened, DM risk and symptom scores increased and DM knowledge scores decreased. **Conclusion:** The risk of diabetes, the incidence of symptoms and diabetes knowledge level were low in the sample group. It is recommended that awareness training sessions and risk screenings are carried out about diabetes**.**

Key Words: Diabetes Mellitus, Knowledge, Nursing, Risk Factors, Signs and Symptoms.

Öz

Toplumda Tip 2 Diyabet Riski, Belirtileri ve Bilgi Düzeylerinin Araştırılması

Giriş: Tip 2 diyabet riski giderek artmaktadır. **Amaç:** İl merkezinde yaşayan erişkin bireylerin Tip 2 diyabet riski, belirtileri ve bilgi düzeylerinin belirlenmesi amaçlanmıştır. **Yöntem:** Tanımlayıcı nitelikte olan bu çalışmanın evrenini bir il merkezindeki (30 mahalle) 2015 yılında yaşayan bireyler, örneklemini ise rastgele sayılar tablosundan seçilmiş altı mahallede oturan bireyler (n = 1000) oluşturdu. Veriler araştırmacılar tarafından ilgili literatür taranarak hazırlanan "Kişisel Bilgi Formu, Diyabet Risk Tanılama Formu (DRTF), Diyabet Belirti Tanılama Formu (DBTF) ve Diyabet Bilgi Düzeyi Formu (DBDF)" aracılığı ile elde edildi. **Bulgular:** Yaşları 33±30 olan katılımcıların; %51.3 erkek, %35.3 lise mezunu, %51.6'sı evliydi. DRTF:18.50±2.0, DBTF:25.14±4.22 DBDF:25.28±5.68 ile ortalama puanın altında idi. DRTF, DBTF ve DBDF toplam puanı ile yaş, cinsiyet, medeni durum, eğitim durumu, beden kitle indeksi ve bel çevresi arasında istatistiksel olarak anlamlı bir farklılık vardı ($p<0.05$). Günde tüketilen öğün sayısı ile DM belirti ve bilgi düzeyi toplam puanı arasında istatistiksel olarak anlamlı bir farklılık varken, DM riski toplam puanı arasında istatistiksel olarak anlamlı bir farklılık saptanmadı ($p>0.05$). Katılımcıların bel çevresi genişledikçe DM risk ve semptom puanlarının arttığı, DM bilgi puanlarının ise düştüğü saptandı. **Sonuç:** Örneklem grubunda diyabet riski, belirtilerin görülme sıklığı ve diyabet bilgi düzeyi düşükdü. Diyabet hakkında farkındalık eğitimleri ve risk taramalarının yapılması önerilir.

Anahtar Sözcükler: Diyabetus Mellitus, Bilgi, Hemşirelik, Risk Faktörleri, Belirti ve Bulgular.

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Diabetes Mellitus (DM) is a global health problem common in all countries. It is a disease with high cost of diagnosis and treatment affecting more than 350 million people worldwide (1). Factors that increase the risk of developing Type 2 diabetes are family history of DM, age, obesity, and lack of physical activity (2). Many people are not aware that they have the risk of DM. If these individuals do not avoid risk factors such as being overweight, smoking, and physical inactivity, they may develop diabetes rapidly (3). In addition, individuals with impaired glucose tolerance or impaired fasting glucose are prone to developing diabetes activity (2). Therefore, Type 2 DM should be investigated at any age in overweight adults with one or more risk factors. In patients without risk factors, exams evaluating DM should be started at 45 years of age, and if results are normal, screening should be repeated at least every three years (4). If DM is not treated, neuropathy and angiopathy that may develop may impair the functions of cells, tissues, organs, and systems. This may cause other chronic diseases and death (1). Briefly, Type 2 diabetes is a worldwide public health problem that results from lifestyle and genetic factors. Although the pathogenesis of diabetes is uncertain, it can be prevented by lifestyle change and can also be controlled by early identification of the disease (1,5). Early diagnosis of DM risk and other existing patients is very important for the health of the individual and the economy of the country (1,5). Enhancing people's knowledge and attitudes on diabetes is important to reducing the risk factors causing diabetes. By doing so, people can develop healthy lifestyle behaviour (6).

Studies conducted with diabetic patients state that knowledge level is insufficient (7) and limited (8). A study conducted in Mongolia stated that 1/5 of the total population never heard of diabetes and 1/3 of the population did not know that diabetes can be avoided by changes in lifestyle (9). Moreover, another study stated that people had low level of knowledge on the risk factors, care, and treatment of diabetes (10) and trainings are efficient for increasing the knowledge level and quality of life (11). In a study conducted in London, it is stated that the majority of the population are informed and aware of the risk factors, symptoms and lifestyle choices regarding diabetes (12). The same study remarked that increasing the number of awareness studies on avoiding Type II DM might be beneficial due to the lack of knowledge of most participants of the study (12).

