

**Research Article**

**Scientific evaluation of recurrent ketoacidosis in Diabetic mellitus patients**

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**ABSTRACT**

The research was focused on To evaluate the diabetic ketoacidosis in cases of diabetes mellitus.

Total 176 diabetic patients presenting at Department of Medicine, India from June 2019 to Dec 2019, both male or female with age range from 35-60 years were selected for this cross sectional study for the investigation of diabetic ketoacidosis.

Among the 200 diabetic patients, rate of diabetic ketoacidosis was 50 (25%). Diabetic ketoacidosis was noted in 25 (50%) patients of age group 35-50 years and in 25 (50%) patients of age group 51-60. Statistically insignificant association between age group and diabetic ketoacidosis was observed. Diabetic ketoacidosis was observed in 25 male patients and in 25 female patients. Gender of the patients was insignificantly associated with diabetic ketoacidosis.

In present study, a higher number of diabetics were found with DKA. Insignificant association of DKA with age, gender and obesity was noted. DKA was significantly associated with family history of DM

**Key words:** Diabetic ketoacidosis, diabetes mellitus, fasting serum glucose, random serum glucose.

**INTRODUCTION:**

Diabetic ketoacidosis is a serious complication of diabetes that occurs when your body produces high levels of blood acids called ketones. The condition develops when your body can't produce enough insulin. Insulin normally plays a key role in helping sugar (glucose) — a major source of energy for your muscles and other tissues — enter your cells. Without enough insulin, your body begins to break down fat as fuel. This process produces a buildup of acids in the

bloodstream called ketones, eventually leading to diabetic ketoacidosis if untreated.

Diabetes mellitus is a syndrome with disordered metabolism and inappropriate hyperglycemia due to either a deficiency of insulin secretion or to a combination of insulin resistance and inadequate insulin secretion to compensate.<sup>1</sup> The prevalence of diabetes mellitus for all age groups worldwide was estimated to be 2.8% in year 2000 but it will increase to 4.4% by the year 2030.<sup>2</sup> No accurate figures for the prevalence of diabetes mellitus in Pakistan are available but according to several

small scale studies conducted in different parts of the country prevalence 5.3 of diabetes.<sup>3</sup> The prevalence of diabetes mellitus vary from 5.3% to 16.2%. The prevalence of diabetes mellitus has increased dramatically in the past two decades. It is estimated that the number of diabetic patients will grow from 135 million to 300 million by year 2025 in the world. Unfortunately the major increase will occur in developing countries, and in Pakistan the number of diabetic patients in the year 2025 is estimated to be doubled. In Pakistan approximately 8 million people have diabetes mellitus and the same number is suffering from impaired glucose tolerance.<sup>4</sup>

Diabetic ketoacidosis and hyperosmolar non ketotic coma are the most common acute complications of diabetes mellitus.<sup>5,6</sup> Diabetic ketoacidosis is a life threatening medical emergency with overall mortality rate which varies from 1 to 10% depending upon experience of treating center.<sup>7</sup> In one study by Sheikh GA, frequency of diabetic ketoacidosis was 14.3%.<sup>8</sup>

In this study the frequency of diabetic ketoacidosis will be determined in type II diabetic patients presenting to medical departments of BVH Hospital Bahawalpur.

The frequency of diabetic ketoacidosis in type II diabetic patients has not been studied much in Pakistani population. Our study will provide local data about diabetic ketoacidosis and will help to improve medical care, and decrease mortality and morbidity of patients presenting with diabetic ketoacidosis.

#### **MATERIAL AND METHOD:**

This was a cross sectional study and conducted at Department of Medicine, Bahawal Victoria Hospital Bahawalpur from January 2017 to June 2017. Total 200 patients of DM, both gender with age range from 35-65 years were selected. Patients having stroke, patients with serum glucose level >550mg/dl, plasma osmolality >310mosm/kg and patient hepatic encephalopathy were excluded from this study.

