ORIGINAL ARTICLE

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Determination of the Technology Use Status and Attitudes Towards Technology of Patients with Type 2 Diabetes

Ⓘ Nurten Terkeş[1], Ⓘ Ferya Çelik[2], Ⓘ Hicran Bektaş[2]

[1]Department of Internal Medicine Nursing, Mehmet Akif Ersoy University, Bucak Health School, Burdur, Turkey
[2]Department of Internal Medicine Nursing, Akdeniz University Faculty of Nursing, Antalya, Turkey

Abstract

BACKGROUND/AIMS: The aim of this study was to determine the technology use status and attitudes of those patients with type 2 diabetes towards technology.

MATERIALS AND METHODS: The the Strengthening the Reporting of Observational Studies in Epidemiology checklist was used in this descriptive study. This research was carried out on 250 patients diagnosed with type 2 diabetes at a university hospital. The Personal Information form, questions to determine technology use status and the Attitudes Toward Technology Scale were used as the research tools.

RESULTS: According to the results of this study, the patients had a mean age 58.49±1.03 years and included predominately patients who were female (66%), married (93.2%), housewives (48.4%), and who had only completed their primary education (45.6%). It was determined that 34.8% of them used the internet to access health-related information, 43.7% used the internet to learn about their disease and 33.5% used the internet to find out about treatment methods. Among those patients who used the internet to access health-information, 83.9% wanted to receive education and consultation via distance learning tools, and 40.2% did not know whether education and consultation via distance learning tools could solve health problems. The mean score of the Attitude Toward Technology Scale was 47.73±1.11. There was a statistically significant difference between the attitude towards technology scores and age, educational status, occupational status, employment status, and those who used the internet to access health-related information (p<0.05).

CONCLUSION: Patients with type 2 diabetes have positive attitudes towards technology. Patients with type 2 diabetes who are younger, have higher education, those who are retired, self-employed or unemployed, and those who use the internet to access health-related information have better attitudes towards technology use. Most patients wanted to receive distance learning tools. Especially when the Coronavirus disease-19 pandemic conditions were present, the use of remote education tools are specifically important. It is recommended to plan individual nursing interventions and use interactive training methods remotely in patients with type 2 diabetes.

Keywords: Nursing, technology, attitude, type 2 diabetes

INTRODUCTION

Diabetes mellitus is a complex, chronic illness requiring continuous medical care with multifactorial risk-reduction strategies beyond glycemic control.[1] According to the International Diabetes Federation, the number of patients throughout the world with diabetes was 425 million in 2017, and it is estimated that this figure may reach 629 million by 2045. In the world, diabetes accounts for 14.5% of the causes of death of individuals in the age group of 20-79.[2] According to the results of the Turkish Diabetes Epidemiology Study-I and II, the prevalence of diabetes increased from 7.2% to 13.7% in the Turkish adult population within the 12-years between 1998-2010.[3] Type 2 diabetes is

ORCID IDs of the authors: N.T. 0000-0002-1644-8382; F.Ç. 0000-0002-2473-192X; H.B. 0000-0002-3356-3120.

Address for Correspondence: Nurten Terkeş
E-mail: nurtenterkes@gmail.com
ORCID ID: orcid.org/0000-0002-1644-8382

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associated with insulin resistance and has a greater prevalence in adult and elderly patients.[4] It is emphasized that it is required for patients with diabetes to manage their diseases through diabetes education in order for the patients to have a healthy and productive life and for complications to be prevented or delayed.[5] Despite the development of versatile diabetes management programs in most developed countries, many patients remain at increased risk of developing macrovascular and microvascular complications.[6]

Continuous development of tele-medical technologies opens up new opportunities to reach patients suffering from diabetes. Moreover, it has the potential to provide better, uninterrupted medical care, which could result in improved treatment outcomes.[7] The development of such technology allows patients to have continuous access to health-related information. The utilization of technology in diabetes will allow us to extend access to professional care and integrate diabetes surveillance into the patient's total healthcare.[8] The study results of Ramasamy et al.[9] showed that the majority of individuals had access to one or more types of technology for communication. Also, several experimental studies have revealed that remote information access approaches have come up with positive results in blood glucose control and have decreased diabetes complications in long-term follow-ups.[8,10,11]

Access to the required information may be restricted due to reasons such as the individual's health status, living conditions, distance from the health center, and their work conditions. Information technologies such as mobile phones and the internet are used in the remote management of individuals for purposes such as sharing information online, providing distance education, and helping to improve health care outcomes.[11] The use of technology by diabetic patients was seen to be very low in the study by Cerna and Maresova.[12] As a result of the study conducted by Mengiste et al.[13] the internet was used in order to search for general information about diabetes among patients with diabetes at a rate of 41.6%. We believe that positive attitudes towards technology and the appropriate use of technology by diabetics with access to technology-based information can significantly improve treatment outcomes, especially during the Coronavirus disease-2019 (COVID-19) pandemic, when personal contact with healthcare professionals is limited. The aim of this study was to determine the technology use status and attitudes towards technology of those patients with type 2 diabetes.

