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Determining Diabetes Risk and Health Literacy Levels in Individuals Aged 45 and Above: A Descriptive Correlational Study

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ABSTRACT

Purpose: The aim of this study is to determine actual and perceived diabetes risk in individuals aged ≥45 and their health literacy levels.

Methods and Materials: The study is of descriptive, correlational design and was conducted with 82 university staff members of ages ≥45 years. Along with Finnish Diabetes Risk Score (FINDRISC), was used to collect data of the question, "Please comment on your diabetes risk?" and the Health Literacy Scale for Turkey (HLST-32).

Results: About of twenty-six percent for the participants exhibited a high/very high actual diabetes mellitus risk. A positive and significant correlation was found between the participants' actual and perceived risk of diabetes mellitus ($r=0.771$, $p<0.001$). Seventy-two percent of the individuals displayed inadequate, problematic/limited levels of health literacy. There was no significant correlation between actual and perceived diabetes mellitus risk and health literacy scores.

Conclusion: Individuals are aware that they are at risk of developing diabetes mellitus. About three out of every four participants had a low health literacy level. The fact that a more educated group such as university personnel demonstrated low health literacy compared to the general public is an issue that must be addressed.

Keywords: Diabetes mellitus, actual risk, perceived risk, health literacy, university staff

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45 Yaş ve Üzeri Bireylerin Diyabet Riski İle Sağlık Okuryazarlık Düzeylerinin Belirlenmesi: Tanımlayıcı, İlişki Arayıcı Bir Çalışma

ÖZET

Amaç: Bu çalışmada, riskli grupta yer alan ≥45 yaş bireylerin gerçek ve algıladıkları diyabetes mellitus riskleri ile sağlık okuryazarlık düzeylerinin belirlenmesi amaçlanmıştır.

Yöntem: Tanımlayıcı, ilişki arayıcı tipteki çalışmaya, ≥45 yaşında, üniversite personeli olan 82 kişi dahil edilmiştir. Veriler, Finlandiya Tip-2 Diyabet Risk Anketi (FINDRISK), "diyabet riskinizi yorumlayınız" şeklindeki soru ve Türkiye Sağlık Okuryazarlığı Ölçeği (TSOY-32) ile toplanmıştır.

Bulgular: Bireylerin yaklaşık %26'sının gerçek diyabetes mellitus riski yüksek-çok yüksek düzeydedir. Katılımcıların gerçek ve algıladıkları diyabetes mellitus riski arasında pozitif yönde anlamlı bir ilişki varlığı saptanmıştır ($r=0.771$, $p<0.001$). Bireylerin %72'sinin sağlık okuryazarlık düzeyi yetersiz, sorunlu-sınırlı düzeydedir. Sağlık okuryazarlık düzeyi puanının gerçek ve algılanan diyabetes mellitus riski ile anlamlı düzeyde ilişkisi bulunmamaktadır

Sonuç: Bireyler diyabetes mellitus risklerinin farkındadır. Her dört katılımcıdan yaklaşık üçünün sağlık okuryazarlığı düşük düzeydedir. Genel topluma göre daha eğitimli bir grupta olan üniversite çalışanlarının sağlık okuryazarlıklarının düşük olması ele alınması gereken bir konudur.

Anahtar Kelimeler: Diyabetes mellitus, gerçek risk, algılanan risk, sağlık okuryazarlığı, üniversite personeli

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The period between registering normal glucose metabolism and unmistakable diabetes mellitus (DM) is known as the "prediabetic period" and evolves into unmistakable Type 2 DM in 5%-10% of individuals (1,2). In 2020, one out of every three Americans is a prediabetic. More importantly, eight out of every ten adults are unaware that they are prediabetic (3). According to the data of the World Health Organization (WHO), 1.5 million people lost their lives to diabetes in 2019. Almost half of these deaths (48%) were individuals under the age of 70. WHO data reveals that the rate of premature mortality increased by 5% over the period 2000-2016. WHO stresses that a healthy diet, physical activity, the use of medications, and regular screening are important interventions in the prevention of diabetes onset (4). According to the 2019 data of the International Diabetes Federation (IDF), Turkey's diabetes prevalence rate of 11.1% is the highest in the world (5). The "Turkish Diabetes Epidemiology Project (TURDEP-II-2010)" reports a frequency of 28.7% for prediabetes in Turkey (1). Compared with TURDEP-I, it can be seen that in the 12 years that have elapsed, Turkey prediabetes prevalence has soared by 106% (6).

