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Research Article

EVALUATION OF CYBERCHONDRIA, E-HEALTH LITERACY, AND PSYCHOLOGICAL STATUS IN PATIENTS WITH DIABETIC FOOT ULCERS: A PILOT STUDY

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Keywords

Anxiety disorders,
Cyberchondria,
Diabetes mellitus,
Diabetic foot,
Health literacy.

ABSTRACT

Purpose: This study was designed to assess the levels of cyberchondria, e-health literacy, and psychological status in patients with diabetic foot ulcers (DFUs).

Methods: This pilot study involved 33 participants aged 18 years and older who had a diagnosis of DFU for a minimum duration of three months, with sociodemographic and clinical information obtained through a structured questionnaire. Sociodemographic and clinical data were collected via a structured questionnaire. Participants completed the Cyberchondria Severity Scale (CSS), E-Health Literacy Scale, and Depression Anxiety Stress Scale-21 (DASS-21). Descriptive statistics will be used in the evaluation of the data.

Results: The mean age of the participants was 55.48±14.95 years, and the majority were male (81.8%). Participants' cyberchondria levels were low across all subscales and eHealth literacy scores were low (11.39±9.00). Their psychological symptom levels were moderate based on their DASS-21 total score (15.82±11.84). Most participants reported little or no internet use, with 69.7% reporting never searching online for health information. Furthermore, 93.9% did not follow any health-related social media platforms and would not recommend online health research to others.

Conclusion: Patients with DFUs exhibited low levels of cyberchondria and e-health literacy, and moderate levels of depression, anxiety, and stress. Low internet use, older age, male dominance, and low educational background may contribute to these findings. Despite the growing digitalization in healthcare, this population may face significant barriers in accessing and utilizing reliable online health information. Multidisciplinary DFU care should incorporate not only medical treatment but also psychological support and digital health literacy education.

INTRODUCTION

Diabetes mellitus (DM) represents an escalating global health concern and is projected to affect nearly 592 million people by 2035, positioning it as the largest epidemic of the 21st century (1). DFUs represent a common complication of diabetes mellitus, with an estimated lifetime prevalence of approximately 15% among individuals with diabetes. In diabetic wounds, tissue ischemia, hypoxic microenvironments, and sustained hyperglycemia impair

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the orderly progression of wound healing cascades, ultimately leading to delayed repair, chronic non-healing ulcers, and secondary clinical complications (2). The global burden of DFUs has been reported to encompass nearly 6.4% of patients with diabetes. The presence of DFUs confers a 2.5-fold greater risk of five-year mortality relative to patients without foot ulcers. Furthermore, worldwide direct healthcare costs attributable to diabetes mellitus were estimated at 700 billion USD in 2019 and are expected to reach 825 billion USD by 2030. DFUs are recognized in clinical practice as ulcerative lesions accompanied by inflammatory changes in tissues located below the malleoli among diabetic patients (2). Ranking among the most severe complications of diabetes mellitus, DFUs substantially diminish quality of life and contribute to significant economic losses (1).

In a prospective study conducted by Ndosi et al. (3), wound healing was achieved in only 46% of patients within one year of diagnosis, whereas 10% experienced a recurrence. Additionally, approximately 17% of the patients underwent lower extremity amputation. Beyond the physical problems caused by DFUs, progressive complications such as amputation, the difficulty and cost of treatment, and the uncertainty of the healing process increase patients' anxiety levels, lead to depression, and decrease their quality of life, while also elevating psychological stress levels (4). In a review conducted by Janzen et al., 24.1% of patients with DM were reported to suffer from health anxiety (5). Confronted with the progressive course of DFUs, along with financial burden, psychological distress, uncertainty, and stress, patients frequently turn to diverse information sources as a coping strategy.

The World Health Organization defines health literacy as individuals’ capacity to access, interpret, and appropriately apply health-related information. The European Health Literacy Study reported an inadequate health literacy prevalence of 12.4%, while the U.S. Adult Literacy Survey documented a rate of 14%. In Turkey, however, the Ministry of Health’s 2018 survey indicated that 30.9% of the population had inadequate health literacy, with the highest rates observed in Southeastern Anatolia (33.3%), Eastern Anatolia (54.2%), and the Mediterranean Region (35%) (6).