MATERIALS AND METHODS

Study Design

This descriptive study was conducted and reported according to the Strengthening the Reporting of Observational Studies in Epidemiology checklist (Appendix Supplementary 1).

Participants and Data Collection

This study was performed in the department of endocrinology and metabolic diseases at a university hospital in the Mediterranean region in Turkey between January and June 2017. The inclusion criteria were a) being diagnosed with type 2 diabetes at least six months prior to the start of the research, b) being aged 18 years or older, c) the absence of any mental or any other psychiatric disorder according to their medical records, d) being able to speak, read, and write in Turkish, and e) consent to participate in this research. The number of patients with type 2 diabetes who apply to the hospital in an average year is 710. Based on

this number, the sample of the study calculated with a confidence level of 95% and 5% error in the Sample Size Calculator Program was 250. During the data collection phase, 17 patients could not be included in this study because they were in the outpatient clinic and the questions in the measurement tools could not be completed. Data collection was continued until we reached 250 patients with type 2 diabetes who met the sampling criteria and agreed to participate in this study. The results include data from 250 patients with type 2 diabetes.

Data Collection Tools

The research data were collected using the Personal Information form, questions to determine their technology use status and the Attitude Towards Technology Scale.

Personal Information Form

The Personal Information form was used to collect the socio-demographic and disease information of the participants. It was created by the researchers after a literature review.[6,10,14] The Personal Information form had eight questions, namely: Age, gender, marital status, education, occupational status, employment status, duration of illness, and the condition of having a chronic disease apart from diabetes.

Questions to Determine Technology Use Status

These questions were prepared by the researchers in line with the literature in order to determine the technology use status of those patients with type 2 diabetes.[15,16] There are six questions in this section, namely: Whether they used the internet to access health-related information, the purpose to use the internet for health, whether they wanted to receive education and consultation about their disease and its treatment period via the internet at their home, the usefulness of talking about/trying to solve their problems with healthcare professionals via e-mail, using the internet in the previous month to get information about their disease and its treatment procedure, and the application of the information which they obtained from healthcare websites.

Attitudes Toward Technology Scale

The Attitudes Toward Technology Scale was developed by Aydin and Karaa[17] in 2013. It examines attitudes toward technology generally. The scale is a one-dimensional scale with 17 items, of which 15 are positive and 2 are negative. In this scale, the five-point Likert-type negative items are scored in the reverse. The scale's score range is 17 to 85. It can be stated that the positive attitude towards technology increases as the score increases. The reported Cronbach's alpha coefficient for this scale was 0.87.[17] In our study, we calculated the Cronbach's alpha coefficient to be 0.91 (α=0.87).

Ethical Considerations

This study was approved by the Ethics Committee for Clinical Research of the Medical Faculty in the Akdeniz University (approval number: 671.AKD, date: 14.12.2016). Written permission was obtained from the Department of Endocrinology and Metabolic Disease in the Akdeniz University Hospital (date: 31.01.2017). Permission was taken to use the Attitudes Towards Technology Scale from Aydin and Karaa[17] via e-mail. Written and verbal consent was obtained from all participants in this study. The objective of the study was explained to the participants.

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Statistical Analysis

Statistical analyses were carried out using the IBM SPSS statistical program (v. 22.0; IBM Corporation, Armonk, NY, USA) with a significance level of p<0.05. The data were evaluated using frequency distribution, Kruskal-Wallis, and the Mann-Whitney U test as there was no normal distribution. The reliability of the scale was tested with the Cronbach's alpha coefficient.

RESULTS

Socio-demographic and Disease Characteristics

It was found that the mean age of the patients taking part in this study was 58.49±1.03 years, the duration of their illness was 9.54±7.05 years, 43.2% of them were older than 60 years, 66% were female, 93.2% were married, 45.6% were only primary school graduates, 48.4% were housewives, 87.6% were unemployed, the disease duration of 38% was between 5 and 10 years, and 20.8% had a chronic disease apart from diabetes such as heart failure, hypertension, or kidney failure (Table 1).

