INCIDENCE OF UROSEPSIS IN PATIENTS DIAGNOSED WITH DIABETIC KETOACIDOSIS ADMITTED IN TERTIARY CARE CENTRE

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ABSTRACT

AIM

To determine the incidence of urosepsis in patients with diabetic ketoacidosis admitted in Government Vellore Medical College Hospital. To identify the common pathogens causing Urosepsis in Diabetic Ketoacidosis patients in our hospital.

METHOD

This cross-sectional study on the incidence of Urosepsis in diabetic ketoacidosis was done in patients admitted with DKA in our Intensive Medical Care Unit from March 2016 to August 2016.

RESULTS

A total sample of 103 patients admitted with DKA were included in the study. Of the study population, 12 (11.6%) were type 1 DM and 91 (88.4%) were type 2 DM. The incidence of urosepsis in DKA in our study is 13.59%, of which 11 (78.57%) were females and 3 (21.42%) were males ($p < 0.05$). The organisms causing urosepsis were *E. coli* in 9 patients (64.28%), *Klebsiella* in 2 patients (14.28%) and *pseudomonas aeruginosa* in 1 patient (7.14%), *staphylococcus epidermidis* in 1 patient (7.14%) and *candida glabrata* in 1 patient (7.14%).

CONCLUSION

The incidence of urosepsis in