

eHealth Literacy, Self-Management Practices and Glycaemic Control Among Patients with Type 2 Diabetes Mellitus in Selected Hospitals in Colombo District, Sri Lanka

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Abstract

In the era of advancing technology, eHealth literacy is crucial for effective diabetes self-management. This study assessed eHealth literacy, self-management practices, and glycaemic control among patients with type 2 diabetes mellitus (T2DM) in Colombo District, Sri Lanka. A total of 422 patients with T2DM were randomly selected from three hospitals to participate in this descriptive cross-sectional study. Data were collected using an interviewer-administered questionnaire, including the validated eHealth Literacy Scale (eHEALS). Participants were predominantly female (60.4%), aged 50–64 years (44.8%), with 43.8% reporting diabetes for 5–10 years and 62.1% having a family history of T2DM. The mean eHealth literacy score was 24.29 ± 9.38 , with most participants demonstrating moderate literacy (46.0%) and 40.3% showing low literacy. Self-management behaviours were suboptimal as only 7.6% avoided sugary foods, 37% inspected their feet daily, and 53.1% rarely or never exercised. Higher eHealth literacy was significantly associated with more frequent FBS monitoring ($p < 0.001$), regular clinic attendance ($p = 0.042$), and exercise ($p < 0.001$). Poor glycaemic control was observed in 43.8% of patients and was significantly associated with longer disease duration ($p = 0.034$) and longer treatment duration ($p = 0.036$). Although mean eHealth literacy was lower among those with poor glycaemic control, the difference was not statistically significant ($p = 0.361$). In conclusion, eHealth literacy was moderate and self-management practices were inadequate among patients with T2DM, and nearly half of them experienced poor glycaemic control. Enhancing eHealth literacy and promoting effective self-management practices are critical for improving diabetes-related outcomes.

Keywords: T2DM; Health literacy; Self-management practices; Glycaemic control

Introduction

Diabetes Mellitus (DM) is a chronic metabolic disorder characterized by persistent hyperglycaemia. It can lead to severe complications such as nephropathy, neuropathy, retinopathy and cardiovascular diseases if not properly managed (WHO, 2024). In 2021, the global prevalence of Diabetes Mellitus (DM) among adults aged 20 to 79 years was approximately 537 million, and this number is projected to increase to 643 million by 2030 (IDF, 2021). Globally, diabetes poses a substantial public health burden, with 10.5% of the adult population affected, and nearly half being unaware of their condition (IDF, 2021).

Self-management is a critical component in the prevention and control of diabetes, and with the rapid development of information and communication technology (ICT), digital tools are increasingly used to support such practices (Elnagger et al., 2020). According to the WHO (2019), eHealth is defined as the utilization of ICT to facilitate and improve healthcare services, health education, disease monitoring, and health system management. eHealth literacy, a concept that combines both eHealth and health literacy (Paek & Hove, 2012), is defined as the ability to search, find, understand, and evaluate health information obtained through electronic sources. This knowledge helps individuals resolve health problems and make informed health decisions. eHealth literacy consists of six co-literacy skills: traditional literacy, health literacy, information literacy, scientific literacy, media literacy, and computer literacy (Norman and Skinner, 2006). eHealth literacy is essential for maintaining healthy lifestyles, achieving good health outcomes and enhancing quality of life (Filabadi et al., 2020). To measure this construct, Norman and Skinner developed the validated and reliable electronic health literacy scale (eHEALS) in 2006. Using this tool, studies have identified gaps in eHealth literacy among patients with chronic conditions, including diabetes. For instance, research in Ethiopia (Shiferaw et al., 2020) highlighted skill deficits that hindered patients from accessing and evaluating online health information effectively. However, potential disadvantages of eHealth literacy include misinterpretation of online health data (Atlas et al., 2022). Despite these limitations, adequate eHealth literacy remains essential for the effective self-management of chronic conditions like DM.

The American Diabetes Association (ADA, 2023) emphasizes the importance of diabetes self-management behaviours, including healthy eating, regular physical activity, blood glucose monitoring, medication adherence, and complication monitoring. These behaviours positively influence glycaemic control, enhance quality of life, and reduce disease-related complications. Similarly, a narrative review by Ahmad & Joshi (2023) emphasized that such self-care practices when consistently maintained, can improve blood glucose control, reduce risk factors, prolong life expectancy, and enhance the overall management of diabetes.

In Sri Lanka, the use of digital platforms for diabetes care has also proven to be beneficial. For example, a community-based web-mobile platform was found to effectively screen for diabetes, coordinate care, and deliver patient education through mobile devices and electronic personal health records (Siriwardena et al., 2013). Moreover, following the outbreak of COVID-19, the use of digital health services proved to be both practical and beneficial for diabetes management among patients and healthcare providers (Purnamayanti & Wicaksana, 2021).

