Research article

ASSESSMENT OF USAGE OF MOBILE APPLICATIONS FOR SELF-CARE IN DIABETIC PATIENTS ATTENDING DENTAL OPD A PRELIMINARY STUDY

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ABSTRACT

Pakistani population is ranked number 3rd in the prevalence of diabetes after India and China. Its self-management has been considered a keystone for the care of the disease. It is imperative to take measures that can help diabetic patients to maintain self-management. Recent advancements in the field of information technology, such as digital applications, might help to create a platform for delivering and managing self-care interventions that would be easily accessible. Thus, this study was designed to evaluate the frequency of utilization of smartphone technology for self-care. A multi-centric, cross-sectional study was conducted. The results of the study showed that most patients use smartphones but only a few users were aware of health applications for self-care of diabetes. Most patients were using health applications for their self-management only when they are in need. In conclusion, most patients in Pakistan use smart phone but they do not utilise health care mobile applications appropriately due to the lack of awareness. Given the increasing number of patients it is essential to provide public health awareness regarding use of these applications so that patients can manage their glycaemic control at home with convenience. This will also reduce burden on health care system.

Key Words: Self-management, Mobile health application, diabetes, awareness

INTRODUCTION

Diabetes has become a worldwide epidemic and a major public health concern (1). It is also considered the most challenging public health problem (2). About 10.5 percent of the global adult population was reported to be suffering from diabetes in 2021 (3). This number is predicted to rise to 643 million by 2030 and 783 million by 2045 (4). It's one of the most expensive diseases, moreover, 3 in 4 adults with diabetes live in low- and middle-income countries. Pakistan has surpassed the United States of America in the number of diabetics and now ranks third in the world in diabetes prevalence following China and India. According to the International Diabetes Federation (IDF), around 33 million people are living with diabetes in the country (5).

Diabetes management differs depending on the type and severity of diabetes (6). Diabetes self-management has been considered a cornerstone of diabetes care for decades, and it is thought to play an important role in preventing micro- and macro-vascular complications (7). Diabetes education, healthy eating, physical activity, medication, health care applications (apps), and device use, monitoring and using patient-generated data to adjust behavior and medication doses, preventing, detecting, and treating acute and chronic complications, coping with psychosocial issues, and problem-solving are all components of self-management (8). It is imperative to take measures that can assist diabetic patients in maintaining self-management, and many health apps can assist patients in monitoring and tracking their glycemic control.

Information and communication technology (ICT) serves as a conduit for information when dealing with human health issues. Furthermore, advancements in digital technology allowed health applications to greatly assist healthcare professionals and patients. E-health applications used ICT technology for providing better tools for

disease self-care and management. Smartphones are now able to run complete laboratory scanning for the diagnosis of diseases at the lowest possible cost i.e. using fewer men power, energy, and less usage of resources (9). The goal of mobile health applications is to provide a preventive healthcare facility just by using smartphones or wireless digital technology to collect, managing it, and can process disease-related data. (10).

A study done by Demido et al. identified top five applications, which were used by diabetes patients, these were based on augmented and customized usability scores (11). A study in America identified 11 unique applications for diabetes. Common application features include tracking blood glucose, HbA1c, medications, physical activity, and weight. Since Pakistan is one of the countries with high prevalence and increasing incidence, but till date there is limited data available to identify the pattern of use of mobile phone applications in the management plan of diabetes. Thus, this study was conducted to identify the rate and pattern of use of health applications and examine their effectiveness in changing health-related behaviors and clinical health outcomes.

METHODOLOGY

This study was a multi-centric cross-sectional descriptive study, conducted at Dow university of Health Sciences and its constituent/affiliated institutions, and other governments and private sectors of Karachi. Samples were selected by using the non-probability convenience sampling technique (Figure 1). Consent was taken from each patient before distributing the questionnaire. The data was collected from patients coming to Out Patients Department (OPD) and online Google form was sent to all the participants.

In-person interview:

A closed-ended, self-administrated, structured questionnaire was distributed among the diabetic patients presenting in OPD. Most of the patients who walked in the Dental OPD were those who were suffering from a poor systemic condition, most of them present with a history of diabetes.

Virtual data:

Online Google forms were shared among diabetic patients through social media tools. The patients for online forms were identified through social media groups.

Survey Questionnaire:

The questionnaire was in the English language and consists of four sections, section 1: the basic demographics, and educational status. Section 2: Diabetic profile, section 3: Problems with diabetes self-care, and section 4: Usage of the app by diabetic patients. All of the responses were recorded on a Likert scale.