Objectives of the Research

This study was conducted to evaluate the risk of type 2 DM, DM symptoms and knowledge level of DM in individuals over 18 years of age.

Research Questions

- What is the Type 2 Diabetes risk rate of people?
- What is the knowledge level of people on Type 2 DM?
- What is the rate of Type 2 DM symptoms?
- What are the factors affecting Type 2 DM risk, its symptoms and knowledge level?

Methods

Type of Research

Descriptive type.

Sample of the Research

The population of this descriptive study consisted of individuals living in the city centre of the province of Amasya (30 neighbourhoods) in January-March 2015, and the sample consisted of individuals living in six neighbourhoods, randomly selected from random number table, who were also given preliminary information about the study (n=1244). It was targeted to reach out to %20 of the neighbourhoods. 200 subjects refused to participate in the study and 144 had previously diagnosed DM so they were excluded from the study. The study was completed with 1000 participants.

Inclusion criteria

Not having a diagnosed DM, being aged over 18 and being volunteered to participate in the study.

Exclusion criteria

Having a diagnosed DM, not being volunteered to participate in the study.

Data Collection Tools

The data were obtained by "Personal Information Form, Diabetes Risk Diagnosis Form (DRDF), Diabetes Symptom Diagnosis Form (DSDF) and Diabetes Knowledge Level Form (DKLF)" prepared by the researchers after a literature search (13-20). The forms were finalized by conferring with an instructor specialized on Turkish Language and Literature. Comprehensibility of the form questions were tested by a volunteer group of 10 people and test results of these people were not involved in the study. Form questions were found understandable according to the feedbacks.

Personal Information Form

The form includes a total of 15 questions about socio-demographic details of the participants (age, gender, marital status, educational status, social security), characteristics about DM and chronic diseases (presence of diabetes, treatment method of diabetes, doctor's status of recommending a special diet, body mass index (BMI) (calculated based on the height and weight stated by the participants), waist circumference (measured by researchers), serum glucose, how often the participant has his/her cholesterol level measured, dietary routine).

Diabetes Risk Diagnosis Form (DRDF)

The form includes a total of 14 questions about the participants' risk of developing DM (smoking, hypertension, heart disease, stroke, status of receiving treatment for cancer, high level of blood glucose, being told that s/he has latent diabetes, giving birth to a child weighing more than 4 kg in the case of pregnancy and being diagnosed with gestational diabetes and status of doing exercise). In the form, yes = 2 points, no = 1 point. In the form, only the status of doing exercise is scored reversely, as yes = 1 point, no = 2 points. The minimum (min) and maximum (max) scores that can

be obtained from the form are 14 and 28 points, respectively. The higher the score, the higher the risk. The Cronbach alpha value of the questionnaire in our study was determined as .61.

Diabetes Symptom Diagnosis Form (DSDF)

The form includes a total of 19 questions about DM symptoms (dry mouth, drinking too much water, frequent urination, nocturnal urination, constant need to eat, feeling uncomfortable when the time between meals is extended, weakness, fatigue, sudden loss of vision, delay in wound healing, having frequent genital infection, etc.). In the form, yes = 2 points, no = 1 point. There is no question that is reversely scored in the form. The minimum (min) and maximum (max) scores that can be obtained from the form are 19 and 38 points, respectively. The higher the score, the higher the incidence of symptoms. The Cronbach alpha value of the questionnaire in our study was determined as .83.

Diabetes Knowledge Level Form (DKLF)

There are a total of 18 questions in the form that measure the participants' level of knowledge about DM. Yes= 2 points, no= 1 point. The minimum (min) and maximum (max) scores that can be obtained from the form are 18 and 36 points, respectively. The higher the score, the higher the level of knowledge. The Cronbach alpha value of the questionnaire in our study was determined as .92 (highly reliable).

Variables of the Study

Dependent Variable: Diabetes Risk Diagnosis Form, Diabetes Symptom Diagnosis Form, Diabetes Knowledge Level Form.

Independent Variable: Age, gender, mariatal status, educational status, BMI, waist circumference, number of daily consumed meal.

Data Analysis

The study data were transferred to SPSS 20 software package and analyzed using mean, percentage calculation, Kruskal Wallis-H and Mann Whitney U test. $p < .05$ was accepted to be statistically significant. Difference between groups were identified by post-hoc test.

