A Single Center Retrospective Analysis of SGLT2i-Associated Diabetic Ketoacidosis in Bangkok: The Importance Role of Point-of-Care Blood Ketone Testing

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Background: Since the clinical trials of sodium-glucose co-transporter 2 inhibitor (SGLT2i) demonstrated cardiovascular benefits in type 2 diabetic patients with established cardiovascular disease, the number of diabetic patients on SGLT2i has been increasing substantially with SGLT2i starting to become an integrative diabetic treatment in both endocrinologists and other specialists. However, SGLT2i could increase the risk of diabetic ketoacidosis (DKA). The rare events of euglycemic DKA (plasma glucose < 300 mg/dL) might occur undetectably without any indicative hyperglycemia.

Objective: This study aimed to illustrate the case series of SGLT2i-associated DKA in one of the largest diabetes centers in Bangkok. The role of point-of-care blood ketone testing for rapid diagnosis of DKA was also reviewed in our cases.

Materials and Methods: We conducted a retrospective study from the consecutive cases of SGLT2i-associated DKA following the available data of this anti-diabetic class in our hospital from November 2014. The clinical characteristics, precipitating events, laboratory data, and treatment outcomes were reviewed.

Results: A total of 4 SGLT2i-associated DKA cases (one case of type 1 diabetes mellitus [T1DM] and three cases of type 2 diabetes mellitus [T2DM]) were reviewed. In T2DM patients, all patients had a long-standing duration of diabetes (median duration of 11 years) and poorly glycemic control (mean A1C 10.6±0.8%). The median glucose at presentation was 382 mg/dL (range 166-708 mg/dL). All cases had an obvious precipitating event (1 case with acute diarrhea, 1 case with sepsis, and 2 cases with insulin dose reduction). Euglycemic DKA was noted in 2 cases with symptoms of malaise and diarrhea. Point-of-care blood ketone testing led to early diagnosis in a patient with euglycemic DKA at an outpatient clinic, and also allowed prompt action in starting intravenous insulin protocol for DKA in another T2DM patient who presented at emergency room with urosepsis. All patients were alive after the resolution of DKA.

Conclusion: DKA in the setting of SGLT2i treatment is uncommon and often presents with precipitating events in long-standing duration of diabetes. Physicians and patients need to be aware of this risk, especially their usages in long-standing diabetes as a ‘last resort’ therapy before insulin treatment. Rapid point-of-care blood ketone testing should be available in routine clinic to check for the possibility of DKA in patients taking SGLT2i with unexplained malaise or gastrointestinal symptoms.

Keywords: SGLT2i, Diabetic Ketoacidosis, Point-of-care Ketone