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ORIGINAL ARTICLE

Evaluating diabetic patients' perceptions and attitudes toward telemedicine visits during the period of the COVID-19 pandemic

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ABSTRACT

Background: Coronavirus disease 2019 demands more awareness of telemedicine among the Saudi community. Few studies address the perception of diabetic patients about telemedicine in Saudi Arabia. This study aimed to examine the attitude and perception of diabetic patients regarding telemedicine and to address the factors affecting satisfaction.

Methods: A cross-sectional descriptive study was conducted among diabetic patients in Saudi Arabia from March to June 2022. A structured self-prepared questionnaire was developed by Google Forms and distrusted through social media platforms. All statistical calculations were performed using: Statistical Package for the Social Sciences version 26.

Results: One hundred diabetic patients completed the questionnaire. About 55% were females. The majority (94.8%) were Saudi, aged more than 40 years (77.6%), married (82%), unemployed (62%), hold a bachelor's degree (51%), and 45% had diabetes more than 5 years. About 56% experienced only audio calls, 30% experienced video calls, and 14% experienced both. Most participants (93%) were not confused during telehealth consultation, 78.8% were satisfied with the experience in general, 83% would recommend it to others, and 49% see that telehealth can be the primary mean of counseling shortly. More than half of the participants (62%) mentioned that they prefer to see a physician in person. Patients younger than 40 reported a significantly higher satisfaction rate with telehealth (95.5%) than older patients (73.3%), $p = 0.037$.

Conclusion: Diabetic patients were generally satisfied with telehealth consultations. Further studies are needed to examine how to enhance patients' experiences and explore their preferences.

Keywords: Diabetes, telemedicine, telehealth, COVID-19, Saudi Arabia.

Introduction

Diabetes mellitus (DM) is a complex, chronic disease that can lead to mortality. It imposes a substantial economic burden on all governments worldwide. Its prevalence is alarmingly increasing worldwide, from 4.6% to 9.1% in only 17 years. Recent data has shown that around 10% of the global adult population is diabetic [1-3]. The World Health Organization (WHO) has reported that Saudi Arabia has the seventh highest rate of diabetes worldwide and the second highest in the Middle East. Research has estimated that approximately 7 million Saudis have diabetes [4]. With the outbreak of the coronavirus disease 2019 (COVID-19) pandemic, telemedicine has proved very useful for treating diabetic patients. Technologies are now being adopted to avoid the need to visit the doctor and hospital physically and still be able to provide

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suitable treatment options by adopting the virtualized treatment approaches for the patient [5-7]. The WHO has defined telemedicine as delivering healthcare services to distant patients through communication technology. Telemedicine comprises exchanging information for easy diagnosis, treatment, and prevention of diseases and injuries; continuing education; or research and evaluation [8]. Telemedicine is a live audio-visual interaction between a healthcare provider and a patient. It can be both a screening and diagnostic tool [9].

Initially, telemedicine was used to provide medical attention to people residing in rural areas or in cases where access to medical care is challenging to improve the management of urgent diseases and in cases of emergencies [10,11]. However, the employment of telemedicine progressively increased between 2004 and 2017 due to its ability to increase access to medical care in mental health and primary care settings as well as other specialities [12,13]. Telemedicine has been proven to be advantageous as both time and cost-effective. It also provides patients with direct and instant access to healthcare without considering their location. Telemedicine services have been recommended for patients with cancers, immunodeficiency, diabetes, asthma, and patients awaiting surgery. Telemedicine has also provided palliative programs and consultations [14]. Also, it has been established to be efficacious in screening diabetes-related complications such as radiculopathy. The modern technology provided with fundus cameras and other portable devices has enabled patients to take clear retinal photos that help specialists in the screening process. This method has helped offer screening services to a much more significant portion of the diabetic population. The comparison between the standard fundus oculus exam and telemedicine demonstrated the excellent efficacy of nonmydriatic cameras in terms of sensitivity and specificity [15].

Saudi Arabia, like most countries, has implemented COVID-19 preventive measures such as total and partial lockdowns to help control the infection's spread. Unfortunately, this resulted in the disruption of routine management of diabetic patients. To counteract this, many healthcare centers and hospitals implemented telemedicine programs to provide diabetic patients with the necessary medical care in a timely, appropriate manner [16,17]. Several studies were conducted in Saudi Arabia to evaluate patients' satisfaction with telemedicine services during COVID-19 pandemics. The results showed that most telemedicine service participants were satisfied [18,19]. However, with the rise in demand and use of telemedicine, there is little to know about the satisfaction of diabetic patients with telemedicine in the Saudi community. Therefore, it is essential to understand the perception of these patients toward adopting telemedicine during the present COVID-19 pandemic to address the obstacles to physical distancing counseling. Therefore, this study was established to assess the attitude and perception of patients attending clinics concerning telemedicine to ease its usage. In addition, the factors potentially affecting the level of awareness and attitude were evaluated.

