ORIGINAL ARTICLE

Frequency and Determinants of Diabetic Ketoacidosis in Diabetic patients

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ABSTRACT

Aim: To determine the frequency of diabetic ketoacidosis in diabetic patients presenting in a tertiary care setting and frequency of precipitating factors for diabetic ketoacidosis in diabetic patients.
Study design: Cross sectional survey.
Study setting: West Medical Ward, Mayo Hospital, Lahore.
Duration of study: Six months
Results: Majority of patients were between 41-55 years of age, mean age with SD was calculated as 46.75±4.64 years,177(59%**)** were female**s** while 123(41%) were male, frequency of diabetic ketoacidosis in diabetic patients presenting in a tertiary care setting was 34(11.33%) while 266(88.67%) had no findings of the morbidity, while precipitating factors responsible for diabetic ketoacidosis in diabetic patients shows non-compliance as a main factor among other factors i.e. 22(64.71%), new onset of diabetes was recorded in 9(26.47%) and 8(23.53%) had acute illness among 34(11.33%) positive for diabetic ketoacidosis subjects while few patients had >1 precipitating factor i.e. acute illness and new onset of diabetes mellitus.
Conclusion: Frequency of diabetic ketoacidosis among diabetic patients in a tertiary care setting is higher while acute illness, non-compliance and new onset of diabetes are common precipitating factors of the morbidity.
Keywords: Diabetic ketoacidosis, diabetes, precipitating factors, acute illness, non-compliance,

INTRODUCTION

Diabetes mellitus is a syndrome with disordered metabolism and hyperglycaemia due either to deficiency of insulin secretion or to a combination of insulin resistance and inadequate insulin secretion to compensate[1]. The prevalence of diabetes for all age groups worldwide was estimated to be 2.8% in 2000 and will be 4.4% in 2030[2]. No accurate figures for prevalence of diabetes in Pakistan are available even though according to several small scale studies conducted in different parts of the country prevalence for diabetes varies from 5.3% to 16.2%[3].

Throughout the world prevalence of diabetes mellitus has increased dramatically in the past two decades. It is estimated that number of diabetics will grow from 135 million to 300 million by the year 2025 in the world. Unfortunately the major increases would occur in developing countries and in Pakistan. The number of diabetics in the year 2025 is estimated to be doubled. In Pakistan approximately eight million people have diabetes mellitus and the same number is suffering from impaired glucose tolerance[4].

Diabetic ketoacidosis (DKA) and hyperosmolar non-ketotic coma (HONK) are the two most common acute complications of diabetes mellitus[5]. Diabetic ketoacidosis is life threatening medical emergency with mortality rate less than 5% in experienced centers whereas internationally overall mortality is 1 to 10%[6]. DKA tends to occur in individuals younger than 19 years in type 1 diabetics whereas it may occur at any age in type 2 diabetics[7]. The cardinal biochemical features of DKA are hyperglycemia more than 250mg/dl, blood pH less than 7.3, serum bicarbonate less than 15mEq/l and hyperketonemia[1]. In the absence of insulin, tissues like muscles, fat and liver do not take up glucose, counter regulatory hormones such as glucagon, growth hormone and catecholamines enhance triglyceride breakdown into free fatty acids and gluconeogenesis which is the main cause for elevation in serum glucose. Beta oxidation of free fatty acids leads to increased formation of ketone bodies[8].

Snorgaard O et all found prevalence of diabetic ketoacidosis to be 8.9%[9]. Various risk factors have been proposed to precipitate diabetic ketoacidosis. Noncompliance was found to be the precipitating factor for diabetic ketoacidosis in 59% of diabetic ketoacidosis patients while acute illness and new onset diabetes contributed to 18% and 23% cases respectively. In order to prevent diabetic ketoacidosis patient education program should be improved[10].

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MATERIALS AND METHODS

It was conducted in Medical emergency of Mayo Hospital, Lahore for six months. It was a cross sectional survey with a sample size of 300 cases which was calculated with 95% confidence level, 3.5% margin of error and taking expected percentage of diabetic ketoacidosis i.e., 8.9% (least among all) in diabetic patients. It was non-probability purposive sampling. Diagnosed patients of diabetes mellitus, both type-1and type-2 presenting in emergency department, with age of 15 to 55 years of either sex were included, while patients of chronic liver & kidney diseases were excluded. The socio-demographic information like name, age, sex, address was recorded. Blood sugar level, arterial blood gases, urine for ketones were performed to determine frequency of diabetic ketoacidosis. Information regarding compliance was taken from each patient. Bias was addressed by having blood sugar level, arterial blood gases, urine for ketones from a single laboratory of King Edward Medical University, Lahore. Effect modifier like type of diabetes were addressed through stratification. Data was collected and analyzed by a single researcher to overcome bias effect. All information was collected through a specially designed proforma. The data was entered in SPSS version 10 and analyzed. The demographic variables like age was described as simple statistics giving mean and standard deviation. Diabetic ketoacidosis was classified as present or absent and presented as frequency tables and percentages. Determinants of diabetic ketoacidosis i.e. acute illness, non-compliance and new onset diabetes mellitus was classified as present or absent and presented as frequency, tables and percentages.