Given that eHealth literacy is increasingly recognized as a key factor influencing diabetes self-management and glycaemic outcomes, it is important to examine its role in local healthcare settings. Although numerous studies have investigated these factors globally, there is limited published research on this topic in Sri Lanka. Therefore, this study aimed to assess eHealth literacy, self-management practices, and glycaemic control among adults with Type 2 diabetes mellitus (T2DM) in Colombo District, Sri Lanka.

Materials and Methods

A descriptive cross-sectional study was conducted among 422 patients with type 2 diabetes mellitus (T2DM) who were registered and attending diabetic clinics at three selected divisional hospitals in Colombo, Sri Lanka: Piliyandala, Thalangama, and Wethara. Patients were selected using a systematic random sampling technique from the clinic attendance register on clinic days. The inclusion criteria were male and female patients with T2DM more than 03 months of the diagnosis, aged over 18 years, registered in the diabetic clinic of each hospital, and who provided informed consent. The exclusion criteria included patients with hearing impairment, diagnosed with psychological disorders or severe cognitive impairment, gestational diabetes mellitus (GDM), and non-native Sri Lankans.

Data were collected using a pretested and content-validated interviewer-administered questionnaire. The questionnaire was originally prepared in English and translated into Sinhala and Tamil. It consisted of three sections. Section A included six sociodemographic variables: age, gender, marital status, educational

level, occupation, and monthly income. Section B contained items related to diabetes self-management practices and clinical history, including comorbidities, frequency of fasting blood sugar (FBS) monitoring, last FBS levels, disease duration, family history, duration and type of medication, missed medication during the previous week, frequency of clinic visits, diet control, foot care practices, and exercise. Section C assessed eHealth literacy using the eHealth Literacy Scale (eHEALS) developed by Norman et al. (2006) and adapted into Sinhala with cross-cultural validation in 2022 (Rathnayaka et al., 2022). The tool consists of eight items assessing knowledge and confidence in locating, understanding, and evaluating online health resources. Items were scored on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree), giving a total score out of 40. eHealth literacy levels were categorized as low (8–22), moderate (23–32), and high (33–40) (Mialhe et al., 2023).

Ethical Considerations

Ethical approval was obtained from the Ethics Review Committee of the Faculty of Medicine, University of Colombo. All interviewers received standardized training prior to data collection, covering questionnaire administration, ethical considerations, and management of participant queries. Regular meetings were held to ensure consistency in data collection. Data were collected concurrently at the diabetic clinics of Thalangama, Wethara, and Piliyandala.

Data analysis

Data were coded and analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics (percentages, means, and standard deviations) were used to summarize the data. Inferential statistics, including the independent samples t-test and ANOVA, were used to compare mean values between groups.

Results

A total of 422 participants with T2DM were included in the study. Most participants (44.8%) were between 50–64 years, and 60.4% were female. The majority were married (85.3%), while 37.7% had education up to O/L and 42.7% were unemployed. One-third (33.2%) reported a monthly income above Rs. 40,000. Nearly half (43.8%) had been diagnosed with diabetes for 5–10 years, and 62.1% reported a family history of the condition. Comorbidities were common (73.2%), with hypertension the most prevalent (54.3%). In terms of treatment, 91% were on oral medication, with 44.3% having used medication for 5–10 years. Most participants (76.3%) reported no missed doses in the previous week.

eHealth literacy

The mean eHealth literacy score was 24.29 (± 9.38). Most participants had moderate eHealth literacy (46.0%), followed by low (40.3%) and high (13.7%) as depicted in Table 01. At the item level, around one-third of participants reported confidence in finding online resources, evaluating their quality, and applying them in decision-making.

Table 1: eHealth literacy level among participants

eHealth literacy score	Level	Total (%)
08 – 22	Low EHL	170 (40.3)
23 – 32	Moderate EHL	194 (46.0)
33 – 40	High EHL	58 (13.7)

Self-Management Practices

Self-management practices were inadequate in several areas. About half of participants (51.4%) monitored fasting blood sugar (FBS) monthly, and 49.1% attended diabetic clinics every two months. Only 7.6% reported completely avoiding sugary foods, 37% inspected their feet daily, and 53.1% rarely or never exercised.

As depicted in the Table 02, statistically significant associations were observed between mean eHealth literacy scores and self-management behaviours. Higher eHealth literacy was associated with more frequent FBS monitoring ($p<0.001$), clinic attendance ($p=0.042$), and engagement in exercise ($p<0.001$). For instance, participants who monitored FBS regularly had higher mean literacy scores (30.92 ± 8.47) compared to those who rarely monitored (23.17 ± 9.41). Similarly, those exercising a few times per month scored higher (26.89 ± 9.19) than those rarely or never exercising (22.35 ± 8.63).

