ORIGINAL ARTICLE

Six Months Audit of Precipitating Factors for Diabetic Ketoacidosis Mayo Hospital, Lahore

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ABSTRACT

Aim: To evaluate various precipitating factors for diabetic ketoacidosis.
Methods: This descriptive one time observational study was conducted in Mayo Hospital, Lahore. Patients and their relatives were selected for interview on the basis of convenient sampling. The data was collected on a specially designed proforma. Fifty patients were included in the study and the proforma was filled for each patient. All patients were investigated with various blood tests, urine tests, ECG and chest x-rays. The data analysis was computer based. SPSS 10 was employed.
Results: The mean age was 31.3 years. 60% of the patients were males. Diabetes mellitus was newly diagnosed at presentation in 22% patients. Vomiting was present in 44% patients, altered conscious level was observed in 42% patients. Mean blood sugar level was 509mg/dl (380-698mg/dl). Mean arterial pH value was 7.05 (6.9-7.2). Infection (56%) and non-insulin compliance (38%) were the most common precipitating factors. Poor knowledge about disease, treatment and follow up was also noted.
Conclusion: Though infection and poor compliance with antidiabetic treatment were the major factors but equal emphasis must be given to the education about the disease and awareness about the early detection of the complications.
Key words: Diabetic ketoacidosis, precipitating factors.

INTRODUCTION

Demographic data has shown that the prevalence of diabetes is increasing in Pakistani population, especially in obese females with positive family history[1,2]. Diabetic complications are a significant cause of morbidity and mortality in our part of the world.[3] Diabetic ketoacidosis is a serious and life threatening metabolic complication of diabetes mellitus. The average mortality in developed countries is 5-10%[4] and figures are much higher in Pakistan. The purpose of this study, therefore, is to give some insight into the problem and provide local statistical data for comparison with international data.

PATIENTS & METHODS

This descriptional one time observational study was conducted on 50 patients at Mayo Hospital, Lahore from January to June 2011. The type of sampling was convenient. All the patients or their relatives were interviewed and data was entered on specially designed proforma. Diabetic ketoacidosis diagnosed in patients at first presentation or previously diagnosed cases of insulin dependent diabetes mellitus and non-insulin dependent diabetes mellitus were included in the study. Patients were excluded with ate and chronic renal failure, lactic acidosis, drugs intoxication, alcoholic ketosis, non-ketotic hyperosmolar coma

Diagnostic criteria used for DKA was blood glucose (random) >250mg/dl, arterial pH < 7.3 and urinary ketones positive. Respiratory tract infection was diagnosed on the history of cough with expectoration, fever, leukocytosis > 10000/cmm and supportive radiological findings if any. Urinary tract infection was diagnosed on history of dysuria, lower abdominal pain, fever, leukocytosis >10000/cmm and evidence of >5 pus cells/hpf in urine complete examination. The data analysis was computer based SPSS 10 was employed for this purpose.

RESULTS

A total of 50 patients, who visited Mayo Hospital from areas in and around Lahore, were studied. The mean age of these patients was 31.30±15.64 (13-72). 30(60%) of them were males and 20(40%) were females. Abdominal pain was present in 24(48%) patients. Vomiting was present in 22(44%) patients. Conscious level was altered in 21(42%) patients. The mean temperature of these patients was 100±1.45 (98-103°F). Infection was seen in 28 (56%) patients. The mean blood sugar level was 509.88±65.61(380-698). Mean pH was 7.05±9.65 (6.9-7.2). 39(78%) patients were already diagnosed diabetics and 11(22%) patients presented first time with diabetic ketoacidosis (Graph 1). The standard of knowledge about their disease and level of health education was

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very poor among majority of the patients. 40 (80%) patients were of type 1 diabetes and 10 (20%) patients were of type 2 diabetes.

In 40 (80%) patients of type 1 diabetes compliance of medicine was poor in 20 (50%) patients. The mean blood glucose level was 517±68 (380-698). Urinary ketones were ++ in 5 (12.5%) patients, +++ in 18(45%) patients and ++++ in 17 (42.5%). Mean pH was 7.04±9.79 (6.9-7.2).

