Original Article

Fasting during Ramadan in adolescents with diabetes

Bedowra Zabeen, Samin Tayyeb, Biplob Benarjee, Abdul Baki[1], Jebun Nahar[1], Fauzia Mohsin[1], Nazmun Nahar[1], Kishwar Azad

Departments of CDIC, and [1]Paediatrics, BIRDEM, Dhaka, Bangladesh

ABSTRACT

Background: Fasting (Sawm) during Ramadan, one of the five pillars of Islam is obligatory for all healthy adult and adolescent Muslims from the age of 12 years. Some children with diabetes, despite their exemption insist on fasting in Ramadan. We evaluated the safety of fasting among children with type 1 diabetes. **Materials and Mathods:** A prospective observational study was designed for diabetic children and adolescents who wish to fast during Ramadan 2012. Patients with their caregivers were given intensive education and instructions were provided by diabetic educators, dieticians and physicians on insulin adjustment, home blood glucose monitoring and dietary adjustments prior to Ramadan. **Results:** A total of 33 children and adolescents were included in this study. Of these, 16 were male and 17 were female. Majority (60.6%) of the patients could complete their fasting during the Ramadan. Patients were divided into two groups, those who completed fasting were considered as Group-I, whereas patients who broke the fast were in Group-II. Blood glucose, hemoglobin A1c weight, and insulin dose before and after Ramadan in two groups showed no significant difference. **Conclusion:** Children older than 11 years of age with type 1 diabetes mellitus with conventional twice-a-day regimen can fast safely during Ramadan provided they have proper education and intensive follow-up during Ramadan.

Key words: Fasting, ramadan, diabetes

Introduction

Ramadan is the 9th month of the Muslim calendar when the Holy Quran was sent down from heaven. Fasting (Sawm) during Ramadan, one of the five pillars of Islam, is obligatory for all healthy adult and adolescent Muslims from the age of 12 years. Depending on the geographical location and season, the duration of the daily fast may range from a few to 20 h.[1] Muslims who fast during Ramadan must abstain from eating, drinking, taking oral medications, and smoking from early dawn (Sohur) until sunset (Iftar). There is no restriction on food or fluid intake between sunset and dawn. The main meal, Iftar is taken at sunset and usually heavy meal with extra sweet foods and deeply fried food. Sohur is taken before sunrise with lighter meal with complex carbohydrate. Children, elderly people, travelers, pregnant or nursing women and sick individuals are exempted from fasting.[2] Although exempted, many Muslims, both adults and children refuse to take this concession as they feel psychologically and spiritually inclined to fast along with other Muslims.[3]

Access this article online	
Quick Response Code:	Website: www.ijem.in
	DOI: 10.4103/2230-8210.126530

Fasting during the day influences the control of diabetes because of changes in meal times, the type of food eaten and daily life-style.[2] Therefore, there is high risk of developing acute complications like hypoglycemia or ketoacidosis during fasting. The major risk of diabetics who fast during Ramadan is hypoglycemia. On the other hand, the excessive consumption of sweet and fried foods especially with the Iftar meal may pre-dispose to hyperglycemia. Many patients with diabetes insist on fasting during Ramadan, creating a challenge for themselves and their health care providers despite knowing all the risks. There are limited studies on Ramadan and most of studies have been done in adults with type 2 diabetes. There is one observational

Corresponding Author: Dr. Bedowra Zabeen, Room 309, 1/A Shegunbagicha, BIRDEM 2, Dhaka - 1000, Bangladesh. E-mail: bzabeen@hotmail.com

study done in children and adolescents using conventional regimen with twice-a-day soluble insulin (Actrapid) with isophane (Insulatard).[4]

