Effect of COVID-19 infection on the clinical course of diabetic ketoacidosis (DKA) in people with type 1 and type 2 diabetes

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Background

COVID-19 infection in diabetics is associated with a disproportionately increased risk of complications and mortality[1]. Diabetic ketoacidosis is an acute complication of diabetes[2,3]. Little is known about DKA in the presence of COVID-19 infection.

Aims

Our aims were to explore the effects of COVID-19 infection in patients presenting with DKA using their:

- Presentation
- Clinical course
- Outcome

We also explored whether there are any differences between patients with type 1 and type 2 diabetes in respect to the above.

Results

- A total of 88 episodes were included in the study,
- There was no significant difference in the severity or duration of DKA at presentation between the three groups.
- COVID positive type 1 diabetics were more hyperglycaemic on admission compared to COVID-negative and pre-COVID patients.
- There was an over-representation of type 2 diabetes in COVID positive patients than in pre-COVID or COVID negative groups.

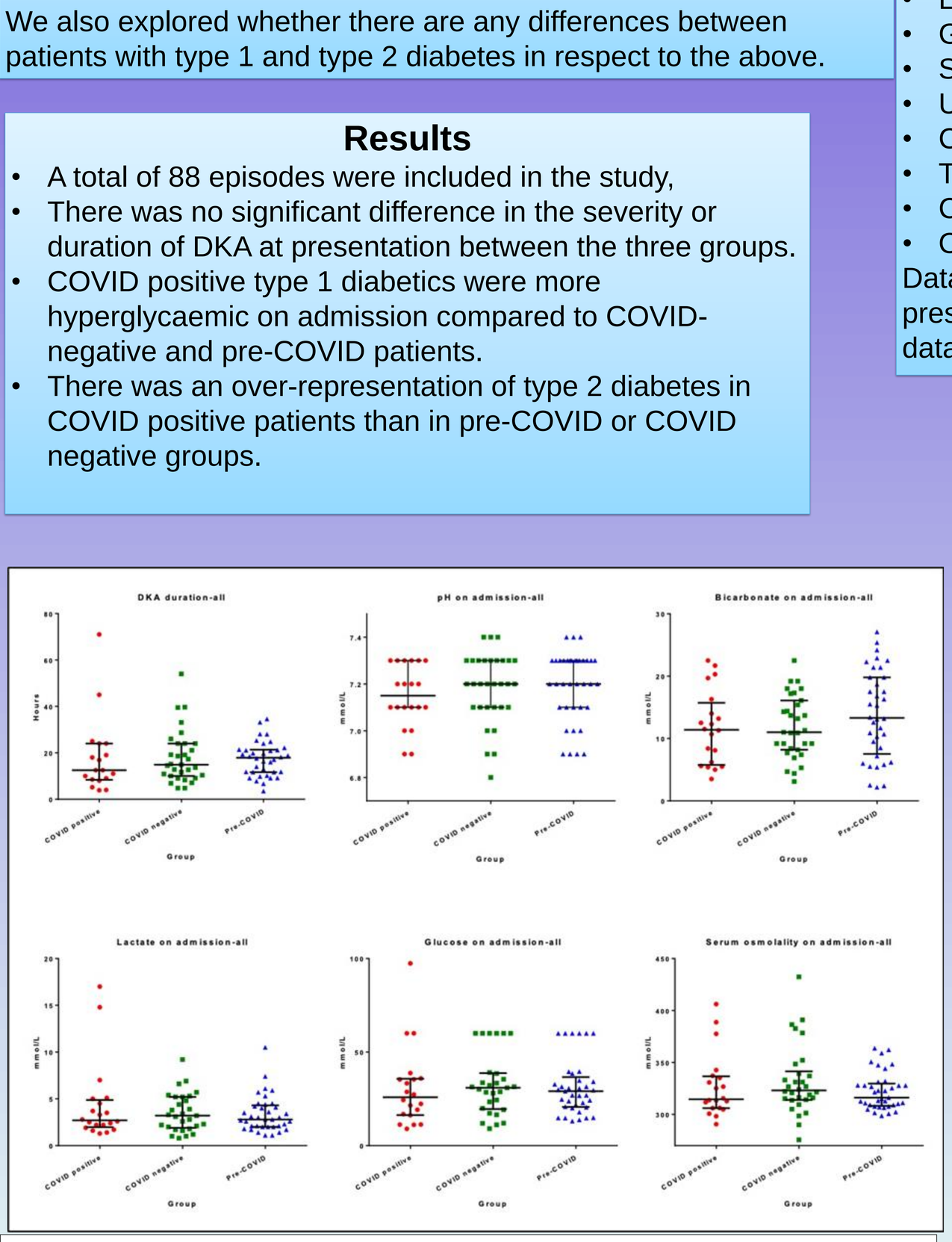