Findings Related to Technology Use Status

When the technology use status of the patients with type 2 diabetes were examined, it was reported that 34.8% of them used the internet to access health-related information, 43.7% used the internet to learn about their disease and 33.5% used the internet to find out about treatment methods. According to the statements of those patients who used the internet to access health-information, 83.9% wanted to receive education and consultation about their disease and its treatment period via the internet at their home, 40.2% did not know whether talking about/trying to solve their problems with healthcare professionals via e-mail would be useful, 65.5% had used the internet once or more within the previous month to get information about their disease and its treatment procedures and only 26.4% of the participants had actually applied the information that they had obtained from healthcare websites (Table 2).

Findings Related to Attitudes Toward Technology Scale

In the present study, it was found that the mean score of the Attitude Toward Technology Scale was 47.73±1.11. When the mean scores of the patients with type 2 diabetes in the Attitudes Toward Technology Scale were compared in terms of their descriptive characteristics, there were statistically significant differences between their age (p=0.001), educational status (p=0.001), occupational status (p=0.001), employment status (p=0.004), and whether they used the internet in order to access health-related information (p=0.001) (Table 3).

DISCUSSION

Education and technology are two basic elements playing an important role in making human life more effective. Using technology in education is a significant opportunity to help meet our needs. When considering the importance of diabetes education, the education prepared appropriately for the needs, as an alternative to the usual education, is crucial and patients must be able to access this information easily for their self-efficacy.[15,18] For this reason, this descriptive study was conducted in order to determine the technology use status and attitudes towards the technology of patients with type 2 diabetes.

The study showed that 34.8% of the participants used the internet in order to access health information. This result was thought to be associated with the fact that more than half of the patients were aged 60 or younger. Quartuccio et al.[19] found in their study that the internet use frequency of those patients with diabetes aged between 50-60 years was 27%. A cohort study in 2012 and 2017 showed the use of the internet to search for health information increased over time.[20] That result supports the results of the present study. In another previous study, more than half of the participants trusted and relied on the internet for seeking health information.[9]

As the internet becomes a more popular health information source, individuals with chronic diseases meet their information needs via the internet.[14] When the aims of internet use were examined based on the results of the present study, it was found that nearly half of the patients

Table 1. Demographic and medical characteristics of patients with type 2 diabetes (n=250)		
	Mean ± SD	Range
Age (years)	58.49±1.03	19-88
Duration of illness (year)	9.54±7.05	1-25
	n	%
Age		
<50	44	17.6
50-60	98	39.2
>60	108	43.2
Gender		
Female	165	66.0
Male	85	34.0
Marital status		
Married	233	93.2
Single	17	6.8
Educational status		
Illiterate	17	6.8
Primary	114	45.6
Secondary	23	9.2
High school	46	18.4
University	50	20.0
Occupational status		
Housewife	121	48.4
Retired	93	37.2
Public servant	25	10.0
Self-employed	11	4.4
Employment status		
Unemployed	219	87.6
Employed	31	12.4
Duration of the illness		
<5 year	73	29.2
5-10 year	95	38.0
>10 year	82	32.8
The condition of having a chronic disease apart from diabetes		
Yes	52	20.8
No	198	79.2
SD: standard deviation.		

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Table 2. Technology use status of patients with type 2 diabetes (n=250)		
	n	%
Used the internet to access health-related information		
Yes	87	34.8
No	163	65.2
Purpose of using the internet for health (n=167)*		
Learn about the disease	73	43.7
Find out about treatment methods	56	33.5
To obtain preliminary information about the symptoms of the disease before going for an examination	14	8.4
Getting information about hospital and doctor selection	13	7.8
Alternative medicine (acupuncture, spa, medicinal plants, etc.)	6	3.6
Receiving prescription or over-the-counter medication information	5	2.9
Wanted to receive education and consultation about their disease and its treatment period via the internet at their home (n=87)*		
Yes	73	83.9
No	14	16.1
The usefulness of talking about/trying to solve the problems with healthcare professionals via e-mail (n=87)*		
Do not know	35	40.2
Could be possible	8	9.3
Undecided	29	33.3
Helpful	14	16.1
Not helpful	1	1.1
Using the internet in the previous month to access information about their disease and its treatment procedure (n=87)*		
Zero/did not use	30	34.5
Once or more	57	65.5
The application status of the information obtained from healthcare websites (n=87)*		
Yes	23	26.4
No	64	73.6
*Percentages were calculated on the value of "n".		