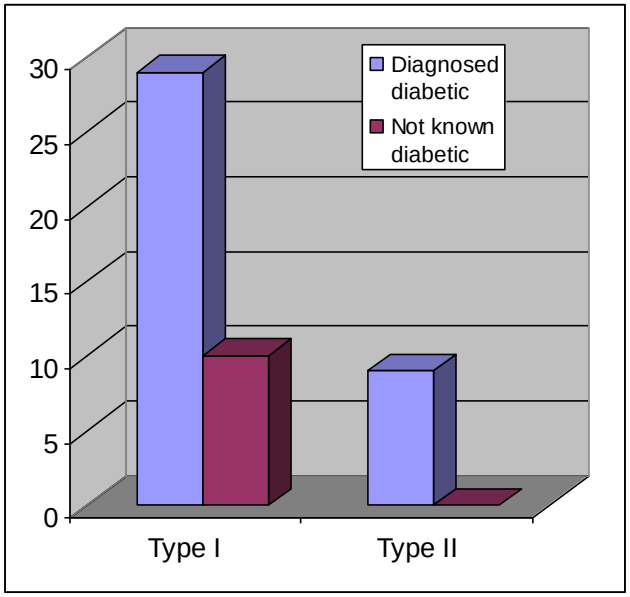
The mean serum sodium was 135±5 (128-149). Mean serum potassium was 3.58±0.4 (3-5). The mean hemoglobin was 11.38±1.65 (8-14.2). The mean total leukocyte count was 9112 ± 2757 (5400-14000). The mean serum bilirubin was 0.7 ± 0.18 (0.5-1.1). The mean SGPT was 29±10 (14-48). The mean blood urea was 36.75±14.6 (20-88). The mean serum creatinine was 0.84±0.34 (0.5-2). The respiratory tract infection was diagnosed in 11 (27%) patients. No significant abnormality in ECG was noted in these patients. Urinary sugar was + in 3 (7%) patients, ++ in 15(37%) patients and +++ in 22(55%) patients. Urinary tract infection was diagnosed in 9(22%) patients.

Insulin was not available to 9(22%) patients. 4(10%) left insulin due to quack's advice and 4(10%) wrongly switched to tablets. 8(20%) patients wrongly left insulin therapy. Poor storage was noticed in 5(12%) patients and 11(27%) patients were taking inadequate dose. Various parameters of poor insulin compliance are showed in graph 2. Infection was present in 20(50%) patients. Evidence of infection along with poor insulin compliance was seen in 12(30%) patients. More than one parameter of poor insulin compliance was noted in 9(22%) patients.

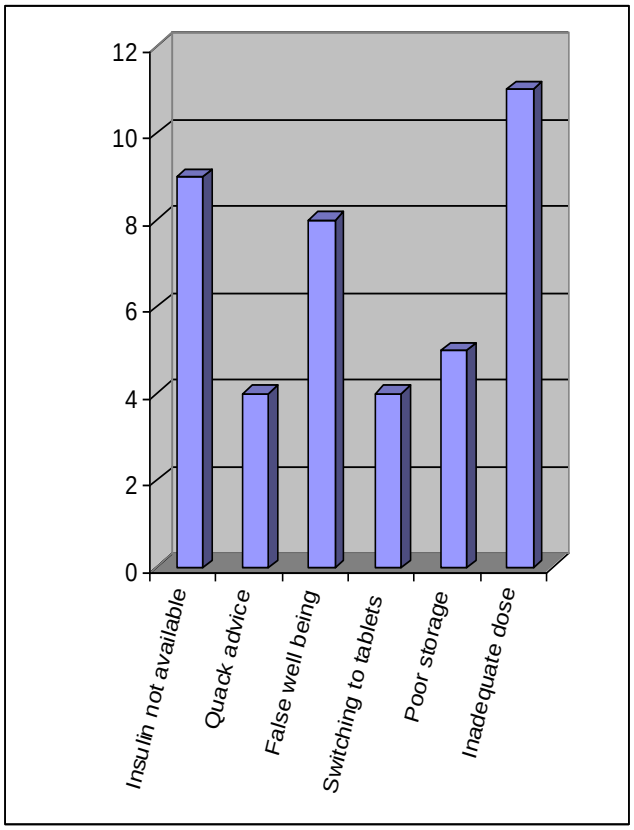
The compliance of medicine was poor in 5(50%) patients of type 2 diabetes. The mean blood sugar level was 481.1±46.34 (415-535) in these patients. The mean serum sodium was 137.7±6.4 (129-149). The mean serum potassium was 3.53±0.56 (3-5). The mean hemoglobin was 11.38± .75 (8-13).

The mean total leukocyte count was 10890±2486.1 (5800-14000). The mean serum bilirubin was 0.84±0.14 (0.6-1.1). The mean SGPT was 32.8±8.65 (22-54). The mean blood urea was 54±21.39 (30-94). The mean serum creatinine was 1.38± .5 (0.9-2.3). The mean pH was 7.05±9.6 (6.9-7.2). The urinary ketones were ++ in 3(30%) patients, +++ in 5(50%) patients and ++++ in 2(20%) patients. The respiratory tract infection was diagnosed in 3(30%) patients. ECG showed no significant abnormality in any patient. The urinary sugar was + in 1(10%), ++ in 6(60%) and +++ in 3(30%) patients. Urinary tract infection was diagnosed in 5(50%) patients. Overall infection was present in 8(80%) patients (Graph 3). Poor drug compliance along with evidence of infection was seen in 4(40%) patients.