Subjects and Methods

A cross-sectional observational study was conducted on diabetic patients from March to June 2022 using an online questionnaire. The included population was diabetic patients attending primary healthcare centers who could fill out the questionnaire and were willing to participate in the study. The study questionnaire was designed with some modifications to determine the diabetic patients' attitudes and perceptions of behaviors toward telemedicine use during the COVID-19 pandemic [20]. The survey was distributed through social media platforms such as Facebook, Instagram, Twitter, and WhatsApp. A total of 100 diabetic patients were included in the study. The participants were directed automatically to the survey by clicking on the link. Participation in this study was voluntary, and each subject had the right to withdraw at any time. The structured online questionnaire-based study was asked in Arabic via Google Forms. The information in the questionnaire was designed to illustrate socio-demographic characteristics, type of telehealth counseling experience, reasons for counseling attitudes, and perceptions of diabetic patients toward telemedicine services. The choices of questions related to attitudes of diabetic patients toward telemedicine service were: "Yes," "No," and "Neutral." All data in the study were collected within the Google Forms spreadsheet system, and no one can access these data except the study investigators. Statistical data analysis was conducted using Statistical Package for the Social Sciences (version 26) software. Descriptive and comparative statistical analysis will be used. Categorical variables will be summarized as frequencies and percentages. The factors affecting satisfaction and attitude were investigated using comparative tests such as Chi-square and Fisher exact *t*-test. A significance level of 0.05 will be considered for all comparative tests.

Results

In the current study, 100 diabetic patients were included. Gender was almost equally distributed (55 were females). Most respondents (n = 76) were at age 40 or older (77.6%), and the remainder (n = 22) were below 40 (22.4%). Saudi participants (n = 92) were considered 94.8%. Most respondents were married (n = 82) and held a university degree (n = 51). Most of the respondents were unemployed (n = 62) (62%). Most participants (n = 45) have been diagnosed with DM for over 5 years (45%). Complete demographic characteristics are demonstrated in Table 1.

In the current study, the type and the duration of the telehealth counseling experience and the reasons for counseling were identified in Table 2. About 56% of the participants (n = 56) used the audio call, and about 30 responders (30%) used the video call. The most frequent duration of telehealth consultation was less than

Table 1. *Demographic characteristics of participants.*

Participants'characteristics		Count *N* = 100	Percentage
Gender	Male	45	45
	Female	55	55
Age	< 40 year	22	22.4
	≥ 40 years	76	77.6
Social status	Single	8	8
	Married	82	82
	Divorced	6	6
	Widowed	4	4
Education	Illiterate	2	2
	High school	37	37
	Graduate	51	51
	Postgraduate	10	10
Nationality	Saudi	92	94.8
	Non-Saudi	5	5.2
Employment status	Unemployed	62	62
	Employed	38	38
Year of diagnosis	Less than 1 year	17	17
	1-5 years	37	37
	More than 5 years	45	45

Table 2. *Factors related to telehealth counseling.*

Parameters	Categories	Count (*N* = 100)	Percentage
Type of telehealth	Audio	56	56
	Video	30	30
	Both	14	14
Duration of telehealth call	Less than 15 minutes	89	89
	More than 15 minutes	11	11
Reason for counselling	Medication refill	26	26
	Follow-up	48	48
	New-consultation	10	10
	Review laboratory test	16	16

15 minutes of call (n = 89, 89%). Follow-up was the primary reason for telehealth counselling (n = 48, 48%), then getting a medication refill (n = 26, 26%).

Table 3 illustrates the attitudes and perceptions of participants toward the telehealth experience counseling. Most respondents (n = 93, 93%) did not find any confusing or complicated aspects of telehealth implementation. Around 83 (83%) of respondents might recommend the implementation of telemedicine services to friends or family members. About 78 (78.8%) of participants were satisfied with the access to telehealth consultation, and only four were unsatisfied. Regarding satisfaction with the availability of physicians during telehealth calls, 81 (82.7%) of individuals were satisfied; on the other hand, 62 respondents preferred to see the physician in person; whereas 31 respondents were neutral. Finally, making telehealth consultation the primary mean shortly was agreed upon by 49% of the participants.

The factors associated with the attitudes and perceptions of individuals toward telehealth applications are shown in Table 4. A significantly higher proportion of participants younger than 40 were satisfied with telehealth (95.5%) compared to older participants (73.3%) with, a p-value of 0.037. On the other hand, other factors such as gender, social status, education, nationality, employment status, duration of diabetes, the reason for the counseling, and duration and type of telehealth consultation session

192 ***Table 3.*** *Participants' attitude toward telehealth during DM diagnosis.*

Parameters	Categories	Count *N* = 100	Percentage
Confusing and/ or complicated were found about using telehealth consultation.	Yes	7	7
	Neutral	0	0
	No	93	93
Satisfaction with the access to telehealth consultation	Yes	78	78.8
	Neutral	17	17.2
	No	4	4
Satisfaction with the availability of physician	Yes	81	82.7
	Neutral	14	14.3
	No	3	3.1
Recommending telehealth to a friend or a family member	Yes	83	83
	No	17	17
Telehealth consultation could be the primary means of consultation in the near future.	Yes	49	49
	Neutral	23	23
	No	28	28
Preferring to see a physician in person	Yes	62	62
	Neutral	31	31
	No	7	7

