



The impact of COVID-19 lockdown on glycaemic control in young adults with type 1 diabetes mellitus

Michael Lockhart¹ · Deirdre Green¹ · Diarmuid Smith¹

Received: 15 February 2022 / Accepted: 24 May 2022 / Published online: 14 June 2022
© The Author(s), under exclusive licence to Royal Academy of Medicine in Ireland 2022

Abstract

Background In December 2019, a novel coronavirus strain, COVID-19, was identified in Wuhan, China. The first case was reported in the Republic of Ireland that month. Since then, along with many other countries worldwide, Ireland has imposed intermittent strict lockdowns to mitigate the spread of the virus.

Aims To investigate the impact of lockdown on glycaemic control in young adult patients with type 1 diabetes mellitus.

Methods Pre- and post-lockdown HbA1c levels were recorded for 118 patients attending the Young Adult Diabetes clinic in Beaumont Hospital, Dublin, and the results were compared. Changes in weight, insulin requirements and incidence of DKA/severe hypoglycaemia were also assessed.

Results HbA1c results were 3.81 mmol/mol lower post-lockdown. Weight increased by 1.8 kg. Both of these results were statistically significant.

Conclusions Lockdown was associated with improved glycaemic control in young adult diabetic patients, and also with an increase in body weight. Changes in lifestyle factors associated with lockdown may explain this finding.

Keywords COVID-19 · Glycaemic control · HbA1c · Type 1 diabetes mellitus

Introduction

In December 2019, a novel coronavirus strain, COVID-19, was identified in Wuhan, China. This virus was shown to cause a systemic acute respiratory distress syndrome known as SARS-CoV-2 [1]. COVID-19 spread worldwide over the following months and was declared a global pandemic by WHO in March 2020. The first case was reported in the Republic of Ireland that month. Since then, along with many other countries worldwide, Ireland has imposed intermittent strict lockdowns to mitigate the spread of the virus. The first such lockdown lasted from 29 March until 5 May, when certain restrictions were eased.

Our study aims to assess the impact of this first lockdown on glycaemic control in an Irish cohort of young adult patients with type 1 diabetes attending the Young Adult Diabetes clinic at Beaumont Hospital, Dublin, by means of HbA1c measurement before and after the lockdown was

commenced. Similar studies have taken place in the UK, Spain and Italy in patients using CGM devices [2–5], but as yet there is no Irish data published.

Methods

We retrospectively collected data on all patients aged between 16 to 24 years who attend the weekly young adult type 1 diabetes mellitus clinic in Beaumont Hospital who had HbA1c levels checked both in the months between November 2019 to February 2020 (pre-lockdown) and again in the months between May to August 2020 (post-lockdown). The primary outcome was the change in HbA1c between these two time periods. Secondary outcomes included change in weight post-lockdown (in kilogrammes), whether insulin requirements had increased or decreased post-lockdown, incidence of severe hypoglycaemia and incidence of diabetic ketoacidosis (DKA).

Wilcoxon Signed-Rank test was used to compare continuous data. Categorical data was compared using Chi-squared test. *P* values < 0.05 were taken to indicate statistical significance. Analyses were performed using Microsoft Excel.

✉ Michael Lockhart
lockhamj@tcd.ie

¹ Department of Diabetes and Endocrinology, Beaumont Hospital and RCSI Medical School Dublin, Dublin, Ireland

The study was entirely observational and ethics approval was not required.

Results

A total of 118 young adult patients with type 1 diabetes attending the Young Adult clinic had HbA1c checks at the pre-defined time periods. 57 (48%) were male and 61 (52%) were female.

The mean reduction in HbA1c was 3.81 mmol/mol post-lockdown compared to pre-lockdown. This result was statistically significant ($p < 0.01$) (Fig. 1). The mean change in weight was an increase of 1.8 kg ($p < 0.01$) (Fig. 2). Figure 3 shows individual changes in HbA1c pre-lockdown and post-lockdown.

Of patients whose insulin regime data was recorded pre- and post-lockdown ($n = 64$), 26 made no change to their insulin regime, 20 increased their insulin regime and 18 decreased their insulin regime. A total of 40 patients were using CSII (34%) and 78 were using multiple daily injections (66%).

There were no reported severe hypoglycaemic events in the pre- or post-lockdown periods. There were 4 reported DKAs in the pre-lockdown period and 3 DKAs reported in the lockdown period, though this finding was not statistically significant ($p = 0.70$).

Discussion

Our findings in terms of change in HbA1c are consistent with other international studies. There was a mild, significant improvement in glycaemic control over the lockdown period. The COVID pandemic was a global public health crisis, changing the way healthcare systems delivered care

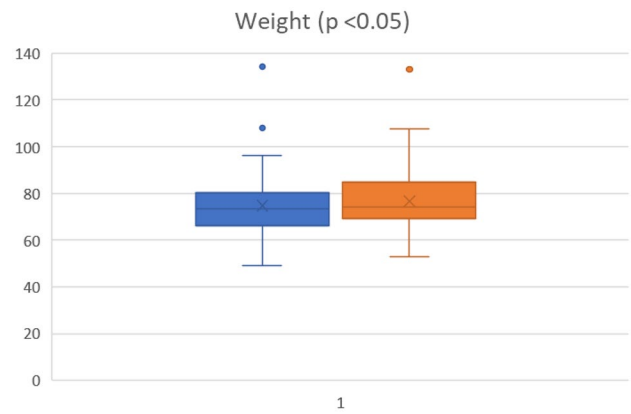


Fig. 2 Weight pre-lockdown (blue) and post-lockdown (orange)

to their patients. Many clinic appointments were undertaken in a virtual capacity, dubbed “telemedicine”, to reduce the risk of vulnerable patients attending hospital [6]. This was true of our Young Adult clinic during this first lockdown in Ireland, where phone consultations were offered in lieu of physical appointments.

