

**Hyperosmolar Hyperglycemic State With Acute Renal Failure In Type 1  
Diabetes Mellitus: A Rare Case Report And Review**

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**ABSTRACT**

**Background:** The hyperosmolar hyperglycemic state (HHS) is the most serious acute hyperglycemic emergency. The hyperosmolar hyperglycemic state (HHS) is a syndrome characterized by severe hyperglycemia, hyper osmolality, and dehydration in the absence of ketoacidosis. Hospitalizations for HHS in children and adolescents have increased significantly in recent studies. Several unresolved questions regarding the pathogenesis and treatment of HHS in adults and children need to be addressed in prospective clinical studies. We present a case report on HHS with acute renal failure in Type 1 Diabetes Mellitus patient.

**Key words:** Diabetes Mellitus, Hyperosmolar hyperglycemic state (HHS), Acute renal failure, Hemodialysis

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**Conflict of interest: No**

**Case report is Original: YES**

**Whether case report publishes any where? NO**

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**INTRODUCTION**

The hyperosmolar hyperglycemic state (HHS) is a syndrome characterized by severe hyperglycemia, hyper osmolality, and dehydration in the absence of ketoacidosis.<sup>1</sup> Most cases of HHS are seen in elderly patients with type 2 diabetes; however, it has also been reported in children and young adults. The overall mortality rate is estimated to be as high as 20%, which is about 10 times higher than the mortality in patients with diabetic ketoacidosis (DKA).<sup>2</sup>

Current Diagnostic criteria for HHS include a plasma glucose >600mg/dl, pH >7.3, serum bicarbonate >15meq/dl, urine and serum ketones small, serum osmolality >320mosm/kg and alteration in sensorium.<sup>3</sup> Acute renal failure is a serious complication in diabetic patients either as a complication of DKA or HHS or due to diabetes itself. Acute renal failure in diabetes as a complication of HHS is very rare.<sup>4</sup> Herein, we present a case report on HHS with acute renal failure in Type 1 Diabetes Mellitus patient.

**Hyperosmolar Hyperglycemic State With Acute Renal Failure In Type 1****Diabetes Mellitus: A Rare Case Report And Review****CASE REPORT**

A 11 year female patient was Presented with complaints of 10 days fever and altered sensorium since last two days. The patient was diagnosed with type 1 diabetes one year ago and was on subcutaneous Human Mixtard insulin. She was regularly taking medications but no history suggestive of regular blood glucose monitoring in home. Physical examination revealed an febrile and had signs of severe dehydration, Glasgow coma scale score was 4, no signs of meningeal irritation was present. Vital signs of patient were stable.

The laboratory data showed an anion gap, metabolic acidosis, and hyperglycemia (pH of 7.32, anion gap of 24, bicarbonate 16.5 mmol/l sodium 128 mmol/L, Potassium 3 mmol/L urinary ketones nil, urine sugar +4, glucose 622 mg/dl, Serum osmolarity 347 mosm/kg) consistent with the diagnosis of HHS. Patient white blood count was 6900/ $\mu$ l. Urinalysis demonstrated 15-20 pus cells/HPF. The patient's hemoglobin A1c (A1C) was not done. Renal functions showed blood urea 176.2 mg/dl, serum creatinine 5.0 mg/dl. Ultrasound was suggestive of pyelonephritis with normal sized kidneys.

The patient was admitted and treated aggressively with intravenous fluid and an insulin-glucose infusion. Despite of aggressive fluid management Patient had oliguria for initial few days and renal function was deranged. Hemodialysis was done on day 2, 3 and 6 after admission. Progressively patient's urine Output and consciousness level improved. At time of discharge patient was fully conscious without any focal deficit and with normal range renal function test. Patient was followed up after one month, there was no renal compromise and patient blood glucose was well controlled.

**DISCUSSION**

HHS is a rare complication of type 1 diabetes mellitus. Acute renal failure itself is a rare and fatal complication of diabetes. In a previous case study of 23 patients with type 1 diabetes complicated with acute renal failure, diabetic ketoacidosis was the main underlying factor in 14 cases, nonketotic hyperosmolar coma was present only in one patient and remaining were with other metabolic complication of diabetes. The patient with nonketotic hyperosmolar coma has been not diagnosed as diabetic before. She was comatose on admission, with a blood sugar 73.8 mmol/L, renal failure and gram negative septicemia of urinary tract origin. After a complicated illness, she died without recovery of renal and cerebral function. [5] In our case also, patient came with same clinical presentation and laboratory findings are suggestive of nonketotic hyperosmolar coma. Urinary tract infection (pyelonephritis) could be a precipitating factor for this event. However patient had no history or signs suggestive of chronic kidney disease. Complete scenario suggests that it's a case of nonketotic hyperosmolar coma with acute renal failure in a patient with diabetes mellitus type 1.

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### **CONCLUSION**

Several unresolved questions regarding the pathogenesis and treatment of HHS in adults and children need to be addressed in prospective clinical studies. Hospitalizations for HHS in children and adolescents have increased significantly in recent studies. Clinical programs are needed for early detection and management to reduce the development of hyperglycemic crises in the pediatric population.

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