

Prerequisite of Insulin and Intravenous Fluid in the Treatment of Diabetic Ketoacidosis to Overwhelmed the Catastrophe

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ABSTRACT

Introduction: Ketoacidosis (DKA) is relatively common among the states of acute metabolic decompensation of diabetes. It usually transpires in patients with diabetes mellitus who have some type of infection and have poor compliance of insulin. Treatment entailed of correcting hyperglycaemia, dehydration, acidosis, electrolyte imbalance and antibiotic therapy in patients with any type of infection or treating another reason, if any. The aim of this study is to determine the requirement of insulin and intravenous fluid for the treatment of diabetic ketoacidosis to overcome the catastrophe

Study Design: It was a cross-sectional study, held in the Medicine of Sialkot Medical College, Sialkot for six-months duration from July 2021 to December 2021.

Methods: Sixty adult patients with DKA who met the exclusion and inclusion criteria who need the total volume of intravenous fluid (saline) required to manage diabetic ketoacidosis.

Results: The total numbers of selected patients were 60. Diabetic ketoacidosis was communal in patients with formerly detected diabetes (71.4%), and its frequency was higher in the poor and the rural population, no significant gender differences were found. Vomiting (53.3%), Nausea (36.7%), infection (38.3%) and abdominal pain (30%) were common, with polyuria (25%) and polydipsia (18.3%). The main causes were infection (38.3%) and failure to administer insulin (51.7%). In most cases, status of glycaemia was poor. Many of the cases had mild (43.3%) to moderate (56.7%) acidosis, and electrolyte disturbances were less frequent. Leucocytosis (90%) was consistently present even in the absence of any infection. The result (91.7% survival) is comparable to that of developing countries. For the treatment of CKD, 35% of patients with increased diuresis required 11 liters of fluid. 23.3% of patients required 91-100 insulin units, and maximum patients (31.7%) needed forty-eight hours to correct their acidosis.

Conclusion: Diagnosing diabetic ketoacidosis is not tough if noticed in time and can be treated successfully. In order to prevent mortality; adequate fluid replacement is mandatory.

Keywords: Diabetic ketoacidosis, diabetes, intravenous fluids and insulin.

INTRODUCTION

In 2009, there were 140,000 hospitalizations for diabetic ketoacidosis (DKA), with an average stay of 3.5 days¹. The annual indirect and direct hospitalization costs for DKA are \$ 2.4 billion. The most common factor causing DKA is skipping insulin²⁻³. Infectious stress, acute cardiovascular (myocardial infarction, stroke) and gastrointestinal diseases (pancreatitis, bleeding), endocrine disease (Cushing's syndrome, acromegaly), and recent surgery may result in the DKA development by causing increased levels of insulin counterregulatory hormones, dehydration and deteriorating of peripheral insulin resistance⁴. Medications, such as beta blockers, diuretics, antipsychotics, anticonvulsants and corticosteroids may influence volume status and carbohydrate metabolism and thus accelerate CKD⁵. Extra aspects that may result in CKD comprise eating disorders, psychological problems, the use of illegal substances and insulin pump malfunction. It is now accepted that new-onset type 2 diabetes may occur in DKA⁶. These patients are mostly African American or Asian, obese and have extremely level of resistant to insulin during presentation.

Amongst the decompensated and acute metabolic conditions of diabetes, diabetic ketoacidosis is comparatively communal⁷. It usually transpires in patients with diabetes mellitus who have some type of infection and have poor compliance of insulin⁸. Formerly undiagnosed people with DM may also presented with symptoms of DKA⁹. Accordingly, we assessed sixty patients with DKA for insulin and IV fluid requirements for treatment and outcomes¹⁰. Treatment comprised of correcting acidosis, electrolyte imbalance and dehydration as well as precipitating factor like antibiotics for infections.

METHODS

This Cross-sectional study was held in the Medicine of Sialkot Medical College, Sialkot for six-months duration from July 2021 to

December 2021. for six-months duration from July 2021 to December 2021. The DKA management was carried out conferring to the Portland Protocol. Blood glucose was hourly measured and the insulin rate was regulated on a syringe pump conferring to the protocol of Portland. The chart of Intake and output is retained to verify that fifty percent of the fluid has been directed in order to avoid fluid overload and bicarbonate was not directed. DKA was taken as resolute when there is >18 meq / L of bicarbonate level with pH > 7.3. Subsequently, a subcutaneous split-mix insulin regime was initiated when the volunteers were able to ingest food (1/3rd of regular insulin and 2/3rd intermediate-acting NPH insulin). 2/3rd of the over-all daily dosage was administered in the morning time and 1/3rd in the evening time.

RESULTS

The total number of selected patients were 60. Thirty-five of the cases were men and twenty-five were women. (M: F = 1.8:1). The recently identified cases of diabetes mellitus were 35(58.3%) and known diabetic patients were 25(41.7%) of selectees. More specifically, at most 23.3% of the patients were 21-25 years of age. Table 1 labels the patient's distribution in the various age groups.

