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The impact of COVID-19 pandemic on treatment adherence, access to care, and disease control in diabetic patients in Jordan, an online survey

Ghaith M. Al-Taani[1]*, Suhaib M. Muflih[2], Rawan Alsharedeh[3], Reema Karasneh[4], Sayer I. Al-Azzam[2]

[1]Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy, Yarmouk University, Irbid, Jordan.
[2]Department of Clinical Pharmacy, Faculty of Pharmacy, Jordan University of Science and Technology, Irbid, Jordan.
[3]Department of Pharmaceutics and Pharmaceutical Technology, Faculty of Pharmacy, Yarmouk University, Irbid, Jordan.
[4]Department of Basic Medical Sciences, Faculty of Medicine, Yarmouk University, Irbid, Jordan.

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ABSTRACT

This study aimed to assess the impact of the COVID-19 pandemic on treatment adherence, access to care, and disease control in diabetic patients. An online survey design was utilized to collect data from a convenient sample of diabetic patients in Jordan. The developed survey collected data on sociodemographic characteristics, COVID-19 impact on access to care in diabetic patients, COVID-19 impact on diabetic patients' adherence to their medications, and patients' level of knowledge of COVID-19 impact on their health. Nearly three-quarters of the participants reported that they avoided going to the physician for regular non-emergent visits during the outbreak, and 69.5% stated that their access to insulin, other diabetic medications, and supplies was not affected by the pandemic situation. The majority of patients reported that COVID-19 did not affect their adherence to their medications. Almost 42% reported that COVID-19 has negatively affected their physical activity level and their healthy lifestyle habits, while 60% stated that it did not affect their diet. Additionally, 56.6% reported that they have noticed less control in their blood glucose readings. The findings may reflect that the patients high adherence rate to their medications and that they avoided going to the doctor's clinic to avoid contracting the virus.

INTRODUCTION

The 2019 novel coronavirus disease (COVID-19) was first identified in Wuhan, China in December 2019 [1]. It has rapidly spread worldwide, then it was declared a global pandemic by the World Health Organization (WHO) on March 11, 2020 [2]. It is caused by a novel coronavirus, the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) [1], which belongs to the same family as that of the SARS-CoV and the Middle East respiratory syndrome coronavirus (MERS-CoV), which caused remarkable outbreaks in 2003 and 2012, respectively [3,4]. The novel coronavirus disease is highly contagious with the most common symptoms being fever, dry cough, and fatigue. However, some patients may develop severe respiratory symptoms, shock, acidosis, and coagulation dysfunction [5]. As of January 14, 2024, there have been 774,291,287 confirmed cases of COVID-19 globally, including 7,019,704 deaths, reported to WHO [6]. On January 14, 2024, in Jordan, 1,746,997 cases were confirmed, including 14,122 deaths, as reported by the Jordanian Ministry of Health [7]. These figures include new cases and recurrent cases. In a systematic review and meta-analysis of 41 studies in the field, 15% of patients hospitalized for COVID-19 had a subsequent recurrence of COVID-19 [8]. Diabetes mellitus (DM) is associated with multiple microvascular and macrovascular complications, that affect the overall patient's survival. Moreover, it is one of the leading causes of morbidity and mortality around the world [9].

*Corresponding Author
Ghaith M. Al-Taani, Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy, Yarmouk University, Irbid, Jordan.
E-mail: g.altaani @ yu.edu.jo

As reported by the International Diabetes Federation, DM has affected 463 million people globally by 2019 [10]. Clinically, it has long been recognized that a relationship exists between diabetes and infections [11]. For example, influenza and pneumonia are more common and serious in older people with type 2 DM [12,13]. Thus, it is recommended that people with diabetes take the pneumococcal and annual influenza vaccines [14]. However, it remains controversial whether diabetes itself increases the susceptibility and affects the outcomes of infections, or the comorbidities and complications that are frequently associated with it are the major involved factors [15]. Notably, in patients infected with several viruses, such as the 2009 pandemic influenza A (H1N1) [16], SARS-CoV [17], and MERS-CoV [18], diabetes and uncontrolled glycemia were described as significant predictors of severity and death. Regarding the current COVID-19 pandemic situation, some studies did not detect a clear association between diabetes and the severity of the disease [19,20]. While other reports from Italy [21] and China [22,23] indicated that patients with chronic diseases, including diabetes, had a greater risk for a severe COVID-19 course and death. However, the susceptibility to COVID-19 infection may not be greater in people with diabetes, as several studies have reported that the prevalence of diabetes in people infected with COVID-19 is nearly the same as the general population, or ≤10% [24–26,22,27–30]. The COVID-19 pandemic has contributed to a massive change in people's lives in every aspect, it forced a new lifestyle, with social distancing rules, the precautions and measures of constantly disinfecting the hands and wearing facemasks, and sedentary behaviors due to the lockdown and the closure of most of the facilities, all of these sudden unexpected changes are expected to have an impact on patients with chronic diseases in several perspectives, such as their adherence to their medications, the access to medications and the ability to refill their prescriptions on time, and doing exercises that are beneficial in many diseases.