Table 3. Comparison of descriptive characteristics and the attitude toward technology scale in patients with type 2 diabetes (n=250)		
Variable	Attitudes Toward Technology Scale (mean ± standard deviation)	Z-, KW-, and p-values
Age		
<50	53.7±1.65	KW: 23.124 p=0.000
50-60	48.4±1.11	
>60	44.6±0.97	
Educational status		
Illiterate	30.7±1.31	KW: 63.187 p=0.000
Primary	43.2±0.83	
Secondary	51.9±1.82	
High school	51.0±1.71	
University	55.5±1.58	
Occupational status		
Housewife	45.1±0.81	KW: 20.394 p=0.000
Retired	56.3±4.40	
Public servant	52.1±3.17	
Self-employed	54.5±3.06	
Employment status		
Unemployed	53.7±2.63	Z: -2.886 p=0.004
Employed	46.8±0.69	
Used the internet to access health-related information		
Yes	59.4±0.83	Z: 15.298 p=0.000
No	50.2±4.37	

technology. Considering that patients with diabetes especially have disease and treatment-related information needs, it seems appropriate to consider disease and treatment-related information as a priority in education programs which can be planned online for these patients.

The results of this study show that when patients with type 2 diabetes are evaluated according to the score they get from the scale, their attitude towards technology is low. This is thought to be due to the high average age of the patients. Similar to our study, the use of technology by diabetic patients was very low in the study of Cerna and Maresova.[12] In a systematic review, technology-assisted education efforts appear to possess both positive and negative aspects as perceived by those patients with diabetes. This review demonstrates that technology platforms should be user-friendly, intuitive to use, and cater to older persons who may not be so technologically savvy.[21]

When the mean scores of the patients with type 2 diabetes for the Attitude Toward Technology Scale were compared with their socio-demographic data in our study, it was found that younger and well-educated participants had more positive attitudes and intentions toward using technology in their treatment than older participants. Similar to our study results, it is seen that younger patients and well-educated patients have better attitudes towards technology use according to the study conducted by Zhang et al.[22] In a few studies examining the technology use of patients with diabetes, it was stated that young patients use technology more.[10,20,23] In line with these findings, it may be asserted that as the educational level increases, the attitude towards technology use becomes more positive.

used the internet to learn about their disease and one-third of them used the internet to find out about treatment methods. Also, in this study, the vast majority of patients with diabetes who used the internet to access health-related information wanted to receive education and consultation about their disease and its treatment procedure via the internet at home. Dobson and Hall[16] found that 77% of their participants intended to use an internet application to manage their diabetes in the future, and 58% intended to use a mobile application. In our research findings, although the mean age of the participants was high, almost half of them used the internet to learn about the disease, and one-third of them used the internet to find out about health information and treatment options. These findings indicate that patients with type 2 diabetes want to receive disease-related education and counseling at distance. Technology-related needs and technology use behaviors are expected to increase rapidly, especially for chronic diseases such as diabetes, due to the pandemic experienced all over the world. Today, because of the pandemic situation in the world, we recommend that patients with type 2 diabetes should be encouraged in their use of

Appendix Supplementary 1. STROBE Statement-Checklist of items that should be included in reports of cross-sectional studies			
	Item no	Recommendation	Page no
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	1
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	2-3
Objectives	3	State specific objectives, including any prespecified hypotheses	3
Methods			
Study design	4	Present key elements of study design early in the paper	3
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	3
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	3-4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	4
Data sources/measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	4-5
Bias	9	Describe any efforts to address potential sources of bias	
Study size	10	Explain how the study size was arrived at	3
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	4
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	5
		(b) Describe any methods used to examine subgroups and interactions	5
		(c) Explain how missing data were addressed	5
		(d) If applicable, describe analytical methods taking account of sampling strategy	5
		(e) Describe any sensitivity analyses	
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study-eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	5
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	5, Table 1
		(b) Indicate number of participants with missing data for each variable of interest	
Outcome data	15*	Report numbers of outcome events or summary measures	5-6
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	3
		(b) Report category boundaries when continuous variables were categorized	5
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done-eg analyses of subgroups and interactions, and sensitivity analyses	5
Discussion			
Key results	18	Summarise key results with reference to study objectives	6-9
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	9
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	6-8
Generalisability	21	Discuss the generalisability (external validity) of the study results	8-9
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Title page

*Give information separately for exposed and unexposed groups. STROBE: Strengthening the Reporting of Observational Studies in Epidemiology.