The American Diabetic Association workgroup[2] suggested that care of the fasting diabetic must be highly individualized. Medical assessment and education should take place before the start of fasting. There should be frequent monitoring of blood glucose, especially for those who are on insulin. A healthy balanced diet should be maintained. Complex carbohydrates are recommended at the predawn meal, which should be taken as late as possible and simple carbohydrates at the sunset meal. Fluid intake should be increased in the non-fasting hours. A normal level of activity should be maintained, avoiding excessive activities in the hours before the sunset meal. The fast should be broken if glucose level is low (<4 mmol/L) or patient experiences signs/symptoms of hypoglycemia and if blood glucose level is >16.7 mmol/L.[5]

Some experienced physicians are of the opinion that fasting during Ramadan is safe for type 1 diabetes mellitus (T1DM) patients including adolescents and older children with good glycemic control who do self-monitoring and are under close professional supervision.[4,6,7] In Bangladesh, more than 90.0% of the population are Muslims. Many children and adolescents with diabetes insist to fast, but there is no study on children and adolescents who fast during Ramadan in Bangladesh. This study was conducted to see the safety and changes in hemoglobin A1c weight, episodes of hypoglycemia in patients who did fasting during Ramadan.

Materials and Mathods

A prospective observational study was designed for diabetic children and adolescents who wish to fast during Ramadan at Changing Diabetes in Children Program (CDiC) Clinic in BIRDEM, Dhaka, Bangladesh. Patients were recruited 1 month before the start of Ramadan. The study period was Ramadan 2012 (July 20 to August 18). Children aged 11-18 years, willing to do frequent blood glucose monitoring at least 2-3 times/day were included. We excluded children with sustained poor glycemic control, those with history of diabetic ketoacidosis (DKA) within 3 months prior to Ramadan and those unwilling to undertake blood glucose monitoring. Insulin doses were altered as necessary to accommodate the changing time of eating. All patients on twice-a-day regimen were advised to take their usual morning dose before their sunset meal (Iftar) and to take the evening dose at the time of Sohur. Patients were asked to monitor blood glucose at Pre-Iftar, Pre-Sohur and at any time during the day when they feel symptoms of hypoglycemia. Patients were instructed to break their 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. All patients were instructed to call health-care providers for dose adjustment whenever necessary or if there was any episode of hypoglycemia. Patients were asked to record the information of blood glucose measurements, ability to maintain fast on their home monitoring blood glucose (HMBG) book. Patients with their caregivers were given intensive education and instructions were provided by diabetic educators, dieticians and physicians on insulin adjustment, home glucose monitoring and dietary adjustments prior to Ramadan.

Data analysis was performed by Statistical Package for the Social Sciences program version 17. Data were expressed in mean ± standard deviation (SD). The $P < 0.05$ was considered to be the cut-off value of significance. Statistical analysis was performed using the non-parametric statistics.

Results

A total of 33 children and adolescents were included in this study. Here, 16 were male and 17 were female. Majority (60.6%) of the patients could complete their fasting during the Ramadan. Patients were divided into two groups, those who completed fasting were considered as Group-I (20 children), whereas patients who broke the fast were in Group-II (13 children). Mean (SD) age was 13.5 ± 2.0 in fasting group and was 13.4 ± 2.0 in the other group [Table 1]. Female (65.0%) participants were higher than male (35.0%) in Group-I whereas male 69.2% were higher than female (30.8%) in Group-II. Mean duration of diabetes was 21.7 ± 27.3 months in Group-I compared with 15.1 ± 15.3 months in Group-II [Table 1].

Two patients missed school for one day, one from Group-I and another one from Group-II [Table 1]. Two (10.0%) patients in Group-I developed mild symptoms of hypoglycemia, one before Iftar and another patient after Iftar at night. Three (23.1%) patients from Group-II developed mild hypoglycemia and broke the fast [Table 1]. However, there was no incidence of DKA or associated ketones in both groups [Table 1]. Sixty six percent (66.0%) patients in Group-I and Seventy five percent (75.0%) in Group-II did HMBG regularly as per instruction. Mean glucose level before Iftar was higher in Group-I compared that in Group-II [Table 2]. In Group-II mean blood glucose before Sohur was higher compared with that in Group-I [Table 2]. However, blood glucose declined to normal around mid-day in both groups. No significant differences were seen in blood glucose before Iftar and after Sohur.