As a response to the first wave of the COVID-19 pandemic, the governmental authorities in Jordan undertook a number of measures as a response to COVID-19 pandemic. These included proactive measures, signaled by the pandemic situation in other countries, and reactive according to the number of cases and their unique geographical distribution and their underlying causes. These measures were the suspension of flights to Jordan and closure of all ports of entry to Jordan and carrying out screening tests for COVID-19, and activation of defense law on March 17, 2020. According to defense law-associated decisions, the majority of sectors were locked down, individuals were prevented from leaving their homes except in cases of extreme necessity, quarantine and isolation of all suspected cases, social distancing and launching web-based platforms for delivery of goods, including medicines, and for health and educational sectors. On May 7, 2023, the defense law was suspended throughout the country (www.esc.jo). Regarding the pharmacy sector within the pandemic time, there has been decreased work capacity within the drug factories nationally and internationally, which might affect the availability of essential medicines, fast-tract approval of remdesivir for selected patients infected with COVID-19, there has been increased delivery of medicines from pharmacies within both private and public sector, there has been panic buying of demand for sanitizers, masks, gloves, and personal protective equipment, also medicines for chronic diseases has been stockpiled by patients as well as acute medicines such as emergency medicine and painkillers [31]. Regarding the day-to-day workflow within the pharmacies, there have been a number of measures that have been put forward by the healthcare policymakers and regulatory bodies in Jordan to ensure the supply of essential medicines, while preventing the transmission of the COVID-19 infection. An electronic platform has been launched named "Emad Hakeem" that addresses the necessary refills for essential chronic medicines, other measures to prevent panic buying of hydroxychloroquine were also made, "Hello Pharmacy" was launched which is a hotline for customers to identify the closest pharmacy to them, and free home delivery was also offered by pharmacies during the quarantine period under strict guidelines from the regulatory bodies in Jordan [32]. There has been a low level of adherence to medications for diabetics in Jordan which was assessed using a self-rated questionnaire before the COVID-19 pandemic. About half of the diabetic patients world-wide are non-adherent to the diabetes medications in prospective studies, with some studies reporting a lower non-adherence rate [33–37]. Diabetes was among the most prevalent underlying diseases in hospitalized COVID-19 patients, as reported by Emami *et al.* [38] in a systematic review of 76,993 patients. As it is crucial for diabetic patients to be adherent to their medications and to always have access to these medications on time, and due to the restrictions in Jordan that were forced by the pandemic, this study aimed at assessing the impact of COVID-19 pandemic on diabetic patients, in terms of medications' adherence, access to care and medications, disease control, and lifestyle (i.e., diet and exercise).

METHODS

Study design

A cross-sectional survey using online social media platforms was used to recruit eligible participants. The data for this study were collected from diabetic patients in Jordan. Different social media platforms were utilized to recruit patients, including Facebook pages and groups, WhatsApp, and personal emails. The data were collected over the period April–May 2020, which corresponds with the first wave of the outbreak. The guidelines for the treatment of coronavirus pneumonia were based on the severity of the illness, and treatment options include antivirals, antibody treatment, corticosteroids, and/or oxygen therapy [39]. At the time of data collection, there was no vaccine approved. According to WHO and worldometrics on May 22, 2020, worldwide there have been more than 13 million cases of COVID-19 and more than 500,000 deaths. In Jordan in the Middle East, there have been 1,206 cases and 10 deaths.

The Google form questionnaire included four sections: sociodemographic characteristics, COVID-19's impact on access to care in diabetic patients, its impact on their adherence to their medications, and their level of knowledge of its impact on their health. The participants were invited through a post that included details about the study and that it is directed to diabetics. The first section of the Google Form

asked whether the participant had diabetes and whether they agreed to complete the survey, if they reported that they were non-diabetics or do not agree to take part, they were directed out of the survey.

