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Research Article

A cross sectional study on diabetic ketoacidosis in type II diabetes mellitus

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ABSTRACT

Introduction: 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. The prevalence of diabetes mellitus vary from 5.3% to 16.2%. Diabetic ketoacidosis and hyperosmolar non ketotic coma are the most common acute complications of diabetes mellitus. It is a life threatening medical emergency with overall mortality rate which varies from 1 to 10% depending upon experience of treating center.
OBJECTIVES: To determine the frequency of diabetic ketoacidosis in type II diabetic patients.
STUDY DESIGN: Cross sectional study
SETTINGS: Department of Medicine, Services Hospital, Lahore.
DURATION OF STUDY: January 2016 to July 2016.
RESULTS: Total 189 patients with type II diabetes mellitus were included in this study. Mean age of the 50.09 ± 9.39 years. Male patients were 79 (42%) and female patients were 110 (58%). Insignificant association between gander and Ketoacidosis was seen. No association of family history of diabetes mellitus with Ketoacidosis was found.
CONCLUSION: Results of this study showed that male or female can be equally victim of diabetic ketoacidosis. Diabetic ketoacidosis can be develop 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.

KEY WORDS: Diabetes mellitus, diabetic ketoacidosis, fasting plasma glucose, random plasma glucose.

INTRODUCTION

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.[1] 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.[2] 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.[3] 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.[4]

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

In one study Edo AE reported frequency of diabetic ketoacidosis was 41.7%.[9]Ganie MA et al observed frequency of diabetic ketoacidosis as 20%[10]

In this study the frequency of diabetic ketoacidosis will be determined in type II diabetic patients presenting to medical departments of Services hospital Lahore. 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.

OPERATIONAL DEFINITION

Ketoacidosis:

Diabetic ketoacidosis is biochemically defined as a venous ph<7.3 or serum bicarbonate concentration<15 mmol/L, serum glucose concentration>200 mg/dL together with ketonemia, glucosuria, and ketonuria.

Type II Diabetes Mellitus (un-controlled):

Fasting plasma glucose level ≥126mg/dl.

Random Plasma Glucose level ≥ 200mg/dl.

Diabetes Mellitus considered un-controlled when HBA1c was >8.

Obese: Patients having BMI ≥ 30 were labeled as Obese.

Non-obese: Patients having BMI <30 were labeled as Non-obese.

Body Mass Index (BMI):

It was calculated as "weight in kilogram divided by height in square meter"

MATERIAL AND METHODS

Study Design: Cross sectional study

Setting: The study was conducted at Medical Department, Services Hospital, Lahore

Duration of the study: January 2016 to July 2016.

SAMPLE SELECTION

Inclusion Criteria:

- All patients with un-controlled type II Diabetes Mellitus with HBA1c levels > 8.
- Both sexes. Male and female
- Patients from 35 to 65 years of age.
- Patients having BMI 18.5 to 40.

Exclusion Criteria:

- Random plasma glucose more than 600 mg/dL.
- Serum osmolality more than 310 mosm/kg.
- Patients with stroke.
- Patients with hepatic and uremic encephalopathy.

DATA COLLECTION PROCEDURE

Study is approved ethically by institutional review board. Patients fulfilling the inclusion criteria were included in this study after taking written consent from every patient. Weight and height was measured for BMI. Family history of diabetes mellitus was also recorded in pre-designed proforma. Random sample of 5 ml blood was drawn and send to the laboratory for investigations like glucose, blood pH and Serum bicarbonate. Fasting urine sample was also be taken for ketones. Demographic data like age and gender was also entered in predesigned Performa.

DATA ANALYSIS:

Data was entered on computer software SPSS version 16. Mean ± SD was calculated for age as quantitative variable. Frequencies and percentages were done for ketoacidosis, gender,

obesity and family history of diabetes mellitus as categorical variables. Pie chart was also be 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 ≤ 0.05 was considered as significant.