As the digital age advances, the internet has increasingly become a primary medium for accessing information in nearly all areas, particularly in health. With the widespread use of the internet, e-health literacy has been recognized as a subdomain of health literacy, accompanied by the emergence of the concept of cyberchondria. E-health literacy is defined as the ability of individuals to search for, access, interpret, and evaluate the quality of health information available on online and digital platforms (6). Cyberchondria, on the other hand, denotes the excessive and persistent seeking of health information via the internet despite its

adverse consequences, and is associated with heightened health anxiety, reduced health-related quality of life, diminished well-being, and impaired daily functioning (7).

This study aims to assess the levels of cyberchondria, e-health literacy, and psychological status among patients with DFU.

Research Questions

1. What are the levels of cyberchondria in individuals with diabetic foot ulcers?
2. What are the levels of e-health literacy in individuals with diabetic foot ulcers?
3. What are the levels of psychological symptoms (anxiety, depression, stress) in individuals with diabetic foot ulcers?

METHODS

Study Design

This pilot study was conducted in the Wound Care Unit of Gaziantep City Hospital between June 3, 2025, and July 20, 2025. Ethical approval was obtained from the Non-Interventional Clinical Research Ethics Committee of Hasan Kalyoncu University on June 2, 2025, with the decision number 2025/079. The entire research process was conducted in compliance with the principles of the Declaration of Helsinki. All participants received prior information about the study, and written informed consent was obtained from those who voluntarily agreed to participate.

Participants

The study sample consisted of volunteer individuals aged 18 to 75 years who had been diagnosed with chronic DFU, were admitted to the hospital where the research was conducted, were engaged in the treatment process, and provided voluntary consent to participate

The inclusion criteria comprised individuals aged 18 years or older who had been diagnosed with DFUs persisting for three months or longer, had no cognitive or communication impairments, were admitted to the hospital where the study was carried out, were engaged in the treatment process, and voluntarily consented to participate.

Individuals with communication problems that would interfere with the administration of the questionnaire due to visual, auditory, or speech impairments; those with cognitive or psychiatric disorders; and those unable to understand or respond to the questionnaire were excluded from the study.

Assessments

Sociodemographic data of the participants (age, gender, educational status, marital status, duration of diabetes, duration of foot ulcer, and internet usage habits) were recorded using a questionnaire form. Subsequently, the following psychological and cognitive assessments were conducted:

1. Cyberchondria Severity Scale: During face-to-face interviews, the scale form was either read aloud to the patients' item by item or provided for self-administration. Comprising 33 items, the scale can typically be completed within 15–20 minutes. Participants rated items assessing their internet-based health concerns and behaviors on a 5-point Likert scale, with response options ranging from "strongly disagree" to "strongly agree" (8). The validity and reliability analyses of the scale on adults were conducted by Uzun and Zencir in 2018 (9).
2. E-Health Literacy Scale: Participants completed this 10-item scale either in the clinical setting or via the questionnaire form. This assessment, requiring approximately 5–10 minutes to complete, evaluates individuals' ability to comprehend and apply health information obtained from the internet, with each item rated on a 5-point scale (1–5). (10). The Turkish adaptation of the scale and validity-reliability studies were conducted by Gencer in 2017 (11).
3. Depression Anxiety Stress Scale – 21: The short form of the scale was presented to participants, who were asked to complete it independently. The administration took approximately 10–15 minutes. The scale, comprising 21 items, evaluates depression, anxiety, and stress using a 4-point Likert-type response format (12). The psychometric properties of the Turkish version of the scale in normal and clinical samples were adapted into Turkish by Sarıçam in 2018 (13).

All assessments were conducted under the supervision of an experienced physiotherapist in the clinical setting, with explanations provided when necessary. Data collection took place in a quiet and private room to ensure that participants could respond comfortably and attentively.

Statistical Analysis

Data analysis will be performed using IBM SPSS Statistics version 25, with descriptive measures such as percentages, frequencies, medians, and minimum–maximum values applied for data evaluation.

