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DIABETIC KETOACIDOSIS;
THE PRECIPITATING ENTITIES IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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ABSTRACT... Objective: To determine the frequency of various precipitating factors for Diabetic Ketoacidosis (DKA) in patients with type 2 diabetes mellitus. **Study Design, Setting & Duration:** This was a prospective study carried out at Department of Medicine, Muhammad Medical College & Hospital Mirpurkhas, from February 2007 to February 2009. **Patients & Methods:** 100 patients with type 2 diabetes mellitus admitted with diabetic ketoacidosis (DKA) were analyzed to determine the precipitating factors. **Results:** Out of 100 patients 47 were males and their average age was 47 years (range=17-65) while 53 were females with an average age of 43 (range=14-58), among them 54 had various systemic infections, 18 were non-compliant to the treatments, 24 had other co-morbidities like chronic liver disease (n=8), stroke (n=7), chronic renal failure (n=5), sub-endocardial infarct (n=2) and acute pancreatitis (n=2) as precipitating factors while 4 had their first presentation of diabetes mellitus as diabetic ketoacidosis. A mortality of 14% was recorded in the study. **Conclusion:** Systemic infections, non-compliance to treatments and co-morbid conditions were the major precipitating factors for diabetic ketoacidosis.

Key word: Diabetic Ketoacidosis, Diabetes Mellitus, Ketoacidosis, Precipitating Factors

INTRODUCTION

Diabetic Ketoacidosis (DKA), one of the common emergencies in patients with Diabetes Mellitus is associated with considerable morbidity and mortality[1,2]. DKA is more common in Type 1 DM as compared to Type 2 DM but contrary to belief it can frequently complicate Type 2 DM and carries relatively high mortality[3]. DKA almost always affects both the genders equally; males being affected at an earlier age group.

Most frequent presenting complaints are vomiting, abdominal pain, dehydration and respiratory distress[4]. In order to prevent diabetic ketoacidosis, patient education programs should be implemented and, in addition, the relevant authorities should ensure that insulin is available to all patients with DKA[5].Various risk factors have been proposed to precipitate the diabetic ketoacidosis in diabetic patients, among them, Infections, non-compliance to treatments and co-morbid states like stroke, chronic renal failure (CRF), Chronic liver disease (CLD) and acute pancreatitis are most important of the list[6-8]. Proper identification of the precipitating factor is very important in management of DKA. Moreover the mortality associated and numbers of days of hospitalization have direct relation with the precipitating factor[9]. As there is scanty data available from within the country it was planned to determine the frequency of various precipitating factors in type 2 diabetic patients presenting with DKA.

PATIENTS AND METHODS

Over a period of two years from February 2007 to February 2009, this prospective study was conducted in medical wards of Muhammad Medical College Hospital Mirpurkhas. Patients of either gender, above 13 years of age who at presentation had random blood sugar of more than 250 mg/dl, pH less than 7.35, serum ketones positive and serum osmolality less than 320 m osmole/l were included in the study.

A detailed history and thorough physical examination was performed. Various investigations both laboratory and radiological were done to sought out the precipitating factor for DKA. Data was analyzed with the help of SPSS version[12].

RESULTS

Out of 100 patients 47(47%) were males while 53(53%) were females. Male to female ratio was 1:1.2. Mean age

of males at presentation was 47 years and it was 43 years in case of females.

54(54%) patients had various systemic infections, 18 (18%) were non-compliant to the treatments, 24(24%) had other co-morbidities like chronic liver disease (n=8), stroke (n=7), chronic renal failure (n=5), sub-endocardial infarct (n=2) and acute pancreatitis (n=2), while 4(4%) had their first presentation of diabetes mellitus as diabetic ketoacidosis as shown in (Table-I).

Table-I. Showing frequency & %age of risk factors

Risk factor	Frequency (n=)	%age
Infections	54	54%
Non-compliance	18	18%
Co-morbid states	24	24%
First presentation	4	4%

Regarding the sex distribution of the precipitating factors; out of 54 patients with infections as precipitating factors, 35(64.9%) were females while 19 (35.2%) were males. Out of 18 patients who were non-complaint to treatments, 7(38.4%) were females and 11(61.6%) were males. Regarding co-morbid states, 15 (62.5%) were females while 9(37.5%) were males. Out of 4 patients 3(75%) males and 1(25%) female patient was presented with ketoacidosis for the first time. A mortality of 14% was recorded in the study. The various co-morbid states are given in Table-II.

Table-II. Showing co-morbid states

Co-morbid state	Frequency (n=24)	%age
CLD	8	33.3%
Stroke	7	29.2%
CRF	5	20.8%
Sub-endocardial infarct	2	8.4%
Acute Pancreatitis	2	8.4%

DISCUSSION

Diabetic Ketoacidosis is the most common emergency in hyperglycemic patients in England[1]. The annual incidence of diabetic ketoacidosis (DKA) among subjects with type 2 diabetes is 1% and 5% in European and American series respectively[10]. About one out of four health care dollars is spent on direct care of adult patients with hyperglycemia[1]. Commonest clinical features include nausea and vomiting (48%), Polyuria and polydypsia (46%), abdominal pain (33%) and dizziness (21%). Coma at presentation was rare[11]. The mean age at presentation was 49 years. Zafar S. et al reported mean age of 22 years[5], while Mehmood K. et al reported 48.7 years[3]. So age at presentation is comparable to already available data from national source.

This study of 100 patients of DKA confirmed the previously known facts about the precipitating factors of DKA. Our data suggests infection as a principal precipitating factor followed by non-compliance. In current study infection accounts for 54% of cases, a figure comparable to already reported rate of 30% to 50%[1,5,12-14]. Umpierrez GE et al published a study which shows infection as most frequent precipitating factor for DKA and according to that study urinary tract infections and pneumonias were the leading infections precipitating DKA[1]. Another study revealed that Mycoplasma Pneumonae was most common agent related to DKA[6]. Another study by Malllane et al showed the same results[8].

Some of the national and international studies showed non-compliance as principal precipitating factor followed by infection a fact contrary to the current study. Zafar S. et al reported non-compliance accounting for 54% of the cases while infection contributing to 28%[5]. The same results are reported by Ko SH. And colleagues[14]. While another study reported that infection is most common precipitating factor in type 1 DM and noncompliance is most common in type 2 DM[3].

Some times the DKA is precipitated by some other pathologies like stroke, CRF, CLD and acute pancreatitis. Shoney SD et al concluded that acute pancreatitis may present with diabetic ketoacidosis in non-diabetic patients[7]. In present study only 2 patients developed DKA due to acute pancreatitis. The mortality rate in current study was 14%. This is comparatively near to 15.9% reported by Zafar N. et al[10] and 11.9% reported by Mehmood K. et al[3] while is higher than 12% as

reported elsewhere[5].

CONCLUSION

Various systemic infections, non-compliance to treatments and co-morbid conditions were the major precipitating factors for diabetic ketoacidosis.

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