RESULTS:

Total 189 patients with type II diabetes mellitus were included in this study. Mean age of the 50.09 ± 9.39 years. Ketoacidosis was found in 47 (25%) patients. (Fig.1)Patients were divided into two age groups, age group 35-50 years and age group 51-65 years. Age group 35-50 years consisted on 105 (55.56%) patients and Ketoacidosis was found in 27 (25.71%) patients. Among the 84 (44.44%) patients of age group 51-65 years, Ketoacidosis was found in 20 (11.9%) patients. Insignificant association was found between age and Ketoacidosis. P. value 0.865. (Table 1)

Stratification in relation to gender was done. Out of 79 (41.8%) male patients Ketoacidosis was found in 21 (26.58%) patients. Among the 110 (58.2%) female patients, Ketoacidosis was found in 26 (23.64%) patients. Insignificant association between gander and Ketoacidosis was seen. P. value 0.733. (Table 2)

Total 120 (63.49%) were present family history of diabetes mellitus and Ketoacidosis was seen in 31 (25.83%) patients. Out of 69 (36.51%) patients without family history of diabetes mellitus, Ketoacidosis was seen in 16 (23.19%) patients. No association of family history of diabetes mellitus with Ketoacidosis was found. P. value 0.730. (Table 3)As shown in table No. 4, out of 119 (62.96%) obese patients Ketoacidosis was found in 29 (24.37%) patients. Among the 70 (37.04%) non-obese patients, Ketoacidosis was seen in 18 (25.71%) patients. No relationship between obesity and Ketoacidosis was observed. P. value 0.863.

Fig. 1: Frequency for Ketoacidosis

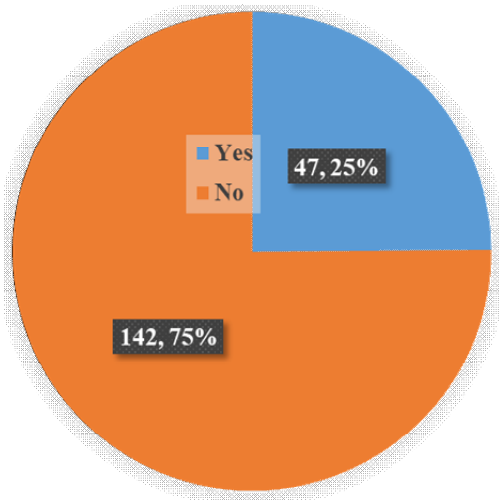

Table No. 1: Stratification for age

Age Group	Ketoacidosis		Total	P. value
	Yes (%)	No (%)		
35-50	27 (25.71)	78 (74.29)	105 (55.56)	**0.865**
51-65	20 (11.9)	64 (76.1)	84 (44.44)	
Total	**47 (24.87)**	**142 (75.13)**	**189**	

Table No. 2: Stratification for gender

Gender	Ketoacidosis		Total	P. value
	Yes (%)	No (%)		
Male	21 (26.58)	58 (73.42)	79 (41.8)	**0.733**
Female	26 (23.64)	84 (76.36)	110 (58.2)	
Total	**47 (24.87)**	**142 (75.13)**	**189**	

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

Family History	Ketoacidosis		Total	P. value
	Yes (%)	No (%)		
Yes	31 (25.83)	89 (74.17)	120 (63.49)	**0.730**
No	16 (23.19)	53 (76.81)	69 (36.51)	
Total	**47 (24.87)**	**142 (75.13)**	**189**	

Table No. 4: Stratification for obesity

Obesity	Ketoacidosis		Total	P. value
	Yes (%)	No (%)		
Obese	29 (24.37)	90 (75.63)	119 (62.96)	**0.863**
Non-obese	18 (25.71)	52 (74.29)	70 (37.04)	
Total	**47 (24.87)**	**142 (75.13)**	**189**	

DISCUSSION

Diabetic ketoacidosis is the most common hyperglycemic emergency in patients with diabetes mellitus.[8] It is a life threatening condition with mortality rate less than 5% in experienced centers whereas overall mortality may be up to 10%.[11] DKA tends to occur in individuals younger than 19 years in type 1 diabetes mellitus whereas it may occur in diabetes of any age.[12] 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.[13]

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.[14]

In present study mean age the diabetic patients was 50.09 ± 9.39 years, similar mean age of diabetic was reported by Sheikh et al.[8] Mean age of diabetics reported by Pinto et al[15] was 45±12

which is also comparable with our study. In our study male patients was 79 (42%) and female patients were 110 (58%) which is compareable with a study by Sheikh et al,[8] 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 41% and female diabetics 59%.[16]

In our study diabetic ketoacidosis was found in 47 (25%) patients. Ganieet al[10] 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.[9]Pitteloudet al[17] 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.[8]

CONCLUSION

Results of this study showed that male or female can be equally victim of diabetic ketoacidosis. Diabetic ketoacidosis can be develop 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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