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Short communication

Impact of COVID-19 on Libyan Patients with Diabetes: A Cross-Sectional Survey in Western Libya

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A B S T R A C T

Diabetes mellitus is highly prevalent in Libya and is a well-established risk factor for severe COVID-19. Real-world data from the Libyan diabetic population during the pandemic are scarce, particularly in conflict-affected settings. This study aims to evaluate COVID-19 infection rates, clinical severity, vaccination uptake, and the influence of glycemic control in Libyan adults with diabetes. A questionnaire-based cross-sectional study was conducted (January–February 2022) at three major diabetes centres in western Libya (Surman, Zawia, and Tripoli). A total of 122 consecutive patients aged ≥20 years with confirmed diabetes were enrolled and interviewed regarding demographics, latest HbA1c level, physical activity, family history, confirmed COVID-19 infection, hospitalisation, and COVID-19 vaccination status. Overall, 44.3 % (54/122) of participants reported laboratory-confirmed COVID-19. All 20 patients with poor glycemic control (HbA1c ≥7.0%) who contracted COVID-19 required hospital admission, whereas none of the 34 with good control needed hospitalisation ($p < 0.001$). Vaccine uptake (≥1 dose) was 72.1 % (88/122) and varied significantly by centre: Tripoli 85.4 %, Zawia 65.5 %, and Surman 63.5 %. Vaccine refusal ranged from 14.6 % (Tripoli) to 36.5 % (Surman). Self-reported regular physical activity was alarmingly low (<10% across centres). Poor glycemic control was strongly associated with severe COVID-19 requiring hospitalisation in this Libyan diabetic cohort, despite a small sample and potential outpatient survival bias. Vaccine hesitancy remains substantial outside major cities. Urgent intensification of diabetes education, glycemic optimisation, and targeted vaccination campaigns is needed.

Introduction

Diabetes mellitus (DM) is a major public health problem in Libya, with an estimated adult prevalence of 10–12 % [1]. Libya has been severely affected by the COVID-19 pandemic, with the decade-long armed conflict significantly hindering surveillance, testing, and response efforts [2,3]. Patients with diabetes face a 2–4-fold higher risk of severe illness and mortality from COVID-19, with risk escalating sharply with poorer glycemic control (HbA1c) [4,5]. The bidirectional relationship between SARS-CoV-2 infection and diabetes — where infection can precipitate hyperglycemic crises and new-onset diabetes — has been well documented globally [6,7].

The armed conflict has fragmented Libya's healthcare system and disproportionately affected the southern and western regions, leading to marked geographic variability in reported COVID-19 cases [2,3]. Despite Libya's high diabetes burden and fragile healthcare system, there are virtually no published data on how the pandemic affected diabetic patients in the country. This survey aimed to document COVID-19 infection rates, clinical severity, vaccination uptake, and the role of glycemic control in Libyan adults with diabetes attending routine follow-up in western Libya.

Methods

A multicentre, questionnaire-based cross-sectional study was conducted between January and February 2022 at three major diabetes centres in western Libya: Diabetes and Endocrinology Centre, Surman; Diabetes and Endocrinology Centre, Zawia; and Endocrinology Centre, Tripoli. Due to the non-invasive design and local cultural sensitivities, verbal informed consent was obtained from all participants, as approved by the Research Ethics Committee of Al-Jafara University. Participants were briefed on the study's aims, anonymity, and their right to withdraw at any stage.

Consecutive adult patients (≥20 years) with previously diagnosed diabetes attending routine visits were invited to participate, with no formal sample size calculation due to the exploratory nature of the study in a resource-limited setting. Exclusion criteria included inability to provide informed consent or incomplete questionnaire responses. A structured nine-item questionnaire (available as supplementary material) collected data on age, sex, centre, most recent HbA1c (categorized as good control: <7.0%; poor control:

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≥7.0%, based on international guidelines), physical activity level (self-reported regular moderate/vigorous activity ≥150 minutes/week per WHO recommendations), family history of diabetes, confirmed COVID-19 infection (patient-reported laboratory diagnosis), hospitalisation/ICU admission for COVID-19, and COVID-19 vaccination status (≥1 dose).

Data were analysed using IBM SPSS version 28. Categorical variables are presented as frequencies and percentages. Continuous variables (e.g., age, HbA1c) are presented as means ± SD or medians (IQR) where appropriate. Comparisons between groups used the Chi-square test or Fisher's exact test; associations between glycemic control and COVID-19 outcomes were tested using Fisher's exact test; $p < 0.05$ was considered significant.

Results

A total of 122 patients were enrolled: 52 from Surman, 29 from Zawia, and 41 from Tripoli. Mean age was 56.4 ± 12.3 years (range 22–82); females predominated in Surman (71.2 %), whereas males predominated in Zawia (58.6 %) and Tripoli (58.5 %). Family history of diabetes was reported by 78.7% (96/122). Participant characteristics and key outcomes are summarised in Table 1.

Overall, 54/122 (44.3 %) patients reported confirmed COVID-19 infection, with similar rates across centres ($p = 0.99$). Of these 54, 20 had poor glycemic control (HbA1c ≥7.0%) and all required hospital admission; none of the 34 with good control (HbA1c <7.0%) needed hospitalisation ($p < 0.001$; Fisher's exact test). No ICU admissions or deaths were reported among infected participants.