RESULTS

Table 1 provides a summary of the participants' sociodemographic and health-related characteristics. Among the participants, 78.8% (n=26) were diagnosed with diabetes mellitus (DM), 12.1% (n=4) with venous insufficiency, and 3% (n=1 each) with Buerger's disease, Ehlers-Danlos syndrome, or hydrocephalus. A majority of the participants were male (81.8%, n=27), while 18.2% (n=6) were female. When examining dominant foot preference, 87.9% (n=29) of the participants reported right foot dominance, while 12.1% (n=4) had left foot dominance. Only 6.1% (n=2) of the participants used assistive devices, whereas 93.9% (n=31) did not require any assistive support. In terms of educational status, 60.6% were primary school graduates, 15.2% had completed middle school, 6.1% were high school graduates, 3% had completed university education, and 15.2% were illiterate. Regarding employment status, only 18.2% (n=6) of the participants were actively working. In terms of monthly income, 91% reported earnings below 20,000 Turkish Lira (TRY), while only 3% had an income of 40,000 TRY or more. Concerning place of residence, 78.8% (n=26) lived in urban areas, and 21.2% (n=7) resided in rural regions. In terms of family structure, 78.8% lived in a nuclear family, 18.2% lived alone, and 3% lived in an extended family household. According to marital status, 75.8% (n=25) of participants were married, while 24.2% (n=8) were single. Regarding DM type, 75.8% (n=25) had Type 2 DM, and 24.2% (n=8) had Type 1 DM. When examining comorbidities, the most frequently reported condition was hypertension (HT). A total of 5 participants (15.2%) reported having only HT. In addition, combinations of HT with other chronic diseases were also observed. For example, two participants (6.1%) reported having both HT and hypercholesterolemia (see Table 1).

Table 1. Distribution of the Sociodemographic and Health-Related Characteristics of the Participants

		n	%
Diagnosis	**Buerger's Disease**	1	3
	Diabetes Mellitus (DM)	26	78,8
	Ehlers-Danlos Syndrome	1	3
	Hydrocephalus	1	3
	Venous Insufficiency	4	12,1
Gender	**Female**	6	18,2
	Male	27	81,8
Dominant foot	**Right**	29	87,9
	Left	4	12,1
Use Of Assistive Device	**No**	31	93,9
	Yes	2	6,1
Educational Level	**Primary School**	20	60,6
	Middle School	5	15,2
	High Scholl	2	6,1
	Universty	1	3
	No Formal Education	5	15,2
Employment Status	**No**	27	81,8
	Yes	6	18,2
Monthly Income (TRY)	**0-10.000 TRY**	15	45,5
	10.000- 20.000 TRY	15	45,5
	20.000- 40.000 TRY	2	6,1
	40.000 TRY and above	1	3
Place of Residence	**Rural**	7	21,2
	Urban	26	78,8
Living Arrangement	**Nuclear Family**	26	78,8
	Extended Family	1	3
	Living Alone	6	18,2
Type of Diabetes	**Type 2**	25	75,8
	Type 1	8	24,2

The participants had a mean age of 55.48 ± 14.95 years, an average weight of 84.42 ± 21.51 kg, and a mean height of 172.12 ± 8.31 cm, resulting in a calculated mean body mass index (BMI) of 28.38 ± 6.26. The mean duration of diabetes was 14.0 ± 7.00 years, with a range of 1 to 30 years. The average total score for e-health literacy among participants was 11.39 ± 9.00. The total score of the DASS-21, used for psychological evaluation, was calculated as 15.82 ± 11.84. When examining the subdimensions of cyberchondria, the following mean scores were observed; Compulsion (SCOM): 8.45 ± 2.61, Distress (SDIS): 8.85 ± 4.87, Excessiveness (SECC): 9.15 ± 5.30, Reassurance (SREA): 6.24 ± 4.92, Mistrust of Medical Professionals (SMIS): 3.48 ± 1.94 (see Table 2).

Table 2. Descriptive Statistics of Participants' Demographic Characteristics, Clinical Data, and Scale Scores

	Mean	SD	Min	Max
Age (Years)	55,48	14,95	10	75
Weight (kg)	84,42	21,51	54	138
Height (cm)	172,12	8,31	150	188
BMI	28,38	6,26	18,5	41,7
Diabetes Duration (years)	14,0	7,5	1	30
E-Health Literacy Total Score	11,39	9,00	8	40
DASS-21 Total Score	15,82	11,84	0	48
SCOM (Compulsion)	8,45	2,61	8	23
SDIS (Distress)	8,85	4,87	8	36
SECC (Excessiveness)	9,15	5,64	8	40
SREA (Reassurance)	6,24	1,09	6	12
SMIS (Mistrust in Doctors)	3,48	1,94	3	11

BMI: Body Mass Index; E-Health Total: Total score from the e-health literacy scale; DASS-21: Depression Anxiety Stress Scale total score; SCOM: Cyberchondria Compulsion subscale; SDIS: Cyberchondria Distress subscale; SECC: Cyberchondria Excessiveness subscale; SREA: Cyberchondria Reassurance subscale; SMIS: Cyberchondria Mistrust in Doctors subscale

