Original Article

Evaluation of glycemic control among Type 2 diabetic patients in the first visit after COVID-19 lockdown, Prince Mansour Military Hospital, Taif, Saudi Arabia

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Abstract

Background: The coronavirus disease (COVID-19) pandemic causes significant morbidities and mortalities. Lockdown is applied worldwide to counteract the spread of the disease. These circumstances limit diabetic patients from hospital visits and follow-ups. **Objectives:** To evaluate glycemic control for type 2 diabetic patients in the first visit after COVID-19 lockdown and to study the effect of COVID-19 lockdown on glycemic control. **Methods:** A cross-sectional study was conducted at Prince Mansour Military Hospital, Taif city, Western Saudi Arabia. It included type 2 diabetic patients of both genders aged over 20 years that were assigned to follow-up in the diabetic center. Data were collected from patients' medical records using a simple random technique. It included patients` gender, age group, body mass index, and three glycosylated hemoglobin (HbA1c) readings for each year (2018–2019) and one HbA1C reading upon the first visit after COVID-19 lockdown. HbA1c level was treated as a continuous variable. **Results:** The study included 420 diabetic patients. Females represented 51% of them, and more than a third (39.8%) were aged 60 years and over. The majority of them were either overweight (29.3%) or obese (61.2%). There was an increase in the overall level of HbA1c after curfew (8.72 ± 1.73) than before it (8.58 ± 1.72). However, the difference did not reach a statistically significant level, $P = 0.056$. Among females, the level of hemoglobin A1c (HbA1c) was statistically and significantly higher after curfew than before it (8.71 ± 1.82 vs. 8.43 ± 1.71), $P = 0.005$. Also, among obese subjects, the level of hemoglobin A1c was statistically and significantly higher after curfew than before it (8.55 ± 1.74 vs. 8.34 ± 1.63), $P = 0.034$. **Conclusion:** There was a relative increase in the level of HbA1c after the lockdown during COVID-19, indicating poorer glycemic control; this impact was more obvious among female and obese type 2 diabetic patients.

Keywords: COVID-19, HbA1c level, Lockdown, Saudi Arabia

Introduction

Coronavirus (CoV) is one of the enveloped viruses that consist of a single strand, positive-sense ribonucleic acid (RNA) genome and causes respiratory infections in humans.[1] Generally, human CoV infection causes mild upper respiratory infection in immunocompetent individuals.[1]

The presence of diabetes mellitus (DM), hypertension, and severe obesity (body mass index (BMI) 40 kg/m²) makes individuals more susceptible to COVID-19 infection and increase the risk of complications and death.[1]

The prevalence of diabetes in Saudi Arabia is high (23.7%), and lifestyle changes lead to an increase in the incidence rate in the last 20 years.[2,3] Furthermore, diabetes is one of the top ten chronic diseases that are associated with increased mortality values worldwide.[4]

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Recent studies demonstrated that diabetes mellitus was amongst the most predominant comorbidities in COVID-19 patients.[5,6] Furthermore, elderly diabetic patients had a higher risk of complications and mortality.[3]

The World Health Organization announced On March 11th, 2020, that COVID-19 is a pandemic.[1] Lockdown was applied worldwide to counteract the spread of disease. With a high prevalence of diabetes, increased risk of mortality, and in conjunction with the curfew, it was important to evaluate glycemic control after lockdown and to study the effect of COVID-19 lockdown on glycemic control. Primary care physicians, as the first line facing type 2 diabetic patients in many cases, should be aware of the impact of COVID-19 lockdown on acute health care outcomes and glycemic control in patients with type 2 diabetes.[7] This study aimed to evaluate glycemic control for type 2 diabetic patients in the first visit after COVID-19 lockdown and to study the effect of COVID-19 lockdown on glycemic control.

Materials and Methods

The study was a cross-sectional one, conducted at Prince Mansour Military Hospital, Taif city, Western Saudi Arabia. It included 420 type 2 diabetic patients of both genders aged over 20 years that were assigned to follow-up in the diabetic center. This study excluded patients under 20 years of age, those who were assigned to follow-up outside prince Mansour military hospital, and those with a missed appointment. Data were collected from patients' medical records using a simple random technique via a data collection sheet that contained file number of patient, gender, age group, body mass index, and three glycosylated hemoglobin (HbA1c) readings for each year (2018–2019) and one HbA1C reading upon the first visit after COVID-19 lockdown. HbA1c level was treated as a continuous variable. The Ethical approval is obtained from ethical committee in our hospital on 21/12/2020.

Data analysis was performed by using Statistical Package for Social Science (SPSS) software program version 26. Paired t-test was used to compare HbA1c before curfew and after it, and a P value < 0.05 cut-off was considered for statistical significance.

Results

The study included 420 diabetic patients. Table 1 summarizes their gender and age distribution. Females represented 51% of them, and more than a third (39.8%) were aged 60 years and over.

From Figure 1, it is obvious that the majority of them were either overweight (29.3%) or obese (61.2%).

