Hypoglycemia at the time of covid-19 pandemic

ELSEVIERE

DIABETES ANDMETABOLIC SYNDROME :CLINICAL RESEARCH AND REVIEWS 14(2020) 1143-1146

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INTRODUCTION

- DIABETES MICROVASCULAR AND MACROVASCULAR COMPLICATION.
- NEED ON GOING PATIENT SELF MANAGEMENT ,EDUCATION AND SUPPORT .
- GLYCEMIC GOAL IS LIMITED BY HYPOGLYCEMIA.
- THE RISK OF HYPOGLYCEMIA IS HIGH IN PATIENTS TREATED WITH SULFONYLUREA,GLINIDE,AND INSULIN.
- INTERACTION BETWEEN THESE AGENTS AND HYDROXYCHLOROQUINE

CAN INCREASE RISK OF HYPOGLYCEMIA.

METHOD

- RETROSPECTIVE ANALYSIS STUDY ON T2DM PATINET REPORTING IN THE EMERGENCY DEPARTMENT(ED)WITH SYMPTOMS SUGESTIVE OF HYPOGLYCEMIA(SWEATING,FELLING SHAKY,BEING NERVOUS OR ANXIOUS ,CHILLS,AND CLAMMINESS,IRRITABILITY, INPATIENCE,CONFUSION,FAST HEART BEAT,FELLING LIGHTHEADED,DIZZY
- RANDOM CAPILLARY BLOOD GLUCOSE WAS MEASURED
- BLOOD GLUCOSE VALUE OF <70 WAS DEFINED AS A CASE OF HYPOGLYCEMIA AS PER THE 2020 American Diabetes Guidelines

Results

Table 1
Demographics of patients with hypoglycemia

Sr. No	Characteristics	Observation (Mean ± SD)
1	Male: Female	90:56
2	Age, (Years)	59.88 ± 10.09 (40–82)
3	Duration of Diabetes, (Years)	10.05 ± 2.09 (06–13)
4	Random Blood glucose on admission, (mg/dL)	57.67.±9.00 (35–69)
5	HbA1c, (%)	8.5 ± 0.70 (7–9.8)
6	Serum creatinine, (mg/dL)	1.38 ± 0.60 (0.6–2.8)

Number of subjects (n) = 146, Values are expressed as Mean ± standard deviation (SD),HbA1c: Glycated hemoglobin.

contResult

Table 2
Classification of hypoglycemia.

Sr. No	Random blood glucose categories	Number of subjects (%)	RBG (mg/dL); Mean ± SD
1	Level 1 hypoglycemia Glucose < 70 to ≥ 54 mg/dL	102 (70.83)	62.53 ± 4.67 (54–69)
2	Level 2 hypoglycemia Glucose < 54 mg/dL	44 (29.16)	46.05 ± 4.84 (35–53)

Number of subjects (n) = 146, Values are expressed as Mean ± standard deviation (SD).

contResult

Table 3
Anti-hyperglycemic agents (AHA), Hydroxychloroquine and associated risk of hypoglycemia during lockdown.

Sr. No	Anti-diabetic drugs	N (%)	RBG (mg/dl), Mean ± SD
1	Metformin + SU	96 (65.75)	60.95 ± 7.10 (36–78)
2	Metformin + SU + TZD	16 (10.96)	61.68 ± 3.45 (54–66)
3	Metformin + SU + DPP-4i	25 (17.12)	60.24 ± 5.26 (43–67)
4	Metformin + SGLT-2 inhibitors	12 (8.33)	60.53 ± 8.12 (44–69)
5	Insulin	49 (33.56)	50.75 ± 8.20 (35–67)
6	Hydroxychloroquine 400 mg OD	28 (19.17)	54.82 ± 4.76 (36–61)
7	Hydroxychloroquine 400 mg BD	49 (33.56)	52.95 ± 7.03 (35–67)

n: Number of subjects; RBG: Random blood glucose; SU: Sulfonylureas; TZD: Thiazolidinediones; DPP-4i: Dipeptidyl peptidase-4 inhibitor; SGLT-2 inhibitors: Sodium-glucose co-transporter-2 inhibitors, OD: Once a day, BD: Twice a day.

contResult

Table 4
Associated co-morbidities and risk of hypoglycemia during lockdown.