The mean hemoglobin A1c for the fasting group was 8.5% ±2.94 before Ramadan and 8.1% ± 2.40, 3 months after

Table 1: Comparing the mean age, duration of diabetes and hypoglycemia in two groups

Parameters	Results		*P* value
	Group-I did not break fasting	Group-II broke fasting	
Mean (±SD) age at diagnosis	13.50 (2.06)	13.46 (2.06)	0.735
Mean (±SD) age at registration	15.17 (1.51)	14.20 (1.75)	0.501
Mean (±SD) duration of diabetes (months)	21.78 (27.34)	15.19 (15.34)	0.123
No. of children missing school	1	1	0.751
No. of children developing hypoglycemia	2	3	
No. of. children developing DKA	0	0	

DKA: Diabetic ketoacidosis, SD: Standard deviation

Table 2: Blood glucose, HbA1c, weight and insulin dose before and after Ramadan in two groups

Parameters	Groups		*P* value
	I	II	
Mean blood glucose before Iftar	9.79±5.3	7.96±1.85	0.206
Mean blood glucose before Sohur	8.07±1.56	9.33±2.45	0.367
Mean HbA1c			
Pre-Ramadan	8.57±2.94	8.91±2.17	0.155
Post-Ramadan	8.19±2.40	9.46±2.41	0.553
Mean weight			
Pre-Ramadan	51.45±9.95	55.38±18.80	0.289
Post-Ramadan	51.25±9.34	55.07±15.43	0.242
Mean insulin dose			
Pre-Ramadan	16.39 (3.66)	14.27 (4.12)	0.472
Post-Ramadan	18.42 (4.12)	13.60 (3.77)	0.166

HbA1c: Hemoglobin A1c

Ramadan and was 8.9% ±2.17 and 9.4% ±2.41 in the other group respectively [Table 2]. At the beginning of Ramadan, the weight of patients in Group-II was higher (mean of 55.38 kg (±18.8) than that of the fasting group, (mean of 51.45 kg (±9.95) [Table 2]. There was mild weight reduction in both groups after the Ramadan [Table 2]. Insulin dose was increased in Group-I whereas insulin dose was reduced in Group-II during Ramadan [Table 2].

Discussion

In the past, fasting during Ramadan has not been recommended for type 1 diabetics because of the risk of hyper or hypoglycemia. However, current evidence has proved that with proper education, appropriate adjustment of the drug regimen, diet control and daily activity, it is safe for adult diabetics with type 1 and type 2 to fast during Ramadan.[2,7-13] Regimens using short acting insulin before meals with a long-acting insulin in the evening have been safely used in adults.[7] Our study in T1DM showed that most of children with conventional insulin regimen could complete the fast.

The management of children with diabetes who choose to fast during Ramadan is a challenge for the pediatrician as the majority of guidelines and data on safety and metabolic impact of fasting are based on practice and studies on the adult population. Majority of our patients completed the full month of fasting, only two had mild hypoglycemia and none had DKA. Therefore, our study showed that it is safe for diabetic children over the age of 11 years to fast, provided that a well-structured program of education for both children and their families is completed prior to Ramadan and that they receive close follow-up during the month of Ramadan. Data on the effects and safety of Ramadan fasting in healthy and diabetic adolescents are sparse. An earlier study[4] done in Riyadh on children with similar age group reported three children with biochemical hypoglycemia within the 1st week of fasting. In our study, 10.0% patients developed hypoglycemia in fasting group compared with 33.3% of patients who broke the fast. In one study, eight patients (61.5%) on basal – bolus regimen and 4 (44.0%) on conventional insulin broke their fast on at least one occasion because of hypoglycemia.[6] The reasons for lower hypoglycemia episodes in our patients may be the parental supervision, intensive education, insulin adjustment, monitoring over phone and regular follow-up in CDiC clinic. It is also possible that adequate food intake and higher HbA1c in our patients provided them with protection against hypoglycemia. In our population, there was weight reduction but there was increased in weight in majority of patients in one study,[6] which could be attributed to adequate amount of balanced diet taken by our patients as per the dietary advice given by our dietitian. Our study population was very small in number but still demonstrates that children over the age of 11 years who had proper education, insulin dose adjustment and were under close follow-up had less number of complications and were able to successfully complete fasting during the month of Ramadan.

