Effects of COVID-19 pandemic lockdown on gestational diabetes mellitus: A retrospective study.

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Gestational diabetes mellitus (GDM) is the most common medical complication of pregnancy, with a prevalence varying from 5.8% (1.8–22.3%) in Europe to 12.9% (8.4–24.5%) in the Middle East and North Africa [1]. Maintaining adequate blood glucose levels in GDM reduces morbidity for both the mother and infant [2]. Our hypothesis was that GDM control would be lower during the coronavirus disease 2019 (COVID-19) pandemic lockdown due to a decrease in physical activity and changes in patients' dietary habits. Thus, the objective of our study was to evaluate the impact of the lockdown period on glycaemic balance in patients with GDM.

This single-centre (Lille, France) retrospective study compared two periods: the COVID-19 lockdown from 18 March to 7 May 2020 and the same period in 2019. All pregnant patients who were followed for GDM during those periods were included. Standard-of-care treatment involves a multidisciplinary lifestyle approach defined by diet and exercise interventions [2]: women undertake home blood glucose monitoring six times a day with the aim of achieving a capillary fasting glucose target of < 5.1 mmol/L and/or a 2-h postprandial capillary glucose < 6.6 mmol/L. If these targets are not achieved after at least 10 days of dietary and lifestyle measures, then the women are given either prandial or basal insulin [2]. Each patient also undergoes 10 days of consultation with a diabetologist or nurse regarding their capillary glycaemia data, which are transmitted *via* the 'myDiabby' media application to her usual medical team [2]. The care protocol was the same during both study periods except that, during 2020, all consultations were *via* telemedicine. GDM control was defined as good, acceptable and poor (when < 20%, 20–40% and > 40%, respectively, of all glycaemic values were outside the target range).

A total of 229 patients were included in 2019 *vs* 222 in 2020. There were no significant differences between the two groups regarding maternal age, body mass index or gestational age at inclusion (Table I). Comparable mean capillary blood sugar values were recorded for

the two groups, as were also mean pre- and postprandial glycaemic values, and preprandial blood sugar control was the same in both 2019 and 2020. However, postprandial blood sugar was significantly less well controlled in 2020, with a lower rate of good control (61.6% *vs* 69.4%), and higher rates of acceptable control (24.7% *vs* 21.8%) and poor control (13.7% *vs* 8.7%; $P < 0.05$). Also, use of insulin therapy was significantly higher in 2020 compared with 2019 (47.7% *vs* 36.2%, respectively; $P < 0.05$).

To our knowledge, our study is the first to focus on the impact of the COVID-19 pandemic lockdown on GDM control. Although our patients' follow-ups did not appear to be modified, their glycaemic balance was worse, with poorer control of diabetes according to postprandial glycaemia and a higher rate of women reverting to insulin therapy.

In general, 70–85% of women diagnosed with GDM can gain sufficient control through lifestyle modifications alone [2]. Most physical-activity interventions improve glucose control and/or reduce insulin use. However, social distancing, lockdown and home confinement during the COVID-19 pandemic required patients with diabetes to limit their activities and may also have impacted their dietary habits [3]. Moreover, approximately 12% of pregnant women reported high depressive symptomatology and 60% reported moderate or severe anxiety during this period. On the other hand, they also showed a range of resilience factors, including engaging in self-care, such as maintaining physical activity and eating healthily [4]. Nevertheless, the greater difficulties in following this frontline treatment for GDM during lockdown may explain why more patients had poor diabetes control and required insulin therapy during this period compared with 2019.

At our centre, online demonstrations, educational videos and teleconsultations were all made available to patients. This management decision was appreciated by our patients, contributed to good compliance with diabetes monitoring and did not change rates of follow-up. In addition, a recent study of diabetes management in pregnancy before and during the

lockdown showed that video consultations are well received and that they greatly improve the experience of women who require face-to-face visits [5].

In conclusion, diabetes control was lower during the COVID-19 pandemic lockdown. This may be explained by reduced physical activity, modified dietary habits and greater anxiety during this period. It will now be of interest to follow these patients to evaluate the impact on maternal and neonatal morbidity, including macrosomia, induction and caesarean rates.

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Table I
Patients' characteristics during the 2019 and 2020 study periods

	2019 **(n = 229)**	**2020** **(n = 222)**	*P*
Age (years)	33 ± 5.1	33.6 ± 4.9	0.21
Body mass index (kg/m^2)	28.1 ± 6.3	28.6 ± 6.2	0.40
Gestational age at inclusion (WA)	30.4 (23.1–34.9)	31.3 (25.4–35.7)	0.066
Capillary blood sugar (mg/dL)	147.0 (69.0–218.0)	170.5 (68.0–242.0)	0.49
Preprandial glycaemic values (mean, mmol/L)	4.7 ± 0.3	4.7 ± 0.3	0.40
Postprandial glycaemic values (mean, mmol/L)	5.9 ± 0.5	5.9 ± 0.6	0.12
Preprandial patients with values ≥ 5.1 mmol/L:			0.58
< 20% (good diabetes control)	156 (68.1)	146 (65.8)	
20–40% (acceptable diabetes control)	48 (21.0)	49 (22.1)	
> 40% (poor diabetes control)	25 (10.9)	27 (12.2)	
Postprandial patients with values ≥ 6.6 mmol/L:			0.049
< 20% (good diabetes control)	159 (69.4)	135 (61.6)	
20–40% (acceptable diabetes control)	50 (21.8)	54 (24.7)	
> 40% (poor diabetes control)	20 (8.7)	30 (13.7)	
Patients receiving insulin therapy	83 (36.2)	106 (47.7)	0.013

Results are means ± standard deviation, medians (interquartile range) or n (%); between-group comparisons were by chi-square, Cochran–Armitage, Student's or Mann–Whitney *U* tests; $P \leq 0.05$ considered statistically significant;
WA, weeks of amenorrhoea