An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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According to our study results, it was found that the employed participants internet attitudes were better than those who did not work. Also, when the comparison was made based on the occupation, the difference between the technology attitude means scores of the self-employed patients, public servants, and those patients who were retired and housewives were found to be significant. Based on the data of the Household Information Technology Usage Survey in Turkey, it was reported that internet usage rates of the fee-earners, salary-earners, or casual workers were 89.7%, the internet usage rates of the unpaid family workers were 46.8%, and internet usage rates of retirees were 48.5%.[24] Based on these results, it can be asserted that those in the employed group are younger and they have a higher educational level and for this reason, they have better attitudes towards technology.

In this study, the use of the internet to access health-related information and the Attitude Toward Technology Scale mean scores were compared. It was found that those who used the internet to access health-related information had better attitudes towards technology. As a result of the study conducted by Mengiste et al.[13], the internet was one of the major sources of diabetes information and the internet was used in order to search for general information about diabetes at a rate of 41.6%. These results suggested that internet use is preferred for health, but there is a need for reliable education sources. In pandemics and similar problems which are seen in the world today or that may be seen in the future, it is important to be prepared for remote treatment and care management of diabetic patients, to determine the technology-related needs of these patients, and to make improvements and innovations in line with these needs.

Study Limitations

There are several limitations of the current research. The results of this single-center study may be generalized only for the sample of the study. Secondly, the patients' levels of attitudes towards technology being based on their expressions is considered as another limitation of this study.

CONCLUSION

In this study, it was found that patients with type 2 diabetes had positive attitudes towards technology. Their attitudes towards technology differed based on their age, education, occupational status, employment status, and whether they used the internet to access health-related information. Patients with type 2 diabetes who are younger, have higher education levels, those who are retired, self-employed or unemployed, and those who use the internet to access health-related information have better attitudes towards technology use. While some patients would like to receive education and consultation via distance learning tools, on the other hand, others did not know whether education and consultation via distance learning tools could solve their health problems. It may be recommended that nurses should provide current distance learning tools and encourage patients to use distance learning tools for health management. It is recommended to plan individual nursing interventions via technological tools and use interactive training methods remotely in those patients with type 2 diabetes. Due to reduced hospital admissions from COVID-19, the use of remote education tools are especially important.

MAIN POINTS

• According to the results of this study, those patients with type 2 diabetes had positive attitudes towards technology.

• Type 2 diabetes patient's attitudes towards technology differed based on their age, educational status, occupational status and employment status.

• It is necessary to increase the use of technology in chronic disease management, and to support the education of patients with type 2 diabetes remotely with technology.

ETHICS

Ethics Committee Approval: This study was approved by the Ethics Committee for Clinical Research of the Medical Faculty in the Akdeniz University (approval number: 671.AKD, date: 14.12.2016).

Informed Consent: Written and verbal consent was obtained from all participants in this study.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Concept: N.T., F.Ç., H.B., Design: N.T., F.Ç., H.B., Data Collection and/or Processing: N.T., F.Ç., H.B., Analysis and/or Interpretation: N.T., F.Ç., H.B., Literature Search: N.T., F.Ç., H.B., Writing: N.T., F.Ç., H.B., Critical Review: N.T., F.Ç., H.B.

DISCLOSURES

Conflict of Interest: No conflict of interest was declared by the authors.

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REFERENCES

1. American Diabetes Association. 15. Diabetes Care in the Hospital: Standards of Medical Care in Diabetes-2021. Diabetes Care. 2021; 44(Suppl 1):211-20.

2. International Diabetes Federation (IDF). IDF diabetes atlas. 8th Edition. 2017. Available from: URL: https://diabetesatlas.org/IDF_Diabetes_Atlas_8e_interactive_EN/

3. Satman I, Omer B, Tutuncu Y, Kalaca S, Gedik S, Dinccag N, et al. Twelve-year trends in the prevalence and risk factors of diabetes and prediabetes in Turkish adults. Eur J Epidemiol. 2013; 28(2): 169-80.

4. Chamberlain JJ, Kalyani RR, Leal S, Rhinehart AS, Shubrook JH, Skolnik N, et al. Treatment of type 1 diabetes: synopsis of the 2017 American Diabetes Association Standards of Medical Care in Diabetes. Ann Intern Med. 2017; 167(7): 493-8.