Conclusion

Children older than 11 years of age with T1DM with conventional twice-a-day regimen can fast safely during Ramadan provided they have proper education and intensive follow-up during Ramadan. However, further studies with large population are recommended to expand our knowledge in management of childhood diabetes during Ramadan.

References

1. Ibrahim AM. Managing diabetes during Ramadan. Diabetes Voice 2007;52:19-22.
2. Al-Arouj M, Bouguerra R, Buse J, Hafez S, Hassanein M, Ibrahim MA, *et al*. Recommendations for management of diabetes during Ramadan. Diabetes Care 2005;28:2305-11.
3. Al Alwan I, Al Banyan A. Effects of Ramadan fasting on children

with type 1 diabetes. Int J Diabetes Mellit 2010;2:127-9.
4. Salman H, Abdallah MA, Abanamy MA, al Howasi M. Ramadan fasting in diabetic children in Riyadh. Diabet Med 1992;9:583-4.
5. Azad K, Mohsin F, Zargar AH, Zabeen B, Ahmad J, Raza SA, *et al*. Fasting guidelines for diabetic children and adolescents. Indian J Endocrinol Metab 2012;16:516-8.
6. Al-Khawari M, Al-Ruwayeh A, Al-Doub K, Allgrove J. Adolescents on basal-bolus insulin can fast during Ramadan. Pediatr Diabetes 2010;11:96-100.
7. Kadiri A, Al-Nakhi A, El-Ghazali S, Jabbar A, Al Arouj M, Akram J, *et al*. Treatment of type 1 diabetes with insulin lispro during Ramadan. Diabetes Metab 2001;27:482-6.
8. Salti I, Bénard E, Detournay B, Bianchi-Biscay M, Le Brigand C, Voinet C, *et al*. A population-based study of diabetes and its characteristics during the fasting month of Ramadan in 13 countries: Results of the epidemiology of diabetes and Ramadan 1422/2001 (EPIDIAR) study. Diabetes Care 2004;27:2306-11.
9. Patel P, Mirakhur A, El-Magd KM, El-Matty AN, Al-Ghafri D. Type 2 diabetes and its characteristics during Ramadan in Dhahira Region, Oman. Oman Med J 2007;22:16-23.
10. Benaji B, Mounib N, Roky R, Aadil N, Houti IE, Moussamih S, *et al*. Diabetes and Ramadan: Review of the literature. Diabetes Res Clin Pract 2006;73:117-25.
11. Kobeissy A, Zantout MS, Azar ST. Suggested insulin regimens for patients with type 1 diabetes mellitus who wish to fast during the month of Ramadan. Clin Ther 2008;30:1408-15.
12. Beshyah S, Benbarka M, Sherif I. Practical management of diabetes during Ramadan Fast. Libyan J Med 2007;2:185-9.
13. Kassem HS, Zantout MS, Azar ST. Insulin therapy during Ramadan fast for Type 1 diabetes patients. J Endocrinol Invest 2005;28:802-5.

Cite this article as: Zabeen B, Tayyeb S, Benarjee B, Baki A, Nahar J, Mohsin F, Nahar N, Azad K. Fasting during Ramadan in adolescents with diabetes. Indian J Endocr Metab 2014;18:44-7.

Source of Support: Nil, **Conflict of Interest:** No.