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Young people with type 1 diabetes on insulin pump therapy could fast safely during COVID 19 pandemic Ramadan - a telemonitoring experience in Bangladesh

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Abstract

Our aim was to report our telemedicine experience with type 1 diabetes patients on insulin pumps who fasted during Ramadan 2020 at COVID 19 pandemic time. The routine diabetes outpatient care in our CDiC Paediatric Diabetes Center in BIRDEM hospital was closed as there was lock down since March 26 in Bangladesh. The diabetes team in our center started tele medicine care for routine follow up of patients. Nine patients contacted our diabetes team over phone who wished to fast this Ramadan. Mean age was 19.3 ± 5.0 years, 5 (55.6%) were female. Most of the patients fasted more than 20 days. Hyperglycaemia and mild hypoglycemia were common complications during fasting. There was no episode of severe hypoglycaemia or DKA and none of them required admission.During COVID-19 crisis in Bangladesh, patients with type 1 diabetes on insulin pump, could fast safely in Ramadan with support of telemedicine service by diabetes team.

Introduction:

Fasting during the month of Ramadan, the ninth month of Islamic lunar calendar, is obligatory for all healthy adult and adolescent Muslims from the age of 12 years. [1] Islam has allowed many categories of people to be exempted in specific situations where fasting may pose a danger to health. [2] Although patients with type 1 diabetes are medically exempt, many insist on fasting during Ramadan. Epidemiology in Diabetes and Ramadan study showed that almost half of the patients with type 1 diabetes mellitus insisted on fasting during Ramadan [3]

Ramadan is associated with a higher risk of hypoglycemia, hyperglycemia, and increased glycemic variability. [4] The use of insulin pumps can facilitate insulin adjustment and prevention of hypoglycemia and hyperglycemia during Ramadan. Insulin pump therapy may help in controlling blood glucose during fasting and its continuous insulin infusion can be modified and adjusted instantaneously to avoid hypoglycemia and breaking the fast. It not only reduces hypoglycemia but also improves the glycemic control, and decreases the episodes of recurrent diabetic ketoacidosis (DKAs) .[5-7]

It is a challenge for type 1 diabetes patients to adjust insulin regimens, to ensure a safe fasting, they need a regular monitoring and advice from the health care team. Telemedicine has been an option for health care in the coronavirus disease 2019 (COVID-19) pandemic time.

There are limited data on fasting of type 1 diabetes patients with insulin pump therapy during Ramadan. Introduction of insulin pump has been started in recent years in Bangladesh. More than 20 patients with type 1 diabetes are on insulin pump in our center. We report our telemedicine experience with type 1 diabetes patients on insulin pumps during Ramadan 2020 at pandemic time.

Materials and Methods –

The routine diabetes outpatient care in our CDiC Paediatric Diabetes Center in BIRDEM hospital was closed as there was lock down since March 26 in Bangladesh. The diabetes team in our center started telemedicine care for routine follow up of patients. The Ramadan started from April 24 in Bangladesh and patients contacted Diabetes team over telephone one month prior to Ramadan. Nine patients contacted our diabetes team who wished to fast this Rmadan. We described our experience on these patients who were on insulin pump and wished to observe fast during this pandemic time Ramadan.

Protocol-

Patients with their caregivers were given education and instructions by diabetes team through telemedicine. Insulin doses were altered as necessary to accommodate the changing time of eating. At the start of Ramadan, the basal insulin dose was reduced up to 10 to 20% according to their individual's blood glucose level at the time of sun rise meal (Sohur) and mid afternoon. The bolus dose was adjusted as per the carb count and premeal level. Patients were asked to monitor blood glucose at PreIftar, PreSohur, mid afternoon and at any time during the day when they feel symptoms of hypoglycemia. Patients were instructed to break the fast if blood sugar level was <4 mmol/L or if they experience symptoms of hypoglycemia and if blood glucose level >16.7 mmol/L. [1] All patients were instructed to call healthcare providers for dose adjustment whenever necessary or if there was any episode of hypoglycemia or hyperglycaemia. The initial dose was adjusted after first week and there after weekly or even earlier when required. Consent for data to be entered into the database and for analysis was obtained from all patients and parents.

Statistical analysis

Data analysis was performed by Statistical Package for the Social Sciences program version 21. Descriptive statistics are presented as mean(_SD)score for normally distributed data.