Family history of DM was taken and BMI of all the patients was calculated after measuring height

and weight of all the patients. Five ml blood sample was taken and send to laboratory for serum glucose, serum bicarbonate and blood pH and urine was also taken for ketones. Demographic profile was also taken. All the data was noted on pre-designed profoma.

Data was entered on computer software SPSS version 16. Mean  $\pm$  SD was calculated for age as quantitative variable. Frequencies and percentages were calculated for ketoacidosis, gender, obesity and family history of diabetes mellitus as categorical variables. Pie chart was also being drawn for frequency of ketoacidosis.

Stratification was done for age, gender, obesity and family history of diabetes mellitus to control the effect modifiers. Chi-square test was applied and p-value  $\leq$  0.05 was considered as significant.

#### **RESULTS:**

Total 200 type-II diabetics were selected for this study. Mean age of the patients was  $45.29 \pm 9.36$ . Among the 200 diabetic patients, rate of diabetic ketoacidosis was 62 (31%) (Fig. 1)

Selected patients were divided into two age groups, age group 35-50 years and age group 51-60 years. Age group 35-50 years consisted on 125 patients and age group 51-60 years consisted on 75 patients. Diabetic ketoacidosis was noted in 25 patients of age group 35-50 years and in 25 patients of age group 51-60 (22.58%) patients. Staistically insignificant association between age group and diabetic ketoacidosis was observed. (Table 1)

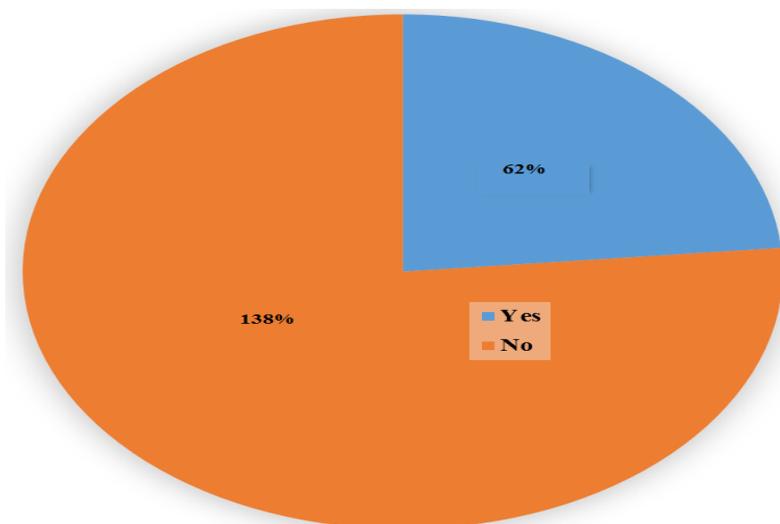
Male patients were 90 and female patients were 110. Diabetic ketoacidosis was observed in 25 male patients and in 25 female patients. Gender of the patients was insignificantly associated with diabetic ketoacidosis.

Total 100 (50%) patients found with family history of diabetes mellitus and diabetic ketoacidosis was noted in 40 (20%) patients. Total 60 (30%) patients were found without family history of diabetes mellitus and diabetic ketoacidosis was noted in 20 (10%) patients. No relation of family history of diabetes mellitus with diabetic ketoacidosis was noted.

Total 100 (50%) patients were obese and 100 (50%) patients were non-obese. Diabetic ketoacidosis was noted in 40 (20%) obese patients

and 22 (11%) non-obese patients. Statistically insignificant association between obesity and diabetic ketoacidosis was noted.