Table 2: Mean comparison between eHealth literacy and self-management related factors

Factor	Mean ($\pm$ SD)	p value
FBS Monitoring		$<0.001^*$
- Rarely/Never	23.17 (± 9.41)	
- Occasionally	24.46 (± 9.17)	
- Regularly	30.92 (± 8.47)	
Attending Diabetic Clinic		0.042*
Monthly follow up	23.54 (± 9.44)	
Every two months	24.54 (± 9.64)	
Low frequent follow up	27.00 (± 6.56)	
Consuming Sugary Food		0.094
Never	25.81 (± 7.57)	
Rarely (Once a week or less)	22.88 (± 9.75)	
Sometimes (2 - 4 times a week)	25.49 (± 9.69)	
Often (5 - 7 times a week)	23.78 (± 8.87)	
Feet Inspection		0.137
Never	23.61 (± 8.05)	
Rarely (Once a month or less)	22.48 (± 8.92)	
Occasionally (1 - 2 times a week)	25.20 (± 9.71)	
Daily	24.92 (± 9.76)	
Exercise for Disease Management		$< 0.001^*$
Rarely/Never	22.35 (± 8.63)	
A few times a month	26.89 (± 9.19)	
Once a week	26.62 (± 9.93)	
Daily	26.01 (± 10.12)	

Note. ANOVA test, * $p<0.05$

Glycaemic Control

Poor glycaemic control, defined by FBS, was observed in 43.8% of participants. As depicted in Table 03, those with uncontrolled glycaemia had significantly longer disease duration (24.15 ± 69.75 years vs. 13.69 ± 26.30 years, $p=0.034$) and longer duration of medication use (23.83 ± 69.80 years vs. 13.48 ± 26.30 years, $p=0.036$). Although mean eHealth literacy was lower among the uncontrolled group (23.82 ± 9.64) compared to the controlled group (24.66 ± 9.17), the difference was not statistically significant ($p=0.361$).

Table 3: Mean differences between glycaemic controlled and uncontrolled groups

Variable	Glycaemic controlled group	Glycaemic Uncontrolled group	P value
Age	60.98 $\pm$ 11.54	61.42 $\pm$ 10.01	0.682
Duration of Diabetes	13.69 $\pm$ 26.30	24.15 $\pm$ 69.75	0.034*
Duration of Medication Use	13.48 $\pm$ 26.30	23.83 $\pm$ 69.80	0.036*
eHealth literacy	24.66 $\pm$ 9.17	23.82 $\pm$ 9.64	0.361

Discussion and Conclusion

This study examined eHealth literacy, self-management practices, and glycaemic control among patients with T2DM in Colombo District, Sri Lanka. The majority of participants were aged 50–64 years, predominantly female, and had moderate eHealth literacy. These results align with studies in other low- and middle-income countries, where digital access is increasing but full engagement with eHealth

resources remains limited due to language barriers, inconsistent internet access, and low digital skills (Liu et al., 2023; Shiferaw et al., 2020).

Moderate eHealth literacy observed in this study suggests that while patients are able to locate health information online, their ability to evaluate and apply such information effectively remains restricted. This underscores the necessity of culturally sensitive digital health education strategies in local languages to strengthen practical application of eHealth tools.

Self-management practices were found to be suboptimal, with more than half of participants rarely exercising, very few avoiding sugary foods, and only one-third inspecting their feet daily. These behaviours are essential in diabetes control, and their inadequacy mirrors findings from other low-resource settings where lifestyle modification is often hindered by limited awareness, socioeconomic constraints, and cultural practices (Ahmad & Joshi, 2023). Encouraging structured education programs and community-based health promotion could improve these behaviours. Significant associations were found between eHealth literacy and self-management behaviours, particularly clinic attendance, FBS monitoring, and exercise. This suggests that higher eHealth literacy may enhance engagement in recommended practices. Similar findings have been reported in Ethiopia and China, where better health literacy was linked to improved clinic follow-up and lifestyle adherence (Wei et al., 2020).

Poor glycaemic control was observed in 43.8% of participants and was significantly associated with longer disease duration and longer treatment duration. This aligns with evidence that longer exposure to hyperglycaemia increases complications and makes control more difficult (Zakir, 2023). Although mean eHealth literacy scores were lower among those with poor glycaemic control, the difference was not statistically significant. This suggests that while eHealth literacy supports self-management, other factors such as disease progression, comorbidities, and socioeconomic barriers play a stronger role in glycaemic outcomes.

Overall, these findings indicate that improving eHealth literacy alone is insufficient. Interventions should integrate digital health education with structured lifestyle programs and regular clinic-based support to improve glycaemic outcomes among patients with T2DM in Sri Lanka.

This study found that most patients with T2DM in Colombo District had moderate eHealth literacy, while a considerable proportion had low literacy. Self-management practices were generally inadequate, particularly in diet control, foot care, and exercise. Significant associations were observed between eHealth literacy and key self-management behaviours, including clinic attendance, FBS monitoring, and physical activity. Poor glycaemic control affected nearly half of participants and was significantly linked to longer disease and treatment duration. Although eHealth literacy was slightly lower among those with uncontrolled diabetes, the difference was not statistically significant. Overall, these findings highlight the need to strengthen both eHealth literacy and self-management practices in order to improve glycaemic outcomes. Interventions should focus on culturally appropriate digital health education, patient empowerment, and lifestyle modification support within routine clinical care.

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