Ethical Considerations

This work Ethical approval was obtained from the Ethics Committee of a university for this study (30640013-044-90/28/01/2015 and ethics committee approval for authors' addition from Amasya University Clinical Studies Ethical Boards 15386878-044-06/01/2020-493).

Results

Demographic Characteristics of Participants

The subjects were aged 33±30 years, 51.3% of the subjects were male, 35.3% were high school graduates, 51.6% were married and 38.9% had DM in the family. 55.7% of the participants did not have their cholesterol measured and 48.8% did not have their glucose measured, and 45.2% had a BMI value above 25 (Table 1).

Table 1. Demographic Characteristics of Participants (n = 1000)

Characteristics		n	%
Age Group	18-29	487	48.7
	30-39	196	19.6
	40-49	157	15.7
	50-59	74	7.4
	60+	86	8.6
Gender	Male	513	51.3
	Female	487	48.7
Marital status	Married	516	51.6
	Single	484	48.4
Educational Status	Literate/illiterate	66	6.6
	Elementary/secondary school	255	25.5
	High school and equivalent	353	35.3
	University and higher education	326	32.6
Social Security	Yes	897	89.7
	No	103	10.3
The Fact that the Doctor Recommends a Special Diet	Yes	215	21.5
	No	785	78.5
Body Mass Index*	24 and less	548	54.8
	25 and over (more)	452	45.2
Waist Circumference**	Lower than 88	327	32.7
	88 and higher	166	16.6
	Lower than 102	317	31.7
	102 and higher	190	19
Frequency of Having Blood Glucose Check	I have never had it measured	488	48.8
	Less than once a year	88	8.8
	Once a year	171	17.1
	More than once a year	253	25.3
Frequency of Having Cholesterol Measured	I have never had it measured	557	55.7
	Less than once a year	78	7.8
	Once a year	143	14.3
	More than once a year	222	22.2

*BMI (18), ** Waist Circumference (19).

Distribution of Scores of the Participants from Diabetes Risk Diagnosis Form (DRDF), Diabetes Symptom Diagnosis Form (DSDF) and Diabetes Knowledge Level Form (DKLF)

DRDF=18.50±2.0, DSDF=25.14±4.22 DKLF=25.28±5.68, which were below the mean score. DM risk, symptom and knowledge level scores of the participants were below average.

Factors Affecting the Participants' Diabetes Risk Diagnosis Form (DRDF) Scores

A statistically significant difference was identified between DM risk score and age (p=.000), gender (p=.000), marital status (p=.000), educational status (p=.000), BMI (p=.000) and waist circumference (males' DRDF p=.062, females' DRDF p=.000) (p<.05) (Table 2).

Factors Affecting the Participants' Diabetes Symptom Diagnosis Form (DSDF) Scores

A statistically significant difference was identified between DM symptom score and age (p=.000), gender (p=.001), marital status (p=.000), educational status (p=.000), BMI (p=.000) and waist circumference (males' DSDF p=.041, females' DSDF p=.000) (p<.05) (Table 2).

Factors Affecting the Participants' Diabetes Knowledge Level Form (DKLF) Scores

A statistically significant difference was identified between DM risk score and age (p=.002), gender (p=.000), marital status (p=.007), educational status (p=.000), BMI (p=.017) and waist circumference (males' DKLF p=.000) (p<.05) (Table 2).

As the age, BMI and number of meals consumed per day of the participants increased DM risk and DM symptom score increased. Females and those married had higher DM risk scores and DM symptom scores. As the level of education of the participants increased, DM risk and DM symptom score decreased (Table 2). There was a statistically significant difference between the number of meals consumed per day and the scores of DM symptoms (p=.000) and knowledge level (p=.011) (p<.05), however, there was no statistically significant difference (p >.05) between the number of meals consumed per day and the score of DM risk (p=.270) (Table 2).

In males, as the waist circumference increased, the DM risk and DM symptom scores were higher, and as DM knowledge level increased, the waist circumference was below 102. In females, DM risk and symptom score of those with a waist circumference of 88 and higher had lower DM knowledge score (Table 2).