RESULTS

Age distribution of the patients shows majority between 41-55 years of age, 123(41%) between 51-55 years, 117(39%) between 41-50 years, 41(13.67%) between 31-40 years, 19(6.33%) between 21-30 years of age, mean and SD was calculated as 46.75$\pm$4.64 years. Gender distribution shows majority of the subjects were females i.e., 177(59%) while 123(41%) were male. Frequency of diabetic ketoacidosis in diabetic patients presenting in emergency department of a tertiary care settings reveals 34(11.33%) diabetic ketoacidosis in diabetics while 266(88.67%) had no findings of the morbidity. Frequency of precipitating factors responsible for diabetic ketoacidosis in diabetic patients were also recorded which shows non-compliance as a main among other factors i.e. 22(64.71%), new onset of diabetes was recorded in 9(26.47%) and 8(23.53%) had acute illness among 34(11.33%) positive for diabetic ketoacidosis subjects while few patients had >1 precipitating factor i.e., acute illness and new onset of diabetes.

DISCUSSION

Diabetic ketoacidosis (DKA) is an acute and life threatening complication of diabetes mellitus[11], which is also associated with a significant increase in healthcare costs for diabetic patients. Until the discovery of insulin in 1922, the case-fatality rate for DKA was virtually 100%. By 1932, the case fatality rate decreased to approximately 30% and reached single digits in the 1960s in most developed countries. This acute and possibly fatal emergency complication can occur in both type-1 and type-2 diabetes, and the case-fatality rate in patients with DKA is normally <5% in experienced centers. The prognosis of DKA can be substantially worsened at the extremes of age and in the presence of coma and hypotension[12].

Contrary to a consistent decrease in case-fatality rate, several studies have reported no decrease or even an increase in incidence of DKA over the past two decades. A recent survey conducted by the United States Centers for Disease Control has reported that the number of hospitalizations for DKA has increased during the past two decades in the United States[9]. Currently, DKA still appears in 4–9% of all hospital discharge summaries among patients with diabetes[13]. The statistics of the current study reveals that majority of the patients were between 41-55 years of age, mean age with sd was calculated as 46.75$\pm$4.64 years, 177(59%) of the subjects were female while 123(41%) were male, frequency of diabetic ketoacidosis was 34(11.33%) while 266(88.67%) had no findings of the morbidity, while precipitating factors responsible for diabetic ketoacidosis in diabetic patients shows non-compliance as a main among other factors i.e., 22(64.71%), new onset of diabetes was recorded in 9(26.47%) and 8(23.53%) had acute illness among 34(11.33%) positive for diabetic ketoacidosis subjects while few patients had >1 precipitating factor i.e. acute illness and new onset of diabetes.

The findings of study are in agreement with the study by Snorgaard O et al who found prevalence of diabetic ketoacidosis in diabetic population as 8.9%[9]. Various risk factors were proposed to precipitate diabetic ketoacidosis in diabetic patients. Noncompliance was found to be the precipitating factor for diabetic ketoacidosis in 59% of diabetic ketoacidosis patients while acute illness and new

onset diabetes contributed to 18% and 23% cases of diabetic ketoacidosis respectively[9].

Mudly S and co-workers[14] in their study establish and identify those risk factors which are responsible for the onset of DKA revealed that Non-compliance was identified in 23.2% of all admissions for single DKA episodes involved non-compliance with medication usage, which was implicated in 32% of multiple DKA episodes. In type 2 DM, this feature was the single most significant factor (53%). Results from the present study indicate that non-compliance with treatment is emerging as a dominant precipitating risk factor for DKA. These results differ from previous studies, involving mostly white populations, in whom infection represented the most common precipitating event (30% to 40%)[15-16].

Several cultural and socio-economic barriers, such as a low literacy rate, limited financial resources and limited access to health care, may explain the lack of compliance. In their multicenter study in the USA, Glaser et al. reported that illness in association with non-compliance was implicated in recurring episodes of DKA[17].

Mudly S and co-workers[14] further reported that patients were classified as newly diagnosed diabetics if the episode of DKA was the first manifestation of diabetes, and if they had not been diagnosed or prescribed any diabetic treatment previously. DKA occurred in 23% of newly diagnosed type 1 DM patients on first presentation, which is in agreement of the results of the current study.

However, the statistics of the current study after evaluation and assessment set the baseline data that may be considered as primary information in Pakistan. In relation to this statement morbidity and mortality because of this acute emergency may be reduced.

CONCLUSION

The results of the study reveals that frequency of diabetic ketoacidosis among diabetic patients presenting in emergency department of a tertiary care setting is higher while acute illness, non-compliance to drugs and new onset of diabetes mellitus are the precipitating factors of diabetic ketoacidosis.

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