Table 3. Internet Usage Duration and Health-Related Internet Use Among Participants

Questions	Answers	n	%
How much time do you spend on the internet per day?	**None**	11	33.3
	10-15 Minutes	1	3
	1-2 Hours	12	36.6
	2-3 Hours	3	9.1
	3-4 Hours	2	6.1
	4-5 Hours	4	12.1
How often do you search the internet for information about your illness?	**Once a month or more**	3	9.1
	Several times a day	3	9.1
	Once a week	3	9.1
	Every day	1	3
	Never	23	69.7
Do you follow any social media networks related to your illness?	**Yes**	2	6.1
	No	31	93.9
Would you recommend others to search for health-related information online?	**Yes**	2	6.1
	No	31	93.9

As presented in Table 3, the participants' duration of internet use and their utilization of the internet for health-related purposes were assessed. Based on the findings, 36.6% (n=12) of the participants reported using the internet for 1–2 hours per day, while a significant portion (n=11, 33.3%) stated that they never used the internet. Longer daily internet usage was less common: 12.1% (n=4) reported using the internet for 4–5 hours per day, and 6.1% (n=2) for 3–4 hours per day. Regarding the frequency of online searches related to their illness, the majority (n=23, 69.7%) stated that they never searched for information. The response options "Once a month or more," "Once a week," and "Several times a day" were each selected by 3

participants (9.1%). Only 3.0% (n=1) of the participants reported conducting health-related online searches every day. Similarly, the behavior of following health-related social media platforms was observed to be very limited. A vast majority (93.9%, n=31) stated that they did not follow any health-related social media networks, while only 6.1% (n=2) reported that they did. When asked whether they would recommend others to search for health-related information online, 93.9% (n=31) said they would not, while only 6.1% (n=2) stated they would recommend it. Additionally, 27.3% of the participants who conducted internet searches regarding their illness most frequently looked up topics such as disease symptoms, foot ulcers and their care, blood test results, medications, and nutrition. However, 72.7% of the participants reported that they did not conduct any internet-based research on their illness (see Table 3).

DISCUSSION

With the influence of the digital age, individuals' habits of accessing health information have shifted, with increasing reliance on online sources rather than direct medical consultation. While this shift offers fast and cost-effective access to health-related information, it also raises serious concerns regarding the accuracy and reliability of such content. The availability of unverified, non-scientific, or misleading information on digital platforms may heighten individuals' health-related anxieties and adversely influence the patient–healthcare professional relationship.

The present study was designed to assess levels of cyberchondria, e-health literacy, and psychological status in patients with DFUs. The results indicated that participants with DFUs exhibited low levels of cyberchondria and e-health literacy, while their depression, anxiety, and stress levels were moderate.

There are studies in literature that have examined cyberchondria in various chronic illnesses. For example, such studies have been conducted in individuals with diabetes (14), cancer (15), cardiovascular diseases (16,17), chronic mental illnesses (18). However, we did not identify any previous studies examining the level of cyberchondria specifically in individuals with DFUs, indicating that our study may be among the first to address this issue.

Studies exploring the determinants of cyberchondria are limited (19–22). These studies have noted that cyberchondria is influenced by sociodemographic factors such as age, gender, and education level, as well as by health literacy, e-health literacy, psychological factors, internet usage duration, and the severity of disease symptoms. Mansur et al. (21) identified a low-level positive association between e-health literacy and cyberchondria among adults in

the general population. A population-based study from Poland, which included 1613 participants, revealed that individuals with greater e-health literacy tended to exhibit increased levels of cyberchondria (20).

In our study, both e-health literacy and cyberchondria levels were found to be low among individuals with DFUs. This finding suggests that a high ability to access digital information does not necessarily offer protection; instead, it may sometimes lead to increased and uncontrolled information-seeking behavior, thereby elevating cyberchondria levels.

Kobryn et al. (20) also reported that age and gender were significant demographic determinants of cyberchondria, with younger individuals being more likely to exhibit higher cyberchondria scores. The average age in our sample was 55.48 years, and the low cyberchondria levels observed are consistent with these findings. This may be attributed to older individuals relying more on traditional sources for health information, whereas younger individuals tend to engage more frequently with digital health content. Conversely, one study reported that there was no significant relationship between age and cyberchondria (24), indicating that the effect of age may vary depending on demographic or environmental factors.