There was an increase in the overall level of HbA1c after curfew (8.72 ± 1.73) than before it (8.58 ± 1.72). However, the difference did not reach a statistically significant level, $P = 0.056$. Among females, the level of HbA1c was statistically significant and higher after curfew than before it (8.71 ± 1.82 vs. 8.43 ± 1.71), $P = 0.005$. Also, among obese subjects, the level of HbA1c
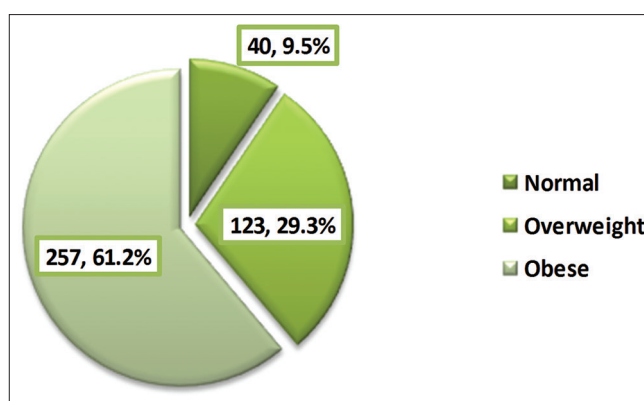

Figure 1: Distribution of the body mass index among the participants

Table 1: Age and gender distribution of the participants (n=420)

	Frequency	Percentage
Gender		
Male	206	49.0
Female	214	51.0
Age (years)		
20-39	37	8.8
40-49	51	12.1
50-59	123	29.3
60-69	110	26.3
70-79	72	17.1
≥80	27	6.4

was statistically significant and higher after curfew than before it (8.55 ± 1.74 vs. 8.34 ± 1.63), $P = 0.034$ [Table 2].

Discussion

With a high prevalence of diabetes in the Kingdom of Saudi Arabia, it is important to evaluate the glycemic state in diabetic patients during lockdown induced by the COVID-19 pandemic. Several studies discussed the effect of diabetes on immunity, the association between diabetes and COVID-19, and the management of diabetes in COVID-19 patients. Given the importance of the link between COVID-19 and diabetes, one cross-sectional, qualitative prospective study explored the impact of the COVID-19 lockdown on diabetes patients in terms of their compliance with medication intake and lifestyle habits and quality of life in Jeddah, Saudi Arabia.[3] Patients with comorbidities such as diabetes require special attention during this pandemic to avoid additional load on the burden of countries' healthcare systems.[5] Our study provided meaningful information for future research and ultimately contributed to better clinical management of patients with diabetes during different circumstances.

In the present study, although not reaching a statistically significant cut-off value, HbA1c increased after the curfew, indicating poor glycemic control during the lockdown due to COVID-19 pandemic. This could be explained by the findings

Table 2: Comparison of glycated hemoglobin levels between, after, and before COVID-19 curfew, according to gender, age, and body mass index

HbA1c%	Before curfew	After curfew	P*
Overall (n=289)	8.58±1.72	8.72±1.73	0.056
Gender			
Males (n=136)	8.75±1.71	8.73±1.63	0.854
Females (n=153)	8.43±1.71	8.71±1.82	0.005
Age (years)			
20-39 (n=28)	8.33±1.63	8.42±1.61	0.626
40-49 (n=33)	8.83±1.72	9.08±1.53	0.207
50-59 (n=86)	8.54±1.90	8.55±1.83	0.994
62-69 (n=77)	8.46±1.54	8.63±1.56	0.253
70-79 (n=44)	8.64±1.71	8.98±1.89	0.063
≥80 (n=21)	8.98±2.14	9.05±1.91	0.793
Body mass index			
Normal (n=31)	9.46±1.95	9.23±2.08	0.41
Overweight (n=93)	8.71±1.68	8.86±1.53	0.274
Obese (n=165)	8.34±1.63	8.55±1.74	0.034

*Paired t-test

of another Saudi study that observed lower levels of compliance with medications and lifestyle behavior as a result of COVID-19 lockdown.[3] Lippi G, *et al.* reported more screen time and lower physical activity among type 2 diabetic patients during the COVID-19 lockdown.[8] Also, others noticed changes in the lifestyle of type 2 diabetic patients during the lockdown in the form of an increase in sugary food and snack consumption as well as found a high rate of physical inactivity.[9,10] Ghosal *et al.*[11] observed that the lockdowns increased the rate of diabetes-related complications and documented a direct association between the length of lockdown and uncontrolled glycemia. On the other hand, Ajay K, *et al.* (2020) documented that it was unclear if the COVID-19 pandemic has impacted the compliance levels of diabetes patients.[12] Alshareef R, *et al.*[3] observed that the patient`s compliance with treatment as well as lifestyle habits was reduced during the lockdown. Contrary to our findings, in Italy,[13] the glycemic control during the COVID-19 lockdown among type 1 diabetic patients was improved during the lockdown and the authors attributed this to decrease work and its related stress and improved adherence to healthy lifestyle habits. However, Beato-Víbora[14] found no deleterious impact of lockdown on glycemic control of type 1 diabetic patients. A recent systematic review done by Eberle C and Stichling S (2021)[15] concluded that glycemic control was improved during the COVID-19 lockdown in type 1 diabetic patients, while a short-term worsening of glycemic control was observed among type 2 diabetic patients.

In the current study, the deterioration of glycemic control during COVID-19 lockdown was more evident among female and obese patients. Reviewing of the literature did not reveal similar findings. However, we can explain these findings to the fact that female and obese diabetic patients are usually more exposed to stress and decreased physical activity during a lockdown.[16,17]

Some important limitations of this study should be mentioned. We included only type 2 diabetic patients; therefore, we have no information about the situation with type 1 diabetic patients due to different pathogenesis and different lines of treatment between both types.[18] Conduction of the study in one healthcare facility is considered another limitation that could affect the generalizability of findings. Finally, the accuracy and completeness of findings obtained from medical records retrospectively, is considered another limitation due to the higher possibility of bias.

Conclusion

There was a relative increase in the level of HbA1c after the lockdown during COVID-19, indicating poorer glycemic control; this impact was more obvious among female and obese type 2 diabetic patients. Further, a larger detailed multi-center retrospective study including type 1 and type 2 diabetic patients is recommended to have a broader image of the impact of lockdown on glycemic control in Saudi Arabia.

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Conflicts of interest

There are no conflicts of interest.

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