Table 2. Diabetes Risk Diagnosis Form, Diabetes Symptom Diagnosis Form, Diabetes Knowledge Level Form Score and Affecting Factors (n = 1000)

		*DRDF Score		**DSDF Skor		***DKLF Score	
		n	**Mean ± SS**	**n**	**Mean ± SS**	**n**	**Mean ± SS**
Age Group	1=18 - 29	487	17.83 ± 1.76	487	24.27 ± 3.70	487	25.68±5.71
	2=30 - 39	196	18.75 ± 1.84	196	25.21 ± 4.21	196	24.19±5.19
	3=40 - 49	157	19.03 ± 1.91	157	25.89 ± 4.38	157	24.87±5.46
	4=50 - 59	74	19.82 ± 2.12	74	26.95 ± 4.71	74	24.43±5.56
	5=60 +	86	19.63 ± 2.27	86	27 ± 4.86	86	27.02±6.49
			****H=147. 838 **p=0.000** 1-2 2-4 1-3 2-5 1-4 3-4 1-5		****H= 48.224 **p=0.000** 1-3 2-4 1-4 2-5 1-5		****H= 16.941 **p=0.002** 1-2 2-5 3-5 4-5
Educational Status	1=Literate/illiterate	66	19.7 ± 2.02	66	27.21 ± 5.40	66	29.34±6.16
	2=Elementary/secondary school	255	19.10 ± 1.88	255	26.29 ± 4.48	255	25.5±5.59
	3=High school and equivalent	353	18.13 ± 1.98	353	24.67 ± 3.92	353	26.01±5.64
	4=University and higher education	326	18.18 ± 1.91	326	24.34 ± 3.70	326	23.50±5.06
			****H=87. 670 **p= 0.000** 1-4 2-4		****H= 40.702 **p=0.000** 1-4 2-4		****H= 66.743 **p=0.000** 1-3 3-4 1-4
Number of Daily Consumed Meal	1=Less than 3 meals	126	18.52 ± 1.98	126	25.14 ± 3.85	126	25.03±5.33
	2=3 meals	623	18.48 ± 2.01	623	24.62 ± 3.96	623	25.67±5.79
	3=4 - 5 meals	213	18.64 ± 2.04	213	26.19 ± 4.66	213	24.68±5.44
	4=6 meals and over (more)	38	18±1.78	38	27.78 ± 4.94	38	23.23±5.65
			****H=3. 926 p=0.270		****H=29.951 **p= 0.000** 1-4 2-3 2-4		****H= 11.162 **p= 0.011**
Gender	Male	513	18.22 ± 1.88	513	24.86 ± 4.34	513	26.22±5.80
	Female	487	18.80 ± 2.09	487	25.44 ± 4.06	487	24.30±5.39
			*****U=103745 **p=0. 000**		*****U=110265 **p=0.001**		*****U=100759 **p= 0.000**
Mariatal Status	Married	516	19.16 ± 2	516	25.71 ± 4.58	516	24.85±5.64
	Single	484	17.80 ± 1.76	484	24.54 ± 3.70	484	25.75±5.69
			*****U=71333 **p=0. 000**		*****U=108328 **p=0. 000**		*****U=112576 **p= 0. 007**

Table 2. Diabetes Risk Diagnosis Form, Diabetes Symptom Diagnosis Form, Diabetes Knowledge Level Form Score and Affecting Factors (n = 1000) (continue)

		*DRDF Score		**DSDF Skor		***DKLF Score	
		n	**Mean ± SS**	**n**	**Mean ± SS**	**n**	**Mean ± SS**
Body-Mass Index	24 and less	548	18.10 ± 1.94	548	24.66 ± 4.01	548	25.67±5.73
	25 and over (more)	452	18.99 ± 1.98	452	25.73 ± 4.38	452	24.81±5.59
		U****=89102 **p= 0. 000**		U****=106598 **p=0. 000**		U****=112981 **p=0.017**	
		*DRDF Score		**DSDF Skor		***DKLF Score	
	Male	**n**	**Mean ± SS**	**n**	**Mean ± SS**	**n**	**Mean ± SS**
Waist Circumference	102 less	323	18.10 ± 1.79	323	24.61 ± 4.38	323	27.04 ± 5.85
	102 and over	190	18.41 ± 2.01	190	25.27 ± 4.25	190	24.82 ± 5.44
		*****U= 27715 p=0.062		*****U=27379 **p=0.041**		*****U=23992 **p=0.000**	
	Female						
	88 less	323	18.32 ± 2.01	323	24.98 ± 3.97	323	24.50 ± 5.44
	88 and over	164	19.75 ± 1.89	164	26.36 ± 4.09	164	23.90 ± 5.28
		*****U= 15011 **p=0.000**		*****U= 21134 **p=0.000**		*****U= 24681 p=0.217	

*DRDF= Diabetes Risk Diagnosis Form,**Diabetes Symptom Diagnosis Form, ***Diabetes Knowledge Level Form Score,****H= Kruskall-Wallis H testi, *****U= Mann-Whitney U testi

Discussion

TURDEP II study states that, prevalence of Type 2 DM increased by 90% and the prevalence of obesity has increased by 40% in Turkey, compared to the TURDEP I conducted 12 years ago (20). Therefore, it is important to carry out studies to identify the knowledge level, attitudes, and risk factors of the people for diabetes and organize trainings to inform the society.