Results:

Mean age was 19.3 ± 5.0 years, 5 (55.6%) were female. [Table 1] Most of the patients (six) fasted more than 20 days. By day 7, adequate fasting control had been attained in three patients. By day 14, the basal dose in two patients had to be increased as fasting level was more than 10 mmol/l. The same dose was maintained, with minor changes, at the end of Ramadan in four patients. By the end of the month, the Iftar dose had to be increased in two patients. [Table 2]

In one patient there was episodes of hyperglycaemia during the day time., so basal dose at day time had to be increased. This patient had to break the fast as had hyperglycaemia (BG level > 20 mmol/l) in the late afternoon. Another patient developed hyperglycaemia in the morning and after iftar initially but it was adjusted with corrected amount of bolus dose and she did not need to break any fast. There was no episode of DKA in these patients.

There were episodes of mild hypoglycemia in three patients. Hypoglycaemia was in the morning and also in the mid afternoon and they had to break the fast. There was no episode of severe hypoglycaemia and none of them required admission.

Discussion:

Before COVID 19, it was thought that telemedicine would only become available in western countries as because the use of telemedicine leads to significant savings in time and costs. [8] According to the COVID-19 forum on the International Society for Pediatric and Adolescent Diabetes (ISPAD), it is now the reality for all the pediatric diabetes centers around the globe. In our study population majority of the patients could fast more than 20 days with the help of telemonitoring service by diabetes team. A pilot study found a telemonitoring supplemented focused diabetes education group less likely to experience hypoglycaemia compared with education alone in 37 participants with T2DM who were fasting during Ramadan.[9] In our previous study we found that among 33 children with T1DM ,only 3 out of 13 children broke their fasting due to development of hypoglycemia symptoms. [10] A study by Deeb et al showed that the majority of children and adolescents were willing to break their fasting on the occurrence of hypoglycaemia regardless of the timing of the day.[11] In our study population, all are mostly young adults, they were educated for last few years in each Ramadan, they broke their fast whenever they had symptoms of hypoglycaemia.

Initially we reduced the basal dose from 10 to 15% as there was hypoglycaemia in some patients but after a week we had to increase the basal dose to have a good control though out the day time. In most studies, basal insulin rate is reduced (10%-15% reduction of basal

insulin infusion rate during the hours of fasting) and some suggest up to 40% at the end of the daily fasting. [12-14] The lock down, increase carb during iftar, less physical activity, increase stress may contribute to hyperglycaemia followed by high basal dose at Ramadan time in some of our patients.

Few had hypoglycaemia and broke the fast and later they reduced the basal dose. Lowering the basal insulin infusion rate temporarily or suspending it, can help people with T1DM to avoid major hypoglycemic events and improve diabetes control during fasting.[12,15,16] Our patients were on close monitoring of diabetes team which might help them not to develop much hypoglycaemia. According to Hawli et al an individualized approach, close monitoring of blood glucose and weekly follow-up with the medical team may be most important to prevent acute complications.[16]

None of our patients developed severe hypoglycaemia or DKA. In any of the pediatric published studies on insulin pump therapy, there was no severe hypoglycemia or DKA during Ramadan fasting.[11,15,16,17 ,18]

Conclusion: Fasting during Ramadan is feasible in patients with type 1 diabetes using an insulin pump, with adequate counseling and support. During COVID-19 crisis in Bangladesh, patients with type 1 diabetes on insulin pump, could fast in Ramadan with support of telemedicine service by diabetes team.

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There is no conflict of interest.

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Table I: Demographic and Clinical Characteristics of the patients (n= 9)

Characteristics	Mean value / %
Age at Diagnosis (years)	11.3 ± 3.7
Current age (years)	19.3 ± 5.0
Gender	
Male	4 (44.4%)
female	5(55.6%
Diabetes duration (years)	7.7 ± 2.9
Duration of insulin pump (years)	2.9 ± 1.5
HbA1c (%) before Ramadan	8.4 ± 1.4

Table 2 : Basal and bolus doses before and during Ramadan

Characteristics	Pre Ramadan basal and bolus dose	Pre Ramadan TDD (Total daily dose)	Post Ramadan basal and bolus dose	Post Ramadan TDD (Total daily dose)
12years female	19.7 -47	66.7	19.7 -47	66.7
14 years male	42.3 -34.0	76.3	32.4 - 34.0	66.4
17 years male	38 - 30	68	38 - 27	65
17years female	19.3 - 19	38.3	19.2 - 19	38.2
19 years female	67.2 -37.8	105	87 – 33 to 47	120-134
19years female	29.6 -29	58.6	29.6 -28.4	58
24years female	27.3. -10	37.3	23.5 -7	30.5
26 years male	98 -112	210	98 -112	210
26 years male	28.8 - 28	56.8	32.5 - 33	65.5