It is reported that individuals with DM are not aware of their condition and do not know the risks of the illness (3). Health education can be provided to raise levels of awareness in this context (7). Screening should be carried out to determine levels of risk in this group such that individuals are checked for fasting blood glucose, administered an Oral Glucose Tolerance Test (OGTT) and measured for A1C (8). The Turkish Endocrinology and Metabolism Association (TEMA, 2020) (9) recommends the use of the FINDRISC (Finnish Diabetes Risk Calculator) in screening groups at risk of DM. The advice is to achieve the screening of groups at risk as a priority, taking initiatives to reduce these individuals' level of risk in an effort to fully protect against the development of chronic forms of the disease (9).

The steady advances made in informatics technologies brings with it the ensuing modernization of health services and also the need to improve the health literacy (HL) of individuals seeking these services (10). In order to benefit from health services, individuals must be familiar with many digital applications that enable them to get a doctor's appointment, schedule an examination, procure the prescribed medications, all of which fall into the realm of HL (11). HL will guide individuals in their decisions and behaviors regarding healthcare and community health, provide them with basic knowledge about health and healthcare services, help them access, understand and make use of the information they need (12). HL serves to facilitate individual efforts to make decisions about their health in daily life, raise the quality of their lives, improve their health and prevent the onset of disease (12,13).

The "Health Literacy Levels in Turkey and Related Factors Survey (2019)" (13) conducted by the Ministry of Health, Health Improvement General Directorate (HIGD) has found that 7 out of every 10 individuals in Turkey have a low level of HL. It is seen in the literature that an adequate level of HL improves health-promoting behavior as well as health data (e.g., blood glucose levels), thus reducing the prevalence of chronic illness and the risk of developing disease (15,16).

HL is indirectly related to DM risk through the changes that are advised to pursue a healthy lifestyle. At the same time, a low level of HL points to negative health indicators (15). Inadequate HL prevents individuals from accessing accurate health information, leads them into neglecting to engage in risk control and causes their condition to worsen (17). ADA (2020) (8), classifies the 45-and-over age group as a risk group for DM. Determining the groups at risk and defining prevention strategies is an ongoing project in the fight against DM throughout the world. The aim of this study was to determine the actual and perceived DM risks of individuals of 45 and over, as well as their HL levels.

MATERIAL AND METHODS

Study Design

This is a descriptive, correlational study.

Sample

The population of the study comprised 240 individuals, ages 45 and over, who were staff personnel at a state university as of 2020. Sample size, as calculated in this known population, was found to be 147. The sample group was made up of individuals volunteering to participate in the study over the period July 2020-May 2021. Since the data collection phase of the study coincided with the COVID-19 pandemic, the targeted sample size could not be reached, and the research was carried out with 82 (55.7%) individuals.

Inclusion criteria for the study were: Being of age 45 and over and a part of the academic and administrative staff at the state university where the study was conducted, not being pregnant or having any malignant condition, not having a problem with hearing or sight, having at least

an elementary school education, being fluent in spoken Turkish, and consenting to participate in the study. The data of the study were collected from the participants by means of an electronic link to a questionnaire sent out through the state university's email network.

Data Collection

Descriptive Characteristics Data Collection Form

This is a form that queries the individual characteristics of the participants. Created by the authors, the form consists of questions about gender, type of personnel and smoking-drinking habits.

The FINDRISC Questionnaire

The Finnish Type-2 Diabetes Risk Score (FINDRISC) instrument was used to determine the participants' risk of developing DM. TEMA recommends the use of FINDRISC in DM screenings (6,9). FINDRISC was developed in 1987 by Lindström and Tuomilehto (18) for the purpose of determining people at risk for Type-2 DM. The validity of the measure was the subject of a cohort study in 1992 (18). The Turkish validity and reliability study for FINDRISC was produced by Etbaş Demirağ (19) in 2016.

FINDRISC consists of eight questions (age, body mass index-BMI, waist circumference, exercising, consumption of fruit and vegetables, hypertension, pre-pregnancy blood glucose level and family history of DM). Possible FINDRISC scores are "0-26" (18). Risk levels are classified as follows (Table 1)

Table 1: FINDRISC Diabetes Mellitus Risk Classification (4)

Diabetes Risk Score		
Total Score	**Risk Degree**	**10 Year Risk**
<7	Low	%1(1/100)
7-11	Slight	%4(1/25)
12-14	Moderate	%16(1/6)
15-20	High	%33(1/3)
>20	Very High	%50(1/2)

Perceived Diabetes Risk

The perceived DM risk of the individuals was noted by means of the item, "Please comment on your DM risk." The participants were asked to define their perceived risk of DM by selecting a response from the choices of low, slight, moderate, high and very high risk.

The Health Literacy Scale for Turkey (HLST-32)

Developed by the European Health Literacy Survey Consortium, HLST-32 was designed to be used to assess HL in literate individuals of the ages of 15 and over (20). The Turkish adaptation of the scale was created by Okyay and Abacıgil (21) (2016). Cronbach's alpha internal consistency coefficient was found to be 0.92 (21). Cronbach's alpha for the overall scale in the study sample was 0.94.