Figure 1: Differences in DKA duration, acidity (measured in pH and bicarbonate), glucose, lactate and serum osmolality at admission between COVID positive, COVID negative and pre-COVID groups with any type of diabetes

Methods

This retrospective cohort study included all patients treated for DKA between 01 March and 30 May 2020 at a large teaching hospital in the West Midlands. Patients were categorised as COVID-positive or negative and a pre-COVID group was established as external control.

The following information was collected from clinical records:

- Demographics
- Diabetes type
- Admission pH
- Bicarbonate
- Lactate
- Glucose
- Serum electrolytes
- Urea
- Creatinine
- Time to resolution of acidosis and ketosis
- Complications
- Outcome

Data was analysed using GraphPad Prism Version 6.07 for Windows and presented as median (IQR) for continuous variables and frequency for ordinal data.

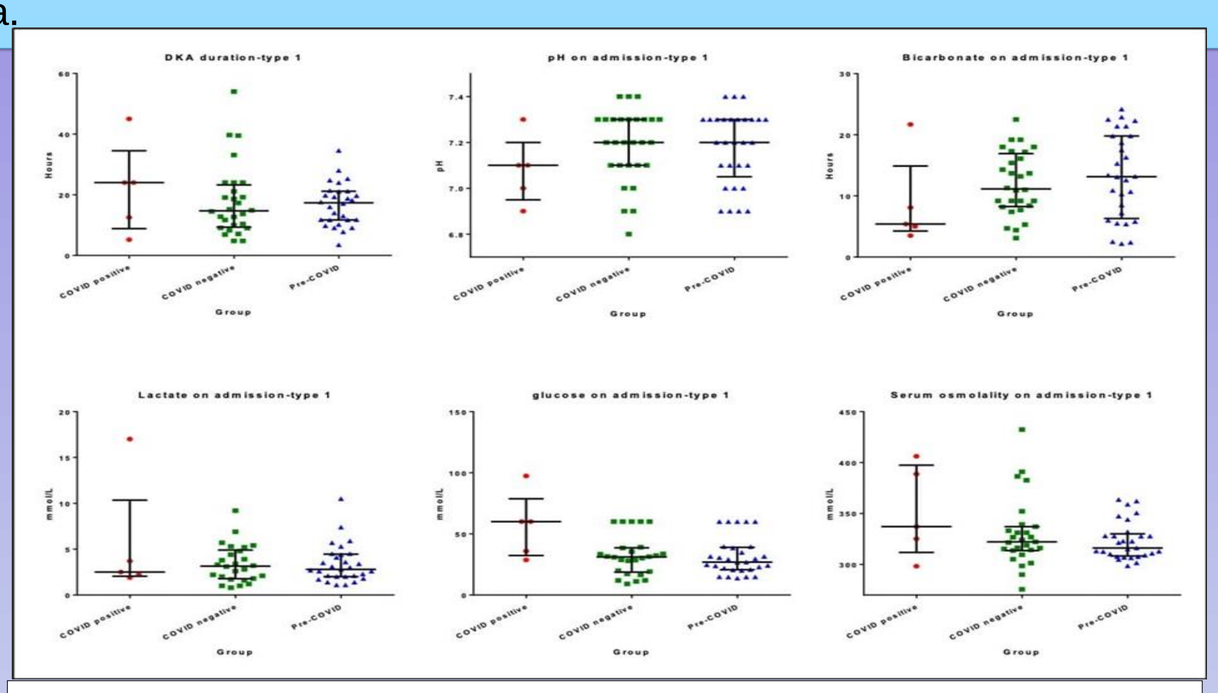

Figure 2: Differences in DKA duration, acidity (measured in pH and bicarbonate), glucose, lactate and serum osmolality at admission between COVID positive, COVID negative and pre-COVID groups with type 1 diabetes