5. Beck J, Greenwood DA, Blanton L, Bollinger ST, Butcher MK, Condon JE, et al. 2017 National standards for diabetes self-management education and support. Diabetes Educ. 2018; 44(1): 35-50.

6. Simó-Servat O, Hernández C, Simó R. Diabetic Retinopathy in the Context of Patients with Diabetes. Ophthalmic Res. 2019; 62(4): 211-7.

7. Scanlon PH. The English National Screening Programme for diabetic retinopathy 2003-2016. Acta Diabetol. 2017; 54(6): 515-25.

8. Agrawal S, Strzelec B, Poręba R, Agrawal A, Mazur G. Clinical characteristics, preventive care and attitude to telemedicine among patients with diabetic retinopathy: A cross-sectional study. J Clin Med. 2021; 10(2): 249.

9. Ramasamy D, Singh AK, Mohan SK, Meenakshi N. Association of sociodemographics, technology use and health literacy among type 2 diabetic individuals living in an Indian setting: an exploratory cross-sectional study. Int J Diabetes Dev Ctries. 2016; 36(3): 303-12.

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10. Orhan B, Bahçecik N. Technology-Mobile training in diabetes and diabetic foot training. JAREN. 2017; 3(2): 101-8.

11. Da Silva E. Internet and information technology use in diabetes education. Austin Diabetes Res. 2017; 2(1): 1012.

12. Cerna L, Maresova P. Patients' attitudes to the use of modern technologies in the treatment of diabetes. Patient Prefer Adherence. 2016; 10: 1869-79.

13. Mengiste M, Ahmed MH, Bogale A, Yilma T. Information-seeking behavior and its associated factors among patients with diabetes in a resource-limited country: A cross-sectional study. Diabetes Metab Syndr Obes. 2021; 14: 2155-66.

14. Lui CW, Col JR, Donald M, Dower J, Boyle FM. Health and social correlates of Internet use for diabetes information: findings from Australia's living with diabetes study. Aust J Prim Health. 2015; 21(3): 327-33.

15. Bonoto BC, de Araújo VE, Godói IP, de Lemos LL, Godman B, Bennie M, et al. Efficacy of mobile apps to support the care of patients with diabetes mellitus: a systematic review and meta-analysis of randomized controlled trials. JMIR Mhealth Uhealth. 2017; 5(3): e4.

16. Dobson KG, Hall P. A pilot study examining patient attitudes and intentions to adopt assistive technologies into type 2 diabetes self-management. J Diabetes Sci Technol. 2015; 9(2): 309-15.

17. Aydin F, Karaa FN. Pre-Service teachers' attitudes toward technology: Scale development study. Journal of Turkish Science Education. 2013; 10(4): 103-18.

18. Shen Y, Wang F, Zhang X, Zhu X, Sun Q, Fisher E, et al. Effectiveness of internet-based interventions on glycemic control in patients with type 2 diabetes: Meta-analysis of randomized controlled trials. J Med Internet Res. 2018; 20(5): e172.

19. Quartuccio M, Minang L, Kalyani RR. Patient preferences and internet use for diabetes education differs by age. J Diabetes Complications. 2018; 32(7): 726-7.

20. Middleton TL, Constantino MI, Molyneaux L, AlMogbel T, McGill M, Yue DK, et al. Secular Trends in Information Communications Technology: Access, Use, and Attitudes of Young and Older Patients With Diabetes. Diabetes Spectr. 2020; 33(1): 66-73.

21. Jain SR, Sui Y, Ng CH, Chen ZX, Goh LH, Shorey S. Patients' and healthcare professionals' perspectives towards technology-assisted diabetes self-management education. A qualitative systematic review. PloS One. 2020; 15(8): e0237647.

22. Zhang Y, Li X, Luo S, Liu C, Xie Y, Guo J, et al. Use, perspectives, and attitudes regarding diabetes management mobile apps among diabetes patients and diabetologists in China: national web-based survey. JMIR Mhealth Uhealth. 2019; 7(2): e12658.

23. Yamaguchi S, Waki K, Tomizawa N, Waki H, Nannya Y, Nangaku M, et al. Previous dropout from diabetic care as a predictor of patients' willingness to use mobile applications for self-management: A cross-sectional study. J Diabetes Investig. 2017; 8(4): 542-9.

24. Turkish Statistical Institute (TSI). Hanehalkı bilişim teknolojileri kullanım araştırması 2017 [Household information technologies usage survey 2017]. Available from: URL: http://tuik.gov.tr/PreHaberBultenleri.do?id=24862