Each item in the 32-item HLST-32 was rated on a 4-point scale of 1=Very easy, 2=Easy, 3=Difficult, 4=Very difficult. A response of "I don't know" is coded as 5. The responses were reversely scored in the calculation of the total score. For ease of calculation, the formula "Index=(arithmetic mean-1)x[50/3]" was used for standardization such that the total score would be in the range of 0-50. The scores for the level of HL are evaluated in four categories: 0-25: inadequate, >25-33: problematic-limited, >33-42: adequate, and >42-50: excellent (21).

Statistical Analysis

Data was analysed with the licensed SPSS (Statical Package for the Social Sciences) 23.0 software. The distribution of FINDRISC and HL levels was assessed with frequency analysis. Skewness and kurtosis coefficients were evaluated to see whether the data displayed normal distribution; it was seen that the continuous data (HL scores) did display normal distribution. The correlations between variables was examined with Pearson's correlation analysis. A post hoc calculation of power was calculated in the G*Power program. The calculation of the power of the study was performed at a confidence level of 95% and a level of significance of 0.05. The power of the post hoc r test was found to be 86%. Since this value was 0.80 or over, this indicated that the power of the test was good and sensitivity was high (22).

RESULTS

An examination of the study participants' sociodemographic characteristics showed that their mean age was 51.34±4.49 and 75.6% were between the ages 45-54. Men comprised 79.3% of the participants and 59.7% of the group were working as administrative personnel (Table 2).

A review of the variable DM risk factors revealed that 25.7% of the participants were obese according to the BMI, the weight circumference of 36.6% was >88 cm, 19.7% were physically inactive, 30.4% smoked, 4.9% drank and 19.5% had hypertension (Table 2). A review of the invariable DM risk factors indicated that 41.4% of the participants had a history of DM/prediabetes in the family (Table 2).

Table 2: Demographic Characteristics of the Participants				
Variables		**Groups**	**(n=82)**	**%**
Age	**Mean±SD**	45-54	62	75.6
		55-64	19	23.1
	51.34±4.49	>64	1	1.30
Gender		Male	65	79.3
		Female	17	20.7
Personal		Academic professionals	33	40.3
		Non-academic professionals	49	59.7
BMI		<25 kg/m2	19	23.1
		25-30 kg/m2	42	51.2
		>30 kg/m2	21	25.7
Waist circumference		Less than 94 cm (male) or 80 cm (female)	21	25.6
		94-102 cm (male) or 80-88cm (female)	31	37.8
		More than 102 cm (male) or more than 88 cm (female)	30	36.6
HT		Yes	16	19.5
		No	66	80.5
Direct family history with DM, preDM		Yes	34	41.4
		No	48	58.6
Physical Activity		≥30 minutes everyday	46	56.0
		<30 minutes everyday	20	24.3
		İnactive	16	19.7
Cigarette smokers		Yes	25	30.4
		No	57	69.6
Alcohol consumption		Yes	4	4.90
		No	78	95.1

BMI: Body mass index; HT: Hypertension; DM: Diabetes mellitus; PreDM; Prediabetes

The actual and perceived DM risk and HL levels of the individuals in the study were reviewed. Accordingly, the FINDRISC questionnaire revealed a high risk of DM in 20.7% and a very high risk in 5.1% of the participants. The perceived DM risk was high in 15.9% and very high in 3.6%. In 72% of the individuals, it was seen that their HL were at the inadequate-problematic/limited level (Table 3).

Table 3: Actual-Perceived Diabetes Risks and Health Literacy Levels of the Participants					
Variables		**Classification**		**(n=82)**	**%**
Actual DM Risk		Low	Risk	14	17.0
		Slight		32	39.0
		Moderate		15	18.2
		High		17	20.7
		Very High		4	5.10
Perceived DM Risk		Low		32	39.0
		Slight		21	25.6
		Moderate		13	15.9
		High		13	15.9
		Very High		3	3.60
Health Literacy Score	**Mean±SD**	Inadequate		18	22.0
		Problematic-limited		41	50.0
	31.39±9.19	Adequate		12	14.6
		Excellent		11	13.4

DM: Diabetes mellitus.

A positive and significant correlation was found between actual and perceived DM risk (r:0.77, p<0.001). There was no significant correlation between actual and perceived DM risk and HL scores (Table 4).