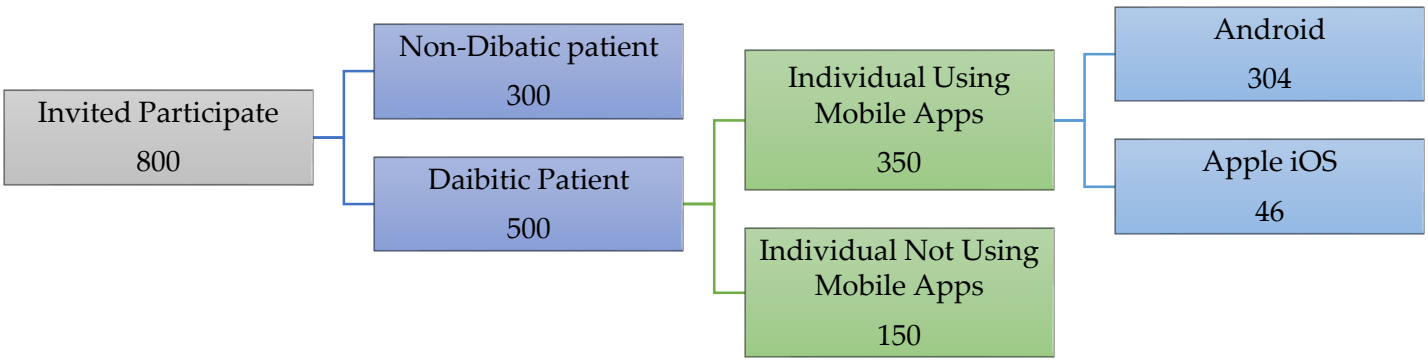

Figure 1. Summary of the patients selected for the study sample

Statistical Analysis:

Data was entered and analyzed using Statistical Package for Social Sciences (IBM-SPSS version 21.0). Mean and standard deviation (SD) were calculated for variables whereas frequency and percentage were calculated by descriptive analysis. Liner model indicates an association between the usage of health apps with educational status by using Chi square test, Results were considered statically significant when the p-value was <0.05.

RESULTS

A total of 800 individuals were invited to take part in this survey, out of which 500 people responded. All were known diabetics. There were 42% males and 58% females. Urban residents were 71% and the remaining 29% were from rural areas. 11% were uneducated, 14% were of below matriculation, 14% did matriculation / O levels, 15% did intermediate/A levels, 255 graduated and 21% were postgraduates (Table 1).

Of the participants, 70% were using smartphones, while 20% were well-skilled and the rest 10% were not very well-skilled. Of 500 diabetic patients, 350 people were using mobile apps to monitor their diabetes, 150 were non-users, 304 were android users, and 46 were apple iOS users as shown in Figure 1. Only 3% of patients had health apps to monitor insulin, and 97% did not have any health apps to monitor insulin. Whereas 13% had health apps that helped track progress on health-related goals, 17% had apps that help them in consultation with healthcare providers, besides this 53% were interested in using apps, and the remaining 47% were not interested, 50.4% recommended apps to the others, and 49.6% didnot recommend apps to others (Table 2).

Among the features of apps, most patients use apps for medication reminders. Other features like blood pressure, blood sugar, fitness, and calories were also used by patients but to a lesser extent. (Figure 2). Most patients are using health apps for their self-management only when they are in need (Figure 3). The number of educated people using health apps was significantly higher. In the multivariate model educational level of diabetic participants using health applications were more likely to be significant for the acceptance of health-related applications in comparison with those who were less educated mean 2.230 (± SD= 1.3894) times.

Table 1: Basic socio-demographic characteristics of the study population.

Gender	Male	208	42%
	Female	292	58%
Country	Pakistan	489	98%
	Abroad	11	2%
	Urban	355	71%
Living	Rural	145	29%
Education	Uneducated	56	11%
	Below matriculation	69	14%
	Matriculation / O levels	71	14%
	Intermediate / A levels	72	14%
	Graduation	127	25%
	Post-Graduation	105	21%

Table 2: Health applications by diabetic patients for their health-related goals

Skilled Using App	Yes, well skilled	99	20%
	Not very well skilled	252	50%
	Non-skilled	149	30%
	Yes	14	3%
Health App to Monitor Insulin	No	486	97%
Helped Track Progress on Health-Related Goals	Yes	65	13%
	No	435	87%
Helped in Discuss or consultations with Healthcare Provider	Yes	84	17%
	No	416	83%
Are you interested in using Apps?	Yes	264	53%
	No	236	47%
Do you recommend Apps to others?	Yes	252	50.4%
	No	248	49.6%

Table 3. Liner model indicates an association between the usage of health apps with educational status on diabetic patients

Educational status to self-care management by apps	Mean	Std. Deviation	P value
	2.230	1.3894	0.004*