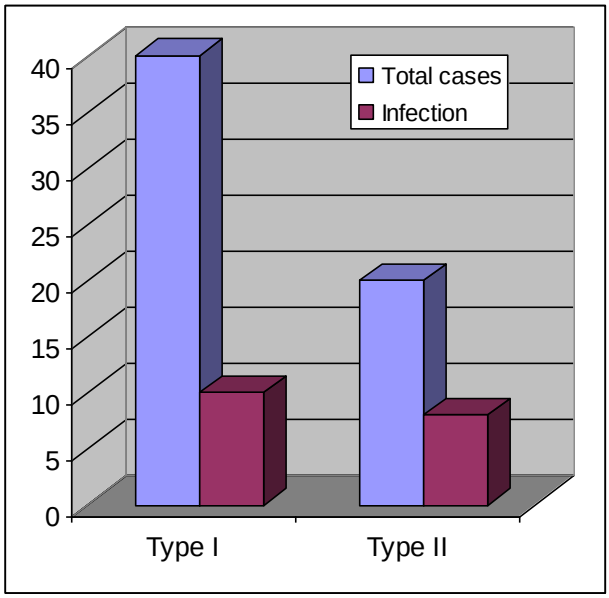
Graph 1: Frequency of first presentation with DKA in type 1 and type 2 diabetes



Graph 2: Frequency of various parameters responsible for poor insulin compliance



Graph 3: Frequency of infection in type 1 and type 2 diabetes



DISCUSSION

Multiple studies haven been carried out on this topic earlier in different parts of the world with varying results. The methods employed to evaluate the precipitating factors were also different.

The age in our group ranged from 13-72 years (mean 31.3±15.64). A similar study conducted locally, carried out by Akhter et al[5] on diabetic ketoacidosis showed a mean age of 28.1 years. Other international study showed even lower mean age like Qari et al (22.5 years)[6].

30(60%) of our patients were male. Similar trend was seen in various other studies. Gomez et al[7] reported 52% males, Yu et al[8] reported 56% males and Qari et al [6] reported 58% male patients. Diabetes mellitus was newly diagnosed in 11(22%) patients in our study, which was comparable to the observation made by Rajasoorya et al[9] (18%) and Smith et al[10] (27%).

In our study, vomiting was present in 22 (44%) patients and abdominal pain was reported in 24 (48%) patients. Rajasoorya et al[9] reported vomiting 52% and abdominal pain 18%.

Conscious level was altered in 21(42%) patients in our study, Rajasoorya et al[9] reported even higher percentage (61%) and Akhter et al[5] reported 12%. The mean blood sugar level was 509.88 ± 65.61 (380-698) in our study. Akhter et al [5] reported mean blood sugar level of 624. Rajasoorya et al [9] reported mean blood sugar of 633 (351-1200). The mean pH in our study was 7.05±9.65 (6.9-7.2). Similarly Akhter et al[5] reported mean pH of 7.09.

In our study infection was the most common precipitating factor (56%) being responsible for diabetic ketoacidosis. Respiratory tract infection was diagnosed in 11(27%) patients of type 1 diabetes and in 3(30%) patients of type 2 diabetes. Similarly urinary tract infection was diagnosed in 9(22%) patients of diabetes and in 5(50%) patients of type 2 diabetes mellitus. As this study was conducted on medical floor, no patient with soft tissue infection, osteomyelitis or diabetic carbuncle etc. was included. Other studies also reported similar finding. Akhter et al[5] reported that infection was the most common precipitating factor (45.2%). Rajasoorya et al[9] reported infection (52%), particularly that of urogenital tract, was the main precipitating factor for diabetic ketoacidosis. Yu et al[8] reported that infection was the most common precipitating factor (63%), especially in patients aged more than 40 years. Gomez et al[7] reported that 41% infection was observed. Qari et al[6] reported infection as second most common precipitating factor (28%) in their study. The possible explanation for this difference could be the poor living conditions and general health facilities of our population as compared to the living standard and health facilities of Kingdom of Saudi Arabia.

Non-compliance of medicines, especially insulin, was the other frequent precipitating factor (38%) noted in our study. Similar observation was made in various other studies. Qari et al[6] reported (54%) insulin non-compliance, Smith et al[10] reported 47% insulin non-compliance, Rajasoorya et al[9] attributed, 25% case to non-compliance with insulin.

The overall standard of knowledge about the disease and level of health education was very poor in our study group. The possible explanation for this is because of our poor educational status of the population and non-availability of proper health education. Many patients complained about the general attitude of the doctors that they had not given them proper instructions regarding their disease process, treatment and follow up. Similar level of health education among diabetics in Quetta was reported by Ali et al[16] and in Karachi by Jabbar et al [11]. In an Indian study Miglani et al[12] reported that a proforma guided survey was conducted in young diabetics and 43% of the subjects had received instructions from some quack to stop all treatment shift to household remedies.

Jacobson et al[13] reported that irregular clinical follow up was a risk factor for diabetic complications like diabetic ketoacidosis, especially, in insulin dependent diabetics. Tankova et al[14] reported that a 5-day structured teaching program improved the quality of life of diabetic patients and their metabolic control and significantly reduced the rate of acute

complications like diabetic ketoacidosis. Chaudry et al [15] emphasized the need of health education and establishment of diabetic clinics at community level in Pakistan.

CONCLUSION

- Infection and poor medication compliance, especially insulin, are the major precipitating factors for diabetic ketoacidosis in our diabetic population.
- Poor knowledge about the disease and poor level of health education is of great concern among diabetics. So more emphases should be given to health education of diabetics along with pharmacological therapy.

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