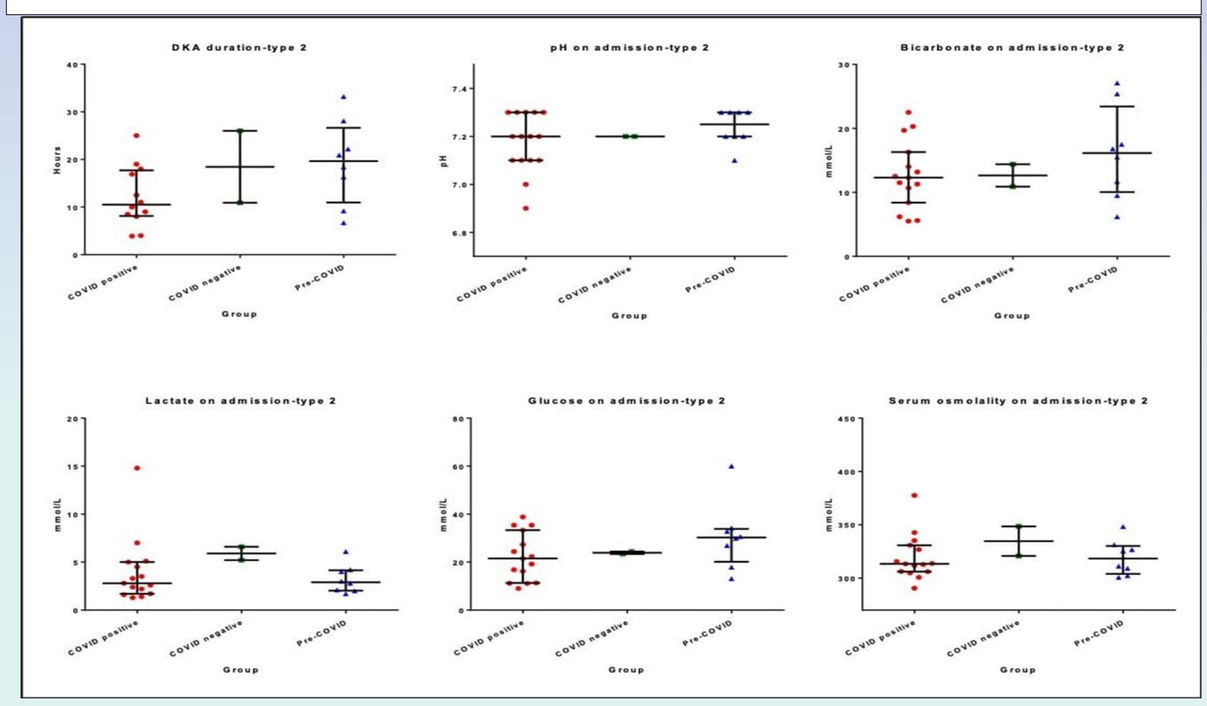

Figure 3: Differences in DKA duration, acidity (measured in pH and bicarbonate), glucose, lactate and serum osmolality at admission between COVID positive, COVID negative and pre-COVID groups with type 2 diabetes

Conclusions

- COVID-19 infection appears to influence the natural history of DKA differently in type 1 and type 2 diabetes.
- Infection was associated with increased hyperglycaemia in type 1 diabetics and commonly greater acidosis on presentation with DKA.
- Type II diabetics were unusually presenting in DKA when infected with COVID and these patients also had higher mortality rates.
- There is need for a multi-centre approach to conduct larger cohort studies in this area.

References

1. Kumar A, *et al.* Diabetes Metab Syndr Clin Res Rev. 2020
2. Savage MW, *et al.* Diabet Med. 2011
3. Braatvedt G, *et al.* N Z Med J. 2019

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