**Fig. 1:** Rate of diabetic ketoacidosis



**Table No. 1:** Stratification for age

Age Group	Diabetic Ketoacidosis		Total
	Yes (%)	No (%)	
35-50	25 (25)	75 (75)	100 (50%)
51-65	25 (25)	75 (75)	100 (50%)
<b>Total</b>	50 (25)	150 (75)	200

**Table No. 2:** Stratification for gender

Gender	Diabetic Ketoacidosis		Total
	Yes (%)	No (%)	
Male	25 (12.5)	65 (33.5)	90 (45)
Female	25 (12.5)	85 (42.5)	110 (55)
<b>Total</b>	50 (25)	150 (75)	200

**Table No. 3:** Stratification for family history of diabetes mellitus

Family History of DM	Ketoacidosis		Total
	Yes (%)	No (%)	
Yes	40 (20)	60 (80)	100 (50)
No	20 (10)	80 (90)	100 (50)
<b>Total</b>	60 (30)	140 (70)	200

**Table 4:** Association of diabetic ketoacidosis with obesity

Obesity	Ketoacidosis		Total
	Yes (%)	No (%)	
Obese	40 (20)	60 (80)	100 (50)
Non-obese	22 (11)	78 (89)	100 (50)
<b>Total</b>	62 (31)	138 (69)	200

**DISCUSSION:**

Diabetic ketoacidosis is the most common hyperglycemic emergency in patients with diabetes mellitus.<sup>8</sup> It is a life threatening condition with mortality rate less than 5% in experienced centers whereas overall mortality may be up to 10%.<sup>9</sup> DKA tends to occur in individuals younger than 19 years in type 1 diabetes mellitus whereas it may occur in diabetes of any age.<sup>10</sup> The cardinal biochemical features of DKA are hyperglycemia more than 200 mg/dL, blood pH less than 7.3, serum bicarbonate less than 15 mEq/L and hyperketonemia. In the absence of insulin, tissues like muscles, fat and liver do not take up glucose, and counter regulatory hormones such as glucagon, growth hormone and catecholamines enhance triglyceride breakdown into free fatty acids, and increased gluconeogenesis is the main cause of hyperglycemia. Beta oxidation of free fatty acids leads to increased formation of ketone bodies.<sup>11</sup>

Nausea and vomiting are often prominent in DKA and their presence in diabetic’s warrants laboratory evaluation. Abdominal pain may be severe and can resemble with ruptured viscus and acute pancreatitis. Hyperglycemia leads to glucosuria, volume depletion, tachycardia and hypotension. Kussmaul’s breathing and fruity odour are classic signs of this disorder. Lethargy and central nervous system depression may evolve into coma in severe DKA. Cerebral edema and ischemic stroke are extremely serious omplications of DKA.<sup>12</sup>

In present study mean age the diabetic patients was 50.29 ± 9.36 years, similar mean age of diabetic was reported by Sheikh et al.<sup>8</sup> Mean age of diabetics reported by Pinto et al<sup>13</sup> was 45±12

which is also comparable with our study. Male patients were 41.67% and female patients were (58.33%) which is comparable with a study by Sheikh et al,<sup>8</sup> in his study male patients were 38.6% and female patients were 61.4%. Study of Habib is also in agreement with our study, he reported in his study male diabetics were 41% and female diabetics were 59%.<sup>14</sup>

In our study diabetic ketoacidosis was found in 31% patients. Ganieet al<sup>15</sup> reported diabetic ketoacidosis in 20% patients. His findings are in agreement with our findings. Sheikh et al found diabetic ketoacidosis in 14.3% patients. In another study a higher proportion (41.7%) of patients with diabetic ketoacidosis was reported.<sup>16</sup>Pitteloudet al<sup>17</sup> reported diabetic ketoacidosis in 16% patients which is also comparable with our findings. Prevention of DKA and reduction of its frequency should be a goal in managing patients of diabetes mellitus. Increasing standards of medical and general awareness among diabetic patients can contribute to this.<sup>8</sup>

**CONCLUSION:**

Results of this study showed that male or female can be equally victim of diabetic ketoacidosis. Diabetic ketoacidosis can be developing equally in younger or older age group. No significant difference for the development of diabetic ketoacidosis was found between obese/non-obese and patients with family history of diabetes or without family history of diabetes.

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