It has been speculated that a more predictable daily routine, with more time to focus on self-care of diabetes, in the face of lockdown restrictions may explain this improvement in glycaemic control [7]. Regular exercise, carbohydrate counting and frequency of BSL checking can all become easier without a daily commute, the necessity to prepare more meals at home, less eating out and having more time in the day while working from home. This was certainly the case with many of the young adults in our clinic, who are either students in secondary/high school or in the early years of their university studies, all of which were either postponed or held virtually during the lockdown period of March–May 2020 in Ireland.

It may also be the case that patients with type 1 diabetes mellitus, in a time when their risk of more severe disease should they be infected with COVID-19 was being widely reported, wished to optimise their glycaemic control to potentially mitigate the risk of severe COVID-19 infection associated with hyperglycaemia [8].

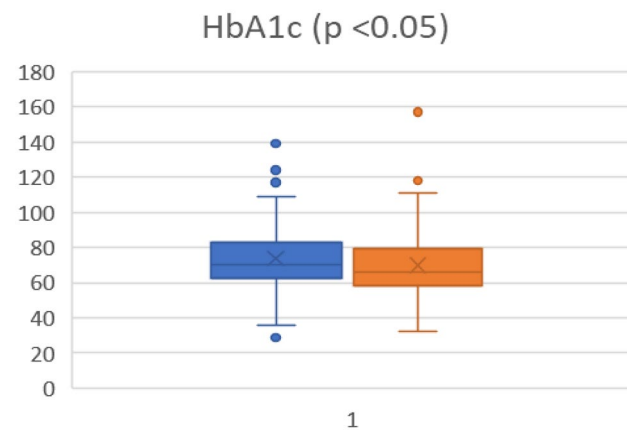


Fig. 1 HbA1c pre-lockdown (blue) and post-lockdown (orange)

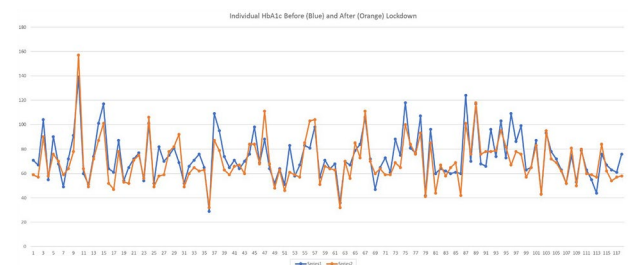


Fig. 3 Individual HbA1c before (blue) and after (orange) lockdown

The slight increase in weight in our population during the lockdown period may be explained by more sedentary lifestyles while working or studying from home. Most extracurricular physical activities were significantly curtailed by the lockdown, with closure of gyms and restrictions on team sports and group training sessions. Among patients whose insulin regime data was recorded pre- and post-lockdown, more had increased than decreased their total daily dose of insulin—this increase in insulin dose may also have contributed to weight gain.

This study has limitations in that it is a real-world, retrospective observational study. Without data for a control group, it is impossible to infer causality, therefore we can only report an association between lockdown and improvements in glycaemic control. We were unable to collect data on changes to exercise and dietary habits for every patient.

This study shows that strict lockdown during the COVID-19 pandemic was associated with improved glycaemic control in young adult patients with type 1 diabetes mellitus. Further prospective studies, with the use of historical controls, may give further information.

Abbreviations HbA1c: Glycated haemoglobin; CGM : Continuous glucose monitoring.; DKA : Diabetic ketoacidosis; CSII : Continuous subcutaneous insulin infusion

Declarations

Conflict of interest The authors declare no competing interests.

References

1. Zhu N, Zhang D, Wang W et al (2020) A Novel coronavirus from patients with pneumonia in China, 2019. *N Engl J Med* 382:727–733
2. Mesa A, Viñals C, Pueyo I et al (2020) The impact of strict COVID-19 lockdown in Spain on glycaemic profiles in patients with type 1 diabetes prone to hypoglycemia using standalone continuous glucose monitoring. *Diab Res Clin Prac* 167
3. Dover et al (2021) Assessment of the effect of the COVID-19 lockdown on glycaemic control in people with type 1 diabetes using flash glucose monitoring. *Diabet Med* 38(1):e14374
4. Bonora et al (2020) Glycaemic control among people with type 1 diabetes during lockdown for the SARS-CoV-2 outbreak in Italy. *Diabetes Ther* 11(6):1–11
5. Navis et el (2021) Impact of COVID-19 lockdown on flash and real-time glucose sensor users with type 1 diabetes in England. *Acta Diabetol* 58(2):231–237
6. Andrikopoulos et al (2020) The Australian response to the COVID-19 pandemic and diabetes – lessons learned. *Diabetes Res Clin Pract* 165:108246
7. Tornese et al (2020) Glycemic control in type 1 diabetes mellitus during COVID-19 quarantine and the role of in-home physical activity. *Diabetes Technol Ther* 22(6):462–467
8. Singh et al (2020) Hyperglycemia without diabetes and new-onset diabetes are both associated with poorer outcomes in COVID-19. *Diabetes Res Clin Pract* 167:108382

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.