Table-1: shows the patients distribution conferring to age

Age (years)	Number of patients (%)
≤ 20	10 (16.7)
21-25	14 (23.3)
26-30	8 (13.3)
31-35	5 (8.3)
36-40	6 (10)
41-45	10 (16.7)
46-50	3 (5)
51-55	2 (3.3)
56-60	2 (3.3)
≥ 61	0 (0)

Amongst the known diabetic patients, 50% received insulin, 25% received oral hypoglycemic drugs followed by insulin, and 25% received only oral hypoglycemic drugs.

Table-2: shows the patients distribution conferring to the precipitating causes

Cause	No of old cases	No of new cases
Infection (38.3%)	12	11
Omission of drugs/ insulin (51.7%)	19	12
New case (5%)	2	1
Surgery (5%)	2	1
Pancreatitis (6%)		

Omission of insulin and infection were the foremost reasons of the progression of CKD. In most cases, glycemic status was poor. Most of the patients had mild to moderate acidosis. In most cases, status of glycaemia was poor.

Table-3: shows the levels of RBS at admission

RBS mmol/l	No of subjects	%age
≤10	0	0
10-15	12	20
16-20	9	15
21-25	22	36.7
26-30	8	13.3
31-35	5	8.3
>35	4	6.7

Table-4: shows level of acidosis

pH	Number of patients	Percentage
<7	6	10
7-7.24	32	53.3
7.25-7.30	22	36.7

For the treatment of CKD, 35% of patients with increased diuresis required 11 liters of fluid. 23.3% of patients required 91-100 insulin units, and maximum patients (31.7%) needed forty-eight hours to correct their acidosis.

Table-5: shows the Prerequisite of fluid for improvement of acidosis

Amount of (NS) fluid (L)	Number of patients
5	10
6	5
7	2
8	5
9	3
10	6
11	21
12	3
13	3
14	1
16	1

Table-6: shows the Insulin required for improvement in acidosis

Amount (unit)	Number of patients
< 80	12
81-90	10
91-100	14 (23.3%)
101-110	5
111-120	3
121-130	5
131-140	8
141-150	2
151-160	3

Table-7: shows the time required for improvement in acidosis

Time	Number of patients
24 hrs	13
48 hrs	19 (31.7%)
72 hrs	10
4days	4
5 days	4
6 days	5
7 days	5

DISCUSSION

This research was conducted to test the intravenous insulin and fluid requirements in the treatment of diabetic ketoacidosis in order to overwhelmed the emergency experienced at the tertiary care Hospital. In Denmark, the ratio of women to men was 7.1: 6.1. A Taipei recent study institute that 68% of patients with DKA are women¹⁰⁻¹¹. In India case series, the M: F proportion was 3:1.2. The cases of acidosis with mild to moderate level were managed in a general ward, as suggested in analysis held at the Atlanta in Emory University School of Medicine¹²⁻¹³. In this study, infection was the most common causing cause (36%). Infection was documented in 38.3% of cases. They probably had formerly undetected hyperglycaemia and the DKA was caused by the infection. The residual ten patients had a comparatively brief history of polyuria, polydipsia, rapid breathing and weight loss; acute pancreatitis was seen in one case only. Of the 35 known diabetic cases, 20 (57.1%) had insulin deficiency and DKA was developed within 1-19 days¹⁴⁻¹⁵. Infection was noticed in ten cases; acute pancreatitis was seen in two cases. In one patient, omitting insulin after gynaecological surgery aggravate DKA. Most of the patients had slightly low or normal levels of sodium and normal or slightly elevated levels of potassium. Comparable outcomes were obtained in studies in Pakistan and Atlanta¹⁶. Severe hypokalaemia, severe acidosis and hyponatraemia was seen in 4 patients. Afterwards initiating insulin and fluid therapy, nearly all subjects established hypokalaemia necessitating correction by intravenous potassium. A similar observation appeared in a national survey in Denmark. Most of the patients had very high blood sugar and ketonuria on urine ketos-tix test¹⁷⁻¹⁸. Patients were found to have a longer duration of ketonuria compared to biochemical and clinical enhancement as demonstrated by HCO₃ and pH levels. A comparable opinion was conveyed very recently in one Indian study¹⁹⁻²⁰. Correction of acidosis in the majority of patients (24%) took 48 hours, up to a maximum of 1-week. In the Emory Medicine University study, the time required was between 11 and 15 hours. The results were quite comparable and satisfactory in established states. 5 (8.3%) cases who developed severe acidosis died. Mortality in developing countries ranged from 6 to 24%²¹⁻²². In our study, most patients required 91 to 100 units of insulin and 82 to 110 units of insulin, similar to the study at Emory Medicine University. In the 1st 24 hours of inpatient treatment, every subject needed 4.12 liters of IV fluid approximately, 72 units of insulin and 60 mmol of potassium²³⁻²⁴.

CONCLUSION

DKA most often arisen in patients diagnosed with diabetes who had an infection and missed an insulin dose. New cases are common. Common features are polydipsia, polyuria, abdominal pain, vomiting and infection. These patients have poor glycaemic control. Severe acidosis is less common. Severe electrolyte disturbances are rare in mild to moderate acidosis, but after start of therapy; hypokalaemia develops. Leucocytosis is communal even in the absenteeism of infection, and ketonuria may continue or worsen with treatment despite biochemical and clinical enhancement. The general outcome is better with 10% death ratio.

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