Vaccine uptake (≥1 dose) was 72.1 % (88/122) overall, ranging from 63.5 % (Surman) to 85.4 % (Tripoli) ($p = 0.03$). Self-reported regular physical activity (≥150 min/week moderate/vigorous) was alarmingly low at 8.2% (10/122) across all centres.

Table 1. Participant characteristics and key outcomes by centre

Variable	Surman (n=52)	Zawia (n=29)	Tripoli (n=41)	Total (n=122)	p-value
Age, mean ± SD (years)	55.8 ± 13.1	57.2 ± 11.5	56.4 ± 12.0	56.4 ± 12.3	0.88
Male, n (%)	15 (28.8)	17 (58.6)	24 (58.5)	56 (45.9)	0.004
Female, n (%)	37 (71.2)	12 (41.4)	17 (41.5)	66 (54.1)	0.004
Family history of diabetes, n (%)	42 (80.8)	22 (75.9)	32 (78.0)	96 (78.7)	0.85
Poor glycemic control (HbA1c ≥7.0%), n (%)	28 (53.8)	15 (51.7)	19 (46.3)	62 (50.8)	0.72
Confirmed COVID-19, n (%)	23 (44.2)	13 (44.8)	18 (43.9)	54 (44.3)	0.99
Hospitalised for COVID-19, n/N (%) among infected	10/23 (43.5)	6/13 (46.2)	4/18 (22.2)	20/54 (37.0)	0.21
Hospitalised among poorly controlled infected, n/N (%)	10/10 (100%)	6/6 (100%)	4/4 (100%)	20/20 (100%)	<0.001
Vaccinated (≥1 dose), n (%)	33 (63.5)	19 (65.5)	35 (85.4)	88 (72.1)	0.03
Regular physical activity, n (%)	4 (7.7)	3 (10.3)	3 (7.3)	10 (8.2)	0.89

Discussion

This study provides the first multicentre evidence on the interaction between COVID-19 and diabetes in Libya. The most interesting finding was the strong absolute association between poor glycemic control and severe disease: every patient with high HbA1c who contracted COVID-19 required hospital admission, while no well-controlled patient did ($p < 0.001$). This near-universal hospitalization among poorly controlled patients aligns with global evidence showing that type 2 diabetes mellitus significantly increases the risk of severe COVID-19 outcomes, including the need for mechanical ventilation [8,9]. However, the strength of this association exceeds many larger international cohorts and likely reflects Libya's limited capacity for outpatient management of acute illness amid ongoing conflict and resource constraints [10].

The overall vaccine uptake of 72 % is commendable in a conflict setting, but masks profound geographic inequity. Tripoli achieved >85 % coverage, whereas Surman and Zawia lagged at ~64 %. This pattern mirrors the spatiotemporal dynamics of COVID-19 spread previously described in Libya, where conflict-affected western and southern regions experienced delayed testing, reporting, and vaccination rollout [3]. Vaccine hesitancy, predominantly driven by safety concerns, remains a major barrier outside major cities and echoes observations from earlier pandemic waves in Libya [2].

Self-reported regular physical activity was low across all centres, at just 8.2%, consistent with broader Libyan population trends [10]. Sedentary behaviour is a well-known driver of poor glycemic control [11] and,

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in the context of COVID-19, further amplifies the risk of severe outcomes, potentially contributing to the observed disparities in disease severity.

Family history of diabetes was high (54–100 % depending on centre), in line with the strong genetic predisposition observed in Arab populations [12]. Similarly, gender differences in attendance (female predominance in Surman, male in Zawia/Tripoli) may reflect regional variations in healthcare-seeking behaviour rather than true prevalence differences — a pattern also noted in national COVID-19 surveillance data. The absence of reported deaths in this cohort, despite universal hospitalisation of uncontrolled patients, may reflect outpatient survival bias (only outpatients were surveyed) or genuinely lower case-fatality when hospital care is accessed. Nonetheless, the 100 % hospitalisation rate among uncontrolled patients underscores the lethal synergy between hyperglycaemia and SARS-CoV-2 in resource-constrained settings. Several limitations should be acknowledged. The cross-sectional design and small sample size limit causal inferences and generalizability. Reliance on self-reported data introduces potential recall bias for COVID-19 infection and vaccination status, while the outpatient recruitment may underestimate severity by excluding deceased or severely ill patients. Finally, HbA1c reflects pre-pandemic control and may not capture acute changes during infection.

Taken together, these findings highlight how Libya's decade-long conflict has compounded the vulnerability of diabetic patients to COVID-19 through disrupted care, delayed vaccination, and persistent lifestyle risk factors. They provide critical local evidence to support global recommendations [13] and regional calls for prioritised protection of high-risk groups in fragile states, including intensified glycemic monitoring, lifestyle interventions, and equitable vaccine distribution.

Conclusion

In this multicentre survey of Libyan adults with diabetes, poor glycemic control was strongly associated with severe COVID-19 requiring hospitalization, while good control appeared highly protective. Vaccine uptake was overall but showed marked geographic inequity, with hesitancy and low physical activity persisting as key challenges, especially in conflict-affected areas. These findings underscore the urgent need for intensified glycemic optimization, diabetes education, lifestyle interventions, and targeted vaccination campaigns to protect this vulnerable population.

Ethics Statement

Approved by the Research Ethics Committee, Faculty of Biotechnology, Al-Jafara University. Verbal informed consent was obtained.

Data Availability Statement

The datasets are not publicly available due to participant privacy. However, de-identified data are available from the corresponding author upon reasonable request and institutional ethics committee approval

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None.

Competing Interests

None declared.

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