Sr. No	Associated complications	N (%)	Random blood glucose, mg/dl (Mean ± SD)
1	Nephropathy	49 (33.56)	50.75 ± 8.20 (35–68)
2	Ischemic Heart Disease (IHD)	27 (18.49)	56.51 ± 8.98 (35–67)
3	Congestive Cardiac Failure (CCF)	17 (11.64)	50.71 ± 7.94 (39–68)
4	Cerebrovascular accident (CVA)	34 (23.29)	55.64 ± 8.62 (39–68)
5	Diabetic foot	37 (25.34)	58.54 ± 6.59 (42–67)
6	Hypertension (HTN)	68 (46.58)	53.94 ± 9.01 (35–68)
7	Nephropathy + Diabetic Foot	7 (4.80)	52.71 ± 7.64 (42–67)
8	IHD + CCF	4 (2.74)	54.25 ± 7.14 (44–60)
9	Nephropathy + IHD + CCF	48 (32.88)	52.31 ± 5.40 (44–61)

n = Number of subjects, IHD: Ischemic Heart Disease, CCF: Congestive cardiac failure, CVA: Cerebrovascular Disease, HTN: Hypertension.

discussion

Iatrogenic hypoglycemia is a limiting factor in the glycemic management of diabetes [16]. Our data showed the majority of patients (70.83%) had blood glucose values of <70 mg/dL to 54 mg/dL while blood glucose values of <54 mg/dL was observed in one third of patients. A blood glucose concentration of 70 mg/dL has been recognized as a threshold for neuroendocrine responses to falling glucose in people without diabetes [17]. Because many people with diabetes demonstrate impaired counter-regulatory responses to hypoglycemia and/or experience hypoglycemia unawareness, a measured glucose level, 70 mg/dL is considered clinically important, independent of the severity of acute hypoglycemic symptoms. Blood glucose concentration, < 54 mg/dL) is the threshold at which neuroglycopenic symptoms begin to occur and requires immediate action to resolve the hypoglycemic event [18]. Although it was difficult to recollect the causative history for hypoglycemia majority of patients reported reason behind the symptomatic hypoglycemia as stress related to lockdown, delay in availability of food, non-availability of food, fear psychosis of being infected with COVID-19 and the financial issues associated with loss of jobs.

discussion

The COVID-19 pandemic represents a huge burden to public health worldwide and healthcare services have faced severe challenges during outbreaks, resulting in major cutbacks in the care provided to people with chronic diseases, including diabetes [19,20]. Many outpatient clinics have had to change their routine interactions with the patient and use telemedicine to monitor patients at home. Diabetologists were concerned that glucose control could worsen during lockdown because of the limited possibility to exercise, the severe psychological stress imposed by social distancing in a cultural environment heavily reliant on direct interpersonal relationships and limited access to food supply and various other reasons especially in socio-economically weaker people in India [21].

discussion

In our study, sulfonylureas and insulin were the most commonly used anti-hyperglycemic agents associated with the risk of hypoglycemia. Dosage of oral anti-diabetic drugs may need to be re-adjusted based on the blood glucose parameters and the prevailing conditions. Patient's education, sick day guidelines and the need to more frequent monitoring of blood glucose are warranted to avoid hypoglycemia [21].

Many studies have reported that HCQ improves glycemic control in treatment-refractory patients with diabetes [22,23]. Inflammation has been said to be associated with impaired glucose control, the mechanism of HCQ hypoglycemic effect remains unclear. It has been described that patients on HCQ show a larger C peptide response, potentially reflecting an improved pancreatic β-cell function [23]. It has even been approved to treat T2DM in India as an add-on therapy for patients who do not achieve glycemic targets

discussion

with two or more oral glucose-lowering drugs. Reduced intracellular insulin degradation and increased insulin accumulation have also been identified as possible effects of hydroxychloroquine in animals models [24]. Given the previously reported impact of hydroxychloroquine on glucose metabolism, caution should be taken when the drug is administered to patients with diabetes and COVID-19. A dose adjustment of the oral antidiabetic drugs and/or insulin is necessary to prevent potential hypoglycemic events.

Diabetes and its associated co-morbidities have a vicious relationship with hypoglycemia. Associated co-morbidities also increase the risk of hypoglycemia in patients with diabetes [25]. Diabetic kidney disease (DKD) is a significant risk factor for the development of hypoglycemia. Factors that predispose for risk of hypoglycemia in DKD are reduced renal insulin clearance, decreased degradation of insulin in peripheral tissues, reduced renal gluconeogenesis, and impaired renal excretion of commonly used AHA. The confluence of these factors may contribute to a greater risk for hypoglycemia among patients with CKD and may be an unintended consequence of therapy to treat hyperglycemia [26]. In our study, one-third patients of symptomatic hypoglycemia had diabetic kidney disease.

conclusion

Hypoglycemia is a problem for many patients with diabetes, fundamentally iatrogenic, the result of therapeutic hyperinsulinemia. In the acute setting, hypoglycemia is deleterious, and clinical trials have demonstrated that a single episode of severe hypoglycemia increases the risk of subsequent mortality and cardiovascular events. Patient education, support, and telemedicine plays a pivotal role to prevent hypoglycemia. The COVID-19 lockdown has shown to influence the risk of hypoglycemia in patients with T2DM, especially those receiving SU, insulin, HCQ especially in patients with associated co-morbidities.