In our study, the participants' DKLF scores were below average. A study conducted with people with Type 2 Diabetes stated that patients with diabetes had a average level of knowledge on diabetes (21). This may suggest that information provided on diabetes is insufficient in all segments of society. In our study, females had higher DM risk scores and DM symptom scores. This may be associated with pregnancy, women's low level of participation in workforce, sedentary life, and the impact of women's social environment on dietary habits in Turkish society. Our findings are consistent with previous results reported in the literature (22, 23). However, some studies reported higher Type 2 DM risk for males (4, 24, 25). In our study, knowledge level of males was high. Gillani et al (2018) stated that males have high knowledge level and awareness of DM which might be caused by their high level of education (10). Kayyali et al. (2019) stated that females had higher rates on knowing the symptoms of Type II DM, compared to males (12).

In our study, the participants' DM risk, symptoms and knowledge level scores increased with increasing age. This can be attributed to decreasing physical activity with increasing age and the emergence of other chronic diseases. Increased DM knowledge level may result from emergence of DM symptoms, encountering patients with similar conditions and increased level of awareness. Our results are similar to those reported in the literature (23, 26). Similarly, to our results, a Type 2 DM prevalence study conducted with 3073 adults aged over 18 states that DM prevalence increases as age increases (27). It is reported that every one-year increase in age in individuals over 40 causes a 2% increase in the risk of diabetes or diabetes (28). In patients with Type 2 diabetes, the disease is usually asymptomatic so and screening for diabetes is recommended in individuals aged 45 years and older (29). Gillani et al (2018) stated that knowledge level increases by age, therefore, studies to increase the knowledge level of the younger population should be conducted (10). In addition, a relationship between BMI and DM was found in a study which investigates Type 2 DM and its risk factors (30). Therefore, we think that the age factor is important for DM risk.

In our study, those married had higher DM risk and DM symptom scores, compared to those single. This can be attributed to the fact that married couples have affected each other in terms of diet, and that efforts to avoid pregnancy and preserve body image are reduced. In the literature, there are studies that identified a relationship between DM risk and marital status (31, 32), whereas there are also studies which did not find any significant relationship (23).

In our study, participants' DM risk scores and DM symptom scores significantly decreased with increasing educational status. This result suggests that education status is effective in an individual's developing a healthy lifestyle, being able to use healthcare services and having increased level of awareness. Those with a high educational status and a high level of income are reported to have a lower risk of Type 2 DM (33), and low rates of obesity (34). DM-related mortality is related to educational status (35). In literature, it is stated that no significant relationship is present between education level and diabetes risk and symptom scores (12).

In our study, those with a BMI and waist circumference above normal had high diabetes risk and symptom scores. Increased BMI and waist circumference increase the risk of developing DM (26-28,33,36).

Limitations

The study was limited to the year it was conducted and its sample group. Measurement tools used for evaluations were used by only performing Cronbach's alpha internal consistency analysis. BMI was taken as stated by the participant.

Use of Results in Practice

The risk of DM, the incidence of DM symptoms and DM knowledge level were below average in the sample group. DM risk and the incidence of DM symptoms increase with increasing age. Moreover, DM incidence risk and symptoms decrease with increasing DM knowledge level so it is recommended that awareness training and risk screening for DM should be performed so that individuals adopt a healthy lifestyle behavior. It is recommended to give the awareness trainings via social media, non-governmental organizations, and universities, investigate the reasons of the low knowledge level of the society on diabetes and consider these reasons and the society's needs during the trainings.

Information

Study concept/Design: ET, ÖÇ; Data collection/Data processing: EE,CŞ,ME,TK,NÖ,HB; Data analysis and interpretation: ET, GB; Manuscript draft: ET,GB; Critical review of the content: ET,GB,ÖÇ. This work Ethical approval was obtained from the Ethics Committee of a university for this study (30640013-044-90/28/01/2015 and ethics committee approval for authors' addition from Amasya University Clinical Studies Ethical Boards 15386878-044-06/01/2020-493). There is no conflict of interest declared by the authors. The authors declared no financial support

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