194 ***Table 4.*** *Factors affecting participants' satisfaction with telehealth.*

Characteristics of the study group		Satisfied with telehealth counseling		
		Yes	No	*p*-value
Gender	Male	37 (84.1%)	7 (15.9%)	0.248
	Female	41 (74.5%)	14 (25.5%)	
Age	< 40 years	21 (95.5%)	1(4.5%)	0.037
	≥ 40 years	55 (73.3%)	20 (26.7%)	
Social status	Single	7 (87.5%)	1 (12.5%)	0.721
	Married	63 (77.8%)	18 (22.2%)	
	Divorced	4 (66.7%)	2 (33.3%)	
	Widowed	4 (100%)	0 (0%)	
Education	Non graduated	28 (73.7%)	10 (26.3%)	0.327
	graduated	50 (82%)	11 (18%)	
Nationality	Saudi	70 (76.9%)	21 (23.1%)	0.582
	Non-Saudi	5 (100%)	0 (0%)	
Employment status	Unemployed	49 (80.3%)	12 (19.7%)	0.635
	Employed	29 (76.3%)	9 (23.7%)	
Year of DM diagnosis	Less than 1 year	14 (82.4%)	3 (17.6%)	0.735
	1-5 years	30 (81.1%)	7 (18.9%)	
	More than 5 years	33 (75%)	11 (25%)	
Reason for counselling	Medication refill	19 (73.1%)	7 (26.9%)	0.058
	Follow-up	40 (83.3%)	8 (16.7%)	
	New-consultation	5 (50%)	5 (50%)	
	Review laboratory test	14 (93.3%)	1 (6.7%)	
Duration of Telehealth	Less than 15 minutes	69 (78.4%)	19 (21.6%)	1.000
	More than 15 minutes	9 (81.8%)	2 (18.2%)	
Type of telehealth	Audio	42 (76.4%)	13 (23.6%)	0.381
	Video	23 (76.7%)	7 (23.3%)	
	Both	13 (92.9%)	1 (7.1%)	

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showed no significant impact on participants' satisfaction rate shown in Table 4.

Discussion

COVID-19 causes unparalleled issues in the relationship between diabetic patients and physicians. As patients worry about direct contact with physicians and vice versa, telemedicine has facilitated communication between patients and physicians. Generally, prior studies demonstrated that telemedicine is considered an effective tool in providing health care services to patients during the COVID-19 pandemic [19]. Assessing patients' satisfaction with telemedicine and the corresponding factors will aid in evaluating telemedicine implementation [21]. However, to our knowledge, no previous study was conducted among diabetic patients to investigate their attitude/perception about telehealth counseling.

The current study showed increased satisfaction among diabetic patients toward their experience of telehealth counseling during the COVID-19 pandemic. This was by previous studies that illustrated a higher satisfaction of patients and the clinical outcome when using telemedicine compared with patients who were not using it [22,23]. Although, the studies about telemedicine implementation were commonly carried out in developed countries rather than in Saudi Arabia or other countries worldwide [24]. Although as demonstrated in our study, most participants (62%) preferred seeing the physician in person. This could be justified due to a lack of trust in virtual counseling and physicians. Prior studies established in the COVID-19 era showed that patients who seek telehealth counseling rather than an in-person visit had a previous trustworthy relationship between patient and physician before choosing virtual consultation [19,25]

The present study focused on the factors that may associate with the attitudes and convictions of individuals toward telemedicine. In this study, participants aged 40 or more had significantly higher satisfaction with telemedicine than other participants. A previous study in the United States of America (USA) found that age, gender, nationality, and education did not affect patients' attitudes toward telemedicine [26]. Another study in Saudi Arabia emphasized a non-significant effect of gender, nationality, and education level on satisfaction with telehealth. However, the later study empowered the significant satisfaction of respondents aged 18-25 toward telemedicine compared with participants above 25 years [27].

A recent study in the USA showed that audio calls and electronic health records facilitated the treatment and follow-up of patients, especially in emergency cases [28]. The current study showed that the reason for telehealth counseling might affect patients' satisfaction; however, the effect was not statistically significant. For instance, respondents who needed only follow-up were more pleasant with telemedicine than those who needed a new consultation. A prior study showed that one of the challenges of telemedicine was the lack of physical check-up that was essential for getting a further consultation. But that issue did not apply to the follow-up [29]. Moreover, more aspects were assessed in our study, such as other demographics, duration of diabetes disease, and factors related to telehealth counseling but with no significant effect on the satisfaction of diabetic patients. The limitations of this study were the small sample size and recall bias.

Conclusion

Generally, our study has demonstrated a higher satisfaction toward implementing telehealth experiences during the COVID-19 pandemic, especially among younger adults. Therefore, future research is recommended to investigate further the reasons for older adults' dissatisfaction to find practical solutions to cover any gaps and ensure better healthcare for this group of patients while keeping them safe.

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List of Abbreviations

COVID-19	Coronavirus disease 2019
USA	United States of America
WHO	World Health Organization

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent to participate

Informed consent was obtained from all the participants.

Ethical approval

Author details

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