Development of the survey instrument

The survey items were developed via discussions within the research team and adaptation of relevant scales found in the research literature. Since these survey items are in English, as they were translated to Arabic, to ensure a clear and accurate translation of the chosen items and that they conveyed the same meaning as the English version, the back translation process was utilized. The survey was reviewed by experts in the field of pharmacotherapy and medicine to provide necessary changes and establish both face and content validity. The content validity index was assessed for the present survey instrument, in which input from six faculty members from the school of pharmacy was utilized and the content validity index was 0.871.

Principle component analysis: Factor analysis devised using principal component analysis was carried out to confirm the validity of the instrument in diabetic patients. Kaiser-Meyer-Olkin measure was used to confirm the adequacy of the sample size and it was found to be 0.705 which is more than the minimum cut-off point of 0.6 to indicate sample adequacy [40]. Bartlett's test of sphericity was statistically significant (p-value in the present study = <0.001), which highlights that factor analysis is appropriate [40]. In the present study, five factors were retained, corresponding with the survey instrument domains, using a scree plot. The total variance explained by the components was 43.7%. The correlation between the domains of the instrument was low. High item (>0.4) loading confirmed the label of the five domains. Few items have low (i.e., less than 0.3) commonalities.

The reliability of the questionnaire was further established during the pilot testing stage, by collecting data from 10 participants who were not included in the study sample. The final survey was developed and administered in the Arabic language, which is the official spoken language in Jordan. In the present study, Cronbach's alpha was estimated to be 0.718 as a measure of internal consistency, which is considered acceptable to be higher than 0.6.

Ethical considerations

The study protocol was approved by the Institutional Review Board, at Jordan University of Science and Technology with approval number Ref.:205/132/2020, date: 25.06.2020. Participants were informed about the anonymous and voluntary nature of the study, the confidentiality of information obtained in this study, as well as risks and benefits associated with consenting to participate. Informed consent was embedded in the online survey, and questions would not be viewed by potential participants unless they clicked the "I agree" button, which indicated their voluntary participation.

Statistical analysis

Data collected on Google Forms were exported to a Microsoft Excel file, which was directly imported into IBM SPSS® version 24.0 for statistical analysis. Descriptive statistics (e.g., mean with standard deviation) were used to illustrate participants' characteristics and responses. A number of scales have been devised a health literacy scale (higher score lower literacy), adherence scales (higher score lower adherence), and access to care (the higher the score the lower the access to care), and a number of correlations were carried out using Pearson correlation. An automatic linear regression model was used to identify the predictors associated with summated adherence scale (higher score associated with lower adherence), retaining statistically significant independent predictors associated with non-adherence.

Raosoft® was utilized to calculate the appropriate sample size that should be included in this study. To achieve a 95% confidence interval and 5.1 error margin, the minimum sample size was determined to consist of 367 observations [41].

RESULTS

A total of 371 patients have completed the survey. Male participants (62.3%) were more than females, with an

Table 1. Sociodemographic characteristics of the respondents.

Variable		Frequency (%)
Age (mean, range)		49.68 (18–84)
Gender	Male	231 (62.3)
	Female	140 (37.7)
Job	Medical	24 (6.5)
	Nonmedical	322 (86.8)
Marital status	Single	44 (11.9)
	Married	303 (81.7)
	Other (Widowed, Divorced)	24 (6.5)
Smoking	Yes	145 (39.1)
	No	226 (60.9)
Socioeconomic status	Low	102 (27.5)
	Moderate	241 (65.0)
	High	16 (4.3)
	Don't know	12 (3.2)

Table 2. Diabetic patient's knowledge of the impact of COVID-19 on their health.

	True *N* (%)	False *N* (%)
Diabetic patients have a greater chance of COVID19 infection	193 (52.0)	178 (48.0)
Diabetic patients are more likely to have severe medical complications (for example, respiratory) due to COVID 19 pandemic.	174 (46.9)	197 (53.1)
Corona viruses grow more in a high blood-glucose environment like in diabetics who have uncontrolled blood sugar.	125 (33.7)	246 (66.3)
Viral infections, such as SARS-COV-2, can cause serious complications (for example: diabetic ketoacidosis)	101 (27.2)	270 (72.8)
DM increases the risk of death in the event of coronavirus infection in patients who have uncontrolled blood sugar.	187 (50.4)	184 (49.6)

Table 3. The impact of COVID-19 on access to care in diabetic patients.

