Introduction: Diabetes ketoacidosis (DKA) is characterized by hyperketonaemia, metabolic acidosis, and hyperglycemia. Aims: The aim of this study was to describe the demographic profile, clinical characteristics of patients admitted with diabetic ketoacidosis in BPKIHS, medical ward. Settings and Design: The hospital based descriptive study. Materials and Methods: We took all the patients admitted with a diagnosis of diabetic ketoacidosis (DKA) as defined ADA 2006 consensus statement in medical ward from January 2010 to December 2010. The statistical operations was done through Manufactured by IBM Corp. Results: Only sixteen patients (7 type 1 and 9 type 2DM) were with DKA. When compared to the 16 subjects with type 1 DM, the type 2 were older (56.8 ± 25.7 years) and had a significantly higher PH levels (7.11 ± 7.28 P = 0.04). The mean body mass index was 20.5±2.44 in both Type 1 and type 2 DM. Four were on diet control and insulin respectively. Five were on oral hypoglycemic agents (OHA) and three on both (insulin and OHA). Infection was most common precipitating factor (56.25%) followed by poor drug compliance (37.5%) and first presentation (6.25%). Conclusions: We found majority of patients were type 2 DM. Metabolic acidosis has significant association in both type of diabetic. We found infection was the most common precipitating factor for DKA.

Key words: B. P. Koirala Institute of Health Sciences, Dharan, diabetes, ketoacidosis

INTRODUCTION

Diabetic ketoacidosis (DKA) is characterized by hyperketonemia, metabolic acidosis, and hyperglycemia. It is a frequent cause of morbidity and mortality in type 1 diabetes patients. However, it also occurs occasionally in patients with type 2 DM during severe stress, for example, sepsis and myocardial infarction.

Diabetes and DKA are common in the Nepalese population. No study has been done to know the clinical profile and outcomes of DKA patients. Hence, the aim of this study was to determine the pattern of DKA at a teaching hospital in B. P. Koirala institute of health sciences, Dharan, to assess the clinical and biochemical characteristics of the patients and the precipitating factors for DKA.

SUBJECTS AND METHODS

Study type and study design
A hospital-based descriptive study.

Place and duration of study
All consecutive patients diagnosed with DKA admitted in medical ward from January 2010 to December 2010 defined by American Diabetes Association (ADA) 2006 consensus statement. We diagnosed the patient on the basis of clinical features and age and presence or absence of ketone bodies and response to insulin treatment. We do not have facility of GAD antibody in our hospital, c-peptide or insulin level in our hospital.
Typical clinical features such as hyperventilation, vomiting, and dehydration with:
- Hyperglycemia ≥250 mg/dL
- Arterial blood pH ≤7.3
- Serum bicarbonate ≤18 mmol/L
- Presence of ketonuria (2+ on dipstick).

Severity of DKA was defined according to ADA criteria 2006:
- Mild (arterial blood pH 7.25–7.30)
- Moderate (pH 7.00–7.24) or
- Severe (pH < 7.00).

Effective osmolarity was calculated using the ADA formula: 
\[2 \times \text{sodium} + \frac{\text{plasma glucose}}{18}\], with normal values being 290 mmol/kg water. Ethical approval was taken from our institute ethical review board. The data were collected only after proper informed consent taken from subjects.

The following variables were recorded: Age, sex, nationality, duration of diabetes, precipitating factors for DKA, duration of symptoms before seeking medical advice, clinical features, laboratory findings at presentation with DKA (plasma glucose, serum blood urea nitrogen, serum creatinine, serum sodium and potassium, urine acetone, arterial blood pH, plasma bicarbonate, and plasma osmolarity), associated complications, duration of hospitalization and outcome. Patients were classified as having type 1 or type 2 diabetes based on their treatment history.

The mean age at presentation was between 44.12 ± 38.50. The time lag during admission to hospital was 7.19 ± 6 days. Most of the patients had moderate dehydration with mean BP of 100/60 mm Hg. The mean RBS and bicarbonate at presentation were 451.25 ± 115.827 and 13.769 ± 5.2240 respectively with osmolality at presentation 347.41 ± 98.28. [Table 1].

The data were analyzed using SPSS, version 11.0 (IBM Corp). Differences between groups were tested statistically using the Chi-squared test and independent samples t-test. Differences were considered statistically significant at \( P < 0.05 \).

**RESULTS**

Only 16 patients (seven type 1 and nine type 2 DM) were with DKA. The males to female ratio were (1:1.3 in type 1 DM and 1:1.25) of all DKA admission.

Our study showed the age of the patients ranged between 25 and 72 years, with an average of 48.2 years. The maximum number of cases was found between 56.89 ± 14.76 years in type 2 diabetes and 25 ± 7.9 years in type 1 diabetes.

The mean body mass index was 20.5 ± 2.44 in both type 1 and type 2 DM. Four were on diet control and insulin, respectively. Five were on oral hypoglycemic agents (OHA) and three on both (insulin and OHA).

The approximate duration of DKA prior to hospital admission was significantly higher in type 2 DM than type 1 DM (9 ± 0.527 vs 7 ± 0.1 years, \( P = 0.044 \)).

The significant difference between the range of biochemical alterations on admission was seen more in type 2 DM than type 1 DM (Urea, mg/dl 31.14 ± 19.403 vs 69 ± 43.578, \( P = 0.05 \) and arterial pH 7.11 ± 0.204 vs 7.28 ± 0.1180.04, \( P = 0.04 \)).

Most of the patients had a history of diabetes for <5 years and both type 1 and type 2 DM.

Infection was most common precipitating factor (56.25%) more in type 1 DM than type 2 DM followed by poor drug compliance (37.5%) more in type 2 DM than type 1 DM and first presentation (6.25%). The average length of hospitalization was slightly longer in type 2 DM patients than in the type 1 DM patients (60 days vs. 10 days; \( P = 0.04 \)) [Figure 1]. Most of the patients had average duration of diabetes less than 5 years in both type1 and Type 2 diabetes [Figure 2].

**DISCUSSION**

Diabetic ketoacidosis is a serious and preventable acute complication of diabetes mellitus which has been declining in recent years.

In our study, males were predominant in both type 1 and type 2 DM of all DKA admission. Whereas Roacid
and Kablan,\textsuperscript{[4]} had female less than male and El‑Sharief reported a nearly equal ratio of sexes in Tripoli.\textsuperscript{[5]} We think that the cause of these variations is multifactorial, including environmental, genetic, and social differences.

Patients with T2 DM were significantly older than those with T1 DM (which is similar to study done by Edo AE.\textsuperscript{[6]} The reason might be due to significant/physical stress (other than the effects of persistent hyperglycemia \textit{per se}) is a prerequisite for patients with type 2 diabetes to develop DKA.\textsuperscript{[1]} In our study, infection was the most common precipitating factor (56.25%) followed by poor drug compliance (37.5%) and first presentation (6.25%) which were similar to study done by Matoo\textsuperscript{[7]} \textit{et al}. Therefore, DKA should be considered in patients with diabetes who have a concurrent infection, stroke, myocardial infarction, or other serious illness and should be treated aggressively.

Limitations of your study
Despite the small sample size of this study, and the fact that it was a hospital-based prospective study conducted at a teaching hospital, all of which are important limitations, this study gives a basic profile of DKA in this part of the world where studies about DKA are few.\textsuperscript{[8]}

CONCLUSIONS
We found majority of patients had type 2 DM (31.25%) presenting with moderate type DKA. Metabolic acidosis and increased serum urea had a significant association in both types of diabetes. Infection was the most common precipitating factor (56.25%) followed by poor drug compliance (37.5%).

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