Table 4: Correlation for the Relationship between Health Literacy Levels and Actual Perceived Diabetes Risks of the Participants				
Variables		**Actual DM Risk**	**Perceived DM Risk**	**Health Literacy**
Actual DM Risk	r	1	0.771*	0.105
	p		<.001	0.350
Perceived DM Risk	r		1	0.091
	p			0.417
Health Literacy Score	r			1
	p			

**r=0.60-0.79; DM: Diabetes mellitus*

DISCUSSION

When the factors affecting DM risk were examined, it was found that 51.2% of the participants were at risk of obesity, 25.7% were obese according to the BMI, the waist circumference of 74.4% placed them in the risk interval (>80 cm), 19.5% had hypertension, and 19.7% led inactive lives.

The authors of a cross-sectional study conducted in the US reported that 90% of their participants were extremely overweight or obese and 50.6% had hypertension, asserting that these factors could be associated with DM risk (23). In another study examining DM risk and impacting factors among Korean immigrants, it was shown that 21.3% of the individuals were slightly overweight while 55.3% were obese according to the BMI, and it was suggested that these factors could be associated with the DM risk (15). The review of the DM risk factors examined in this study produced lower rates that in similar studies with adults in the literature, but it was seen that obesity was the most significant risk factor.

Among the study participants, 25.8% were at a high-very high risk of DM; 19.6% perceived their DM risk to be high-very high. The additional correlation analysis performed revealed a positive and significant correlation between actual and perceived DM risk (r:0.77, p<0.001). It can therefore be said that the participants correctly assessed their DM risk. A study in China that looked into the actual and perceived DM risks of mothers, their were at low risk for DM (90%), and that the majority (88.7%) again perceived their DM risk to be low (24). In another study conducted in the US, one-third of individuals with high DM risk (about 40%) perceived themselves to be at "no risk" of DM and exhibited "false optimism" in this context (25). It should not be forgotten that perceiving one's risk to be lower than it actually is (false optimism) may be the biggest barrier to reducing individual risks. In fact, individuals who are aware of their existing risks may make an effort to affect a change or adopt a lifestyle conducive to change, such as increasing their level of engaging in physical activity.

It was found in the study that a large majority of the participants (72%) were at an inadequate and problematic/limited HL level. These results are consistent with various other studies in the literature that state that approximately 65% of Turkey's population are at a problematic or inadequate HL level (26). In another study in which the same measuring tool was utilized, it was reported that 70% of the study participants displayed inadequate, problematic/limited HL levels (27). In Brazil, researchers have reported that 56.5% of individuals aged ≥60 exhibit inadequate-problematic HL levels. The same research states that individuals with an adequate level of HL have better health outcomes (28). In a study conducted in Kuwait, it was found that 64% of individuals displayed inadequate, problematic/limited HL (29). In other studies conducted similarly, it is emphasized that 81.5%-90.8% of individuals display inadequate, problematic/limited levels of HL (21,30).

In this study, no significant correlation was found between the level of HL and actual and perceived DM risk. The literature points to a directly proportional correlation between HL and DM. In a study carried out in Indonesia, revealed a significant correlation between the level of HL and DM risk (31). Another study reporting similar results showed that inadequate or low HL levels were associated with DM risk, and that individuals with high DM risk were more likely to display a low HL level. The most important reason for this, it is asserted, is the lack of sufficient knowledge about DM as part of HL and by the same token, the failure to make behavioral changes (32). The participants' actual and perceived DM risks in this study, their awareness about this matter can to some extent be taken to mean that their HL concerning the risk of DM was at a good level.

CONCLUSION

It was seen in this study that there is a directly proportionate and consistent relationship between actual and perceived DM risk and that there is no correlation between HL and actual and perceived DM risk. It can be said that the participants had a correct perception of their risk for DM and in this context, they were at an advantage in terms of making healthy changes in their behaviors. It was noted that in the study group, approximately 74.4% of the sample were at risk in terms of the DM risk factors of BMI and waist circumference. Instead of probing into general HL in this context, future studies should be devoted to measuring HL as it relates to the risk of DM.

Limitations

It is considered a limitation that health history of participants was taken into consideration according to participants' own statements.

DECLARATIONS

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Disclosure of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethics Committee Approval

This study was approved by Ethics committee of Amasya University Clinical Research Ethics Committee (Approval No: E.12759 dated 29/06/2020). Online informed consent was obtained from the participants who agreed to take part in the study. This study was conducted following the guidelines for Good Clinical Practice of the World Medical Association (WMA), the Declaration of Helsinki.

Author Contributions

Concept – İ.T., S.G.; Design – İ.T., S.G.; Supervision – S.G.; Resources – İ.T., S.G.; Materials – İ.T., S.G.; Data Collection and Processing - İ.T., S.G.; Analysis and/or Interpretation – İ.T., S.G.; Literature Review – İ.T., S.G.; Writing – İ.T., S.G.; Critical Review - S.G.

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