Another finding of Kobryn et al. (20) study was that men were more likely than women to have lower cyberchondria scores. Similarly, a study by Göde et al. (25) found a significant difference in cyberchondria levels by gender, with women displaying higher levels than men. In our sample, 81.8% of participants were male, which may partially explain the overall low levels of cyberchondria. This could be due to men's generally more distant attitude toward digital health content and their tendency to evaluate such information with less emotional reactivity.

In a study by Yorulmaz et al. (23), a positive relationship was found between internet addiction and cyberchondria in younger individuals, with longer internet usage strengthening this association. In our study, 33.3% of participants reported not using the internet at all, while 30.3% reported using it only 1–2 hours per day. The limited time participants spent online may be a key reason why cyberchondria levels were found to be low. This supports the "avoidance due to increased anxiety" dimension of Starcevic et al. (26) hybrid model of health-related internet searches, which proposes that searching for health information online may either increase or reduce anxiety. If anxiety increases, individuals may avoid online searches, while in other cases they may continue seeking reassurance, potentially intensifying the cycle.

A previous study suggests that more educated individuals demonstrate greater attentiveness to somatic symptoms and are more likely to engage in online health information-seeking behaviors, a tendency that may be driven by elevated health anxiety (19). In our study, 75.8% of participants had low educational attainment (15.2% were illiterate and 60.6% were primary school graduates), which may have contributed to the low levels of cyberchondria. Individuals with lower education levels may struggle to understand and interpret complex health information found online, thereby reducing their likelihood of engaging in excessive searching behaviors.

In our study, most DFU patients (54.5%) were in stages 0 and 1 according to the Wagner classification, indicating relatively mild or superficial ulcerations. In a study conducted by Santoro et al. (22) with 431 participants aged 18–74 years, the severity of physical symptoms was positively correlated with cyberchondria, while health anxiety was identified as a mediating factor. Similarly, in a study involving patients with fibromyalgia, higher symptom severity was associated with increased health anxiety and cyberchondria levels (27). The relatively mild condition of the participants' foot ulcers in our study may have resulted in lower perceived threat and health anxiety, which in turn could explain the lower tendency toward excessive online information seeking.

A cross-sectional study in Turkey examining individuals with DFUs reported that 77.8% of participants had inadequate health literacy (28). A study conducted in Brazil among patients with type 1 and type 2 diabetes receiving primary care reported that 52.8% had low health literacy specifically concerning DFU care. An association was observed between low health literacy and factors such as advanced age, lower educational attainment, decreased household income, unemployment, prolonged diabetes duration, and the existence of chronic complications (29). While these studies focused on general health literacy, and our study assessed e-health literacy, the consistently low scores across studies point to a shared trend. These findings suggest that individuals with DFUs face challenges in accessing and effectively utilizing both traditional and digital health information.

In research carried out by Elnaem et al. (30) in Indonesia and Malaysia, 56.5% of patients with type 2 DM were found to have depression, and 41.6% had anxiety. Depression and anxiety risks were significantly higher in individuals with DFUs. Our sample consisted solely of individuals with DFUs, and their depression levels were found to be moderate. These results indicate that the severity of psychological symptoms may differ according to both individual and environmental factors.

A systematic review and meta-analysis published in 2020 demonstrated that approximately 47% of individuals with DFUs experience depression (31). The study by Pereira et al. (32) also highlighted emotional consequences such as fear and sadness associated with DFUs, confirming the psychological distress experienced by this patient group. These findings reinforce that the moderate psychological symptoms observed in our study should be taken seriously given their potential impact on disease progression and quality of life. It is evident that multidisciplinary approaches in DFU treatment should include not only medical but also psychological support components.

Limitations of the Study

A key limitation of our study was the restricted sample size, attributable to the limited timeframe available for data collection. Additionally, differences in some sociodemographic characteristics of the participants and the unbalanced distribution across the Wagner classification stages are also among the limitations.

CONCLUSION

This study reveals that individuals with DFUs exhibit low levels of cyberchondria and e-health literacy, together with moderate levels of depression, anxiety, and stress. The limited use of the internet, older age, lower educational attainment, and male predominance within the sample may contribute to these findings. Although digital health resources are increasingly accessible, patients with DFUs appear to face significant challenges in utilizing these tools effectively. These limitations may hinder their ability to make informed health decisions or manage their condition proactively. Therefore, multidisciplinary care approaches for DFU patients should integrate not only clinical and wound management strategies but also psychological support and targeted interventions to improve digital health literacy.

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Conception, design, materials, data collection/processing, analysis/interpretation, critical review. MAÇ: Conception, design, supervision, critical review.

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