*Denotes statistical significance Chi-square

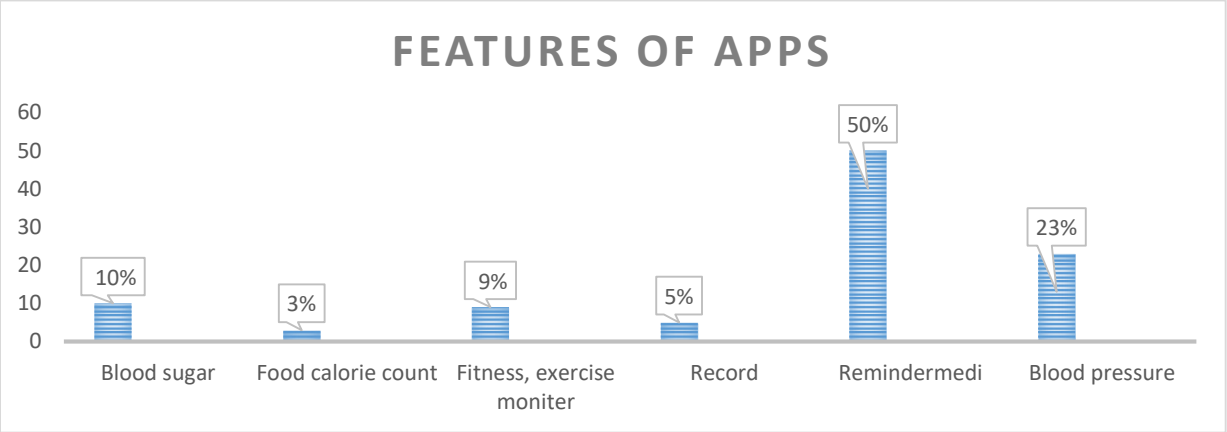

Figure 2: Most commonly used features used by the diabatic patients

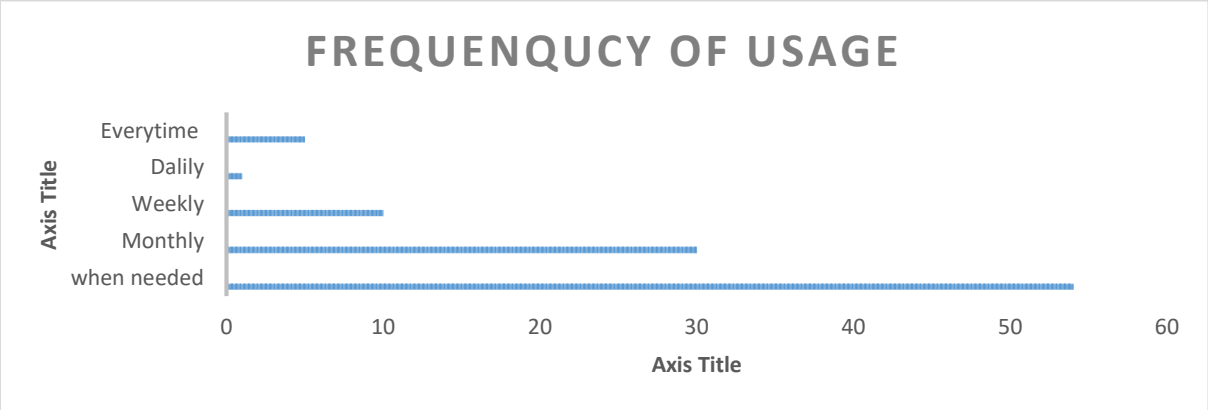

Figure 3: Frequency of usage of health applications by diabetic patients

DISCUSSION

This cross-sectional study observed cumulative and individual levels of self-care, overall, results indicate that most of the population in Pakistan is unaware of health apps that are useful for self-management/care in Diabetic patients. This might indicate less awareness of self-care or due to negligence toward preventive measures. Out of 500 participants in this research, 70% had access to smartphones where only 20% of those were good skilled and the rest of 10% were not skilled enough to the usage of health applications on their smartphones. These results revealed that the usage of health apps by diabetic patients to monitor their diabetes has not yet gained that popularity. Results also indicated that the majority, of the gap, was due to a lack of education. Those who are well-educated are using health apps for their self-management but poorly educated ones were not. As these findings were confirmed by the linear model which indicated a significant association between the usage of health apps for self-care with educational status. The negative usage was also due to the communication gap between doctors and patients. Lack of knowledge and limited access to healthcare facilities were also contributors to limited usage. Similar results were found in the previous study

suggesting that the participants were more intrigued to use social media on their smartphones(12). The subjective evaluation shows that almost all of the participants of the study want to learn to use digital technology for health care, similar study done at the University of Malaysia showed that patients are interested in using the apps if they are trained, and facilities are available from healthcare providers(13). Another study also emphasizes the role of education as an integral part of diabetes self-care and management. If patients are educated enough and have access to healthcare facilities then they can use health apps for their self-management(13, 14).

A study reported from America on diabetic patients and showed clinically significant improvement in HbA1c as they used smartphone apps and statistically significant improvement using the app. Patients using apps for diabetes experienced improvements in hypoglycemic episodes. Earlier studies have recommended the top few health applications based on the extensibility of the application features (15, 16).

The limitation of the present study includes a small sample size, so, the results' generalizability is limited. Another limitation of this study was that the non-diabetic group was not compared with the diabetic one concerning the usage of health applications

CONCLUSION

Most patients in Pakistan are not using any health apps for the self-care/ management of diabetes. The lack of usage is mainly because of the absence of education, the gap between healthcare professionals and patients, and limited access to healthcare facilities. Clear policies should be defined in improving access to digital resources regarding the self-management of diabetes.

Ethical Consideration: Ethical considerations: The study was approved by the ethical and review committee of The Dow university of health sciences having an ethical review number (Ref: IRB-2578/DUSH/Approval/2022). Participants were asked to participate if they voluntarily participate, they were also allowed to skip any question if not comfortable answering.

Conflict of Interest: There is no conflict of interest.

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