Variable	Yes *N* (%)	No *N* (%)	Sometimes *N* (%)
Are you having difficulty consulting a doctor for diabetes?	153 (41.2)	156 (42.0)	62 (16.7)
During the COVID-19 pandemic, did you avoid going to the doctor with problems that could be deferred, for example vaccination or a general examination	273 (73.6)	98 (26.4)	
During the COVID-19 pandemic, has the attainment of insulin and other medicines and diabetes supplies been affected?	113 (30.5)	258 (69.5)	
Do you think that the site of physician 's clinic is suitable for your place of residence for consultation them?	200 (53.9)	170 (45.58)	

Table 4. COVID-19 impact on adherence to medications in diabetic patients.

	Yes *N* (%)	No *N* (%)	Sometimes *N* (%)
Did you forget to take your medications in the past 2 months?	43 (11.6)	300 (80.9)	28 (7.5)
Did you take fewer medications or miss a dose intentionally during the past 2 months?	44 (11.9)	308 (83.0)	19 (5.1)
Did you stop taking any medications intentionally during the past 2 months without consulting a doctor?	19 (5.1)	334 (90)	18 (4.9)

average age of 49.7 years (age range = 18–84 years). The majority of participants were married, with non-medical jobs. Approximately, 40% of the participants were smokers. A total of 92.5% of the respondents reported having a low to moderate socioeconomic status, and 4.3% had a high socioeconomic status (Table 1).

To assess diabetic patients' knowledge of COVID-19's impact on their health, they were asked several "True" or "False" questions. When the participants were asked if "Diabetic patients have a greater chance of getting COVID-19," 52.0% answered "True," when asked if "Diabetic patients are more likely to have severe medical complications due to COVID-19," 53.1% answered "False," while when asked if "Coronaviruses grow in a high blood-glucose environment, like the case in uncontrolled hyperglycemia," 66.3% answered "False," 72% answered "False" when asked "Viral infections can cause serious complications (e.g., diabetic ketoacidosis)," and finally 50.4% answered "True" when asked if "DM increases the risk of death when concurrent with COVID-19 in patients with uncontrolled glycemia" (Table 2).

The majority of the respondents (73.6%) stated that they avoided going to the doctor for regular non-emergent visits during the COVID-19 outbreak, and 69.5% reported that their access to insulin and other DM medications have not been affected, 53.9% said that their physician's clinic location was suitable according to their place of residence, while 41.2% reported having a difficulty consulting an endocrinologist during the outbreak, and 16.7% said that they sometimes had difficulties (Table 3).

Moreover, this study assessed the adherence of diabetic patients to their medications, where 80.9% of them reported that they did not forget to take their medications in the past 2 months (during the COVID-19 outbreak), 83.0% stated that they did not take fewer medications intentionally or missed doses, and 90% confirmed that they did not stop taking their medications intentionally during the outbreak without consulting their doctor (Table 4).

The questionnaire contained a section to investigate COVID-19's impact on diabetic patients' adherence to lifestyle

Table 5. COVID-19 impact on adherence to lifestyle modifications and non-pharmacological therapies in diabetic patients.

a. COVID-19 impact on physical activity and diet			
Variable	**More (%)**	**Less *N* (%)**	**No change *N* (%)**
Do you practice a healthy lifestyle as directed?	110 (29.6)	148 (39.9)	113 (30.5)
How did the COVID-19 pandemic affect your physical activity practice?	25 (6.7)	157 (42.3)	187 (50.4)
How did the COVID-19 pandemic affect your healthy diet?	62 (16.7)	83 (22.4)	225 (60.6)

a. **Healthy lifestyle practices within the past 2 months**				
Variable	**<1 day/week *N* (%)**	**1-2 days/week *N* (%)**	**3-4 days/week *N* (%)**	**5-7 days/week *N* (%)**
Eating five or more portions of vegetables and fruits	145 (39.1)	100 (27.0)	91 (24.5)	35 (9.4)
Eating shortly before bedtime	164 (44.2)	103 (27.8)	75 (20.2)	29 (7.8)
Carrying out continuous physical activity for a period of not less than 30 minutes	157 (42.3)	79 (21.3)	86 (23.2)	49 (13.2)
Eating high-fat diet	165 (44.5)	122 (32.9)	61 (16.4)	23 (6.2)

Table 6. Predictors associated with non-adherence assessed via summated score.

Predictors	B (standard error)	*p* value	95% confidence interval for B
Constant	1.472 (0.588)	0.013	0.315–2.629
Age	−0.014 (0.007)	0.046	−0.028–0.0
Lower access to health care	0.309 (0.067)	<0.001	0.178–0.441
Healthy life style	−0.098 (0.046)	0.035	−0.188–0.007
Higher standard of living	0.282 (0.121)	0.021	0.043–0.521

modifications, when the participants were asked "Do you practice a healthy lifestyle as directed?", 39.9% said that the practice less than before now and 30.5% said that their practice routine did not change, 50% of the respondents reported that COVID-19 did not affect their physical activity practice, while 42.2% said that their physical activity practice is less now, and when asked "How did the COVID-19 pandemic affect your diet?", 60.0% reported no change in their diet (Table 5).

Moreover, 39.1% of the participating patients stated that they ate five or more portions of vegetables and fruits only on 1 day or less of the week, 44.2% reported that they ate shortly before bedtime on 1 day or less of the week, 42.3% said that they performed a continuous physical activity for a minimum of 30 minutes only on 1 day or less of the week, and 44.5% reported that they ate high-fat diet on 1 day or less of the week (Table 5). Correlation analysis revealed that participants with higher age had lower adherence (Pearson coefficient -0.129; *p*-value 0.013), lower health literacy decreased access to care (Pearson coefficient −0.121, *p*-value = 0.020) and non-adherence was correlated with lower health literacy (0.261 *p*-value <0.001). Table 6 summarizes the predictors associated with non-adherence based on a summative scale. The statistically significant independent predictors with associated with non-adherence were lower access to healthcare and higher standard of living. Increased age and having a healthy lifestyle were associated with more adherence.

DISCUSSION

This study in Jordan assessed the impact of COVID-19 on treatment adherence, access to care, and disease control in diabetic patients through comprehensive assessment, while other studies assessed single outcome such as accessibility and disease control [42,43]. A cross-sectional survey using online social media platforms was used to recruit eligible participants. The data for this study were collected from diabetic patients. As demonstrated by the findings, a large proportion of participants reported that during the outbreak, their commitment to taking their medications has not changed (64.7%). Additionally, they stated that they did not forget to take their medications (80.9%), they did not take fewer medications intentionally (83%), and they did not stop taking any of their medications without consulting a doctor (90%). These habits were inconsistent with their levels of knowledge of the impact of COVID-19 on their health, as 72.8% did not know that viral infections, such as SARS-CoV-2 can cause serious complications and 66.3% denied that SARS-CoV-2 favors a high blood-glucose environment to grow in. Thus, the level of diabetic patients' knowledge of the impact of COVID-19 on their health did not affect their medications' adherence, which is inconsistent with the findings of a study conducted by Zhong *et al.* [44] as they reported that a low level of knowledge about COVID-19 was associated with negative attitudes; however, it differs from the present study that it assessed knowledge, attitude and practice towards COVID 19, whereas in the present study assessed the knowledge of impact of COVID 19 on diabetics health. The participants' attitudes might reflect their well-education on the importance of adherence to chronic diseases' medications and how these medications help them to control their diseases and to have a better quality of life with less complications. Their low levels of knowledge regarding COVID-19 may be attributed to the novelty of the disease and the conflicting information that is available about it. The present study highlighted that lower health literacy was correlated with decreased access to care and that non-adherence was correlated with lower health literacy.

The results of this study showed that COVID-19 has negatively affected diabetic patients' adherence to healthy lifestyle habits and nonpharmacological therapies; but to a lesser extent the diet, which may be caused by the impact of the lockdown on the mental health of people, as concluded by Fiorillo *et al.* [45] that the lockdown and the physical isolation constitute a real threat for the mental health of the general population. Additionally, previous studies have shown that diabetes itself is associated with an increased prevalence of depression [46]. Thus, depressive symptoms are expected to exaggerate in the case of the concomitant existence of diabetes and COVID-19. Furthermore, this calls attention to the phenomenon of not enforcing adherence to lifestyle modifications to the same extent as that of medications, and that the practitioners do not give appropriate advice regarding lifestyle modifications, which have all been reflected in the form of low patients' adherence a to lifestyle healthy routine. Therefore, patients should have the knowledge about the importance of healthy lifestyle modifications, to have the willingness to comply with these modifications [47]. In Italy, the perception of weight gain was associated with COVID-19. Thus, a slightly increased physical activity, as well as a greater adherence to the Mediterranean diet (i.e., a plant-based diet using vegetables, fruits, cereals, nuts, and legumes, cooked by adding large amounts of olive oil, with limited intake of meat and alcohol [48]) have been reported [49]. Additionally, in Spain, an increased trend in consuming healthy food by the adoption of the Mediterranean diet was noted during the COVID-19 pandemic [50]. The findings also demonstrated that 73.6% of the participants had avoided going to the physician for regular, non-emergent visits, and nearly 60% stated that they had difficulty consulting an endocrinologist. These behaviors may show that the patients were scared of contracting the virus by going to the healthcare facilities. On the other hand, almost 70% reported that their access to insulin and other DM medications and supplies was not affected by COVID-19. However, half of the participants believed that the physicians' clinic locations were suitable for them according

to their place of residence, which was not related to the current pandemic situation.

Moreover, the WHO has called attention to the fact that COVID-19 is significantly impacting health services for noncommunicable diseases, as it led to a widespread of health services disruption, as well as the reassignment of staff to support COVID-19 and postponing of screening. Hence, implementing alternative strategies for continuing care is mandatory. For example, some countries are now using telemedicine (advice by telephone or online means) to replace in-person consultations as an alternative strategy [51]. As Moazzami *et al.* [52] suggested in their study telemedicine can be utilized to communicate with patients remotely, especially by the quarantined physicians after their exposure to COVID-19 [52]. Generally, the impact of the COVID-19 pandemic was positive on some people, since they have benefited from the quarantine restrictions by adopting a healthy lifestyle, due to the limited access to fast food, snacks, and sweets. While the pandemic's impact was negative on others who adopted a non-healthy lifestyle with low physical activity.

Moreover, this study has shown that the lower adherence to non-pharmacological therapies and lifestyle modifications as well as the difficulty in consulting an endocrinologist can be linked to poor control in the blood-glucose levels. As almost 40% of the participants have noticed a decrease in the control of their blood-glucose level readings during the COVID-19 outbreak. This is perturbing as the findings of some studies illustrated that COVID-19's complications increase with poor glycemic control [53–55]. This study was conducted using an online questionnaire form, therefore it is subject to selection bias, as those who cannot access the Internet, those who did not receive an invitation to the survey, or those who lack digital literacy did not have the chance to participate. Also, there are limitation related to the use of the online sampling frame. However, the global COVID-19 outbreak and the mandatory public quarantine in Jordan made this research methodology feasible and the present study has adequate power based on an a priori determined sample size calculation.

The present study assessed a number of trends within the use of medicines for diabetics at the time of the COVID-19 pandemic. Future research proposed may include enhancement of the capacity to provide healthcare over distance and devising initiatives to enhance the use of new information technology solutions, including digitalization in healthcare and newer artificial intelligence techniques. An extension to the present study is the assessment of the impact of the pandemics on patients from vulnerable populations, such as those from low socioeconomic backgrounds, and the impact of this on the development of health disparities. Furthermore, the development of supply chains for medicines and supplies that are less vulnerable to pandemic situations and other disruptions is another potential future perspective. Through effective supply chain strategies, improvements could be realized in the attainment of the therapeutic goals and adherence to medicines.

CONCLUSION

The majority of the participants realized the importance of adherence to their medications, as the level of adherence among the patients was satisfying during the outbreak. However, their levels of knowledge regarding the impact of COVID-19 on their health were relatively low, as well as their adherence to non-pharmacological therapies and healthy lifestyle modifications. Thus, more education programs and campaigns should be started to improve their knowledge of this novel disease and how it affects their health, in addition to highlighting the importance of lifestyle modifications and healthy habits in glycemic control. Furthermore, few research studies have addressed the mechanism of the impact of DM on the disease course of COVID-19, more research is needed to establish a relationship between these two diseases, and to emphasize the role of education on people's health.

AUTHOR CONTRIBUTIONS

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work. All the authors are eligible to be an author as per the International Committee of Medical Journal Editors (ICMJE) requirements/guidelines.

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CONFLICTS OF INTEREST

The authors report no financial or any other conflicts of interest in this work.

ETHICAL APPROVALS

The study protocol was approved by the Institutional Review Board, at Jordan University of Science and Technology with approval number Ref.:205/132/2020, date 25.06.2020. Participants were informed about the anonymous and voluntary nature of the study, the confidentiality of information obtained in this study, as well as risks and benefits associated with consenting to participate.

DATA AVAILABILITY

All data generated and analyzed are included in this research article.

PUBLISHER'S NOTE

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USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

The authors declares that they have not used artificial intelligence (AI)-tools for writing and editing of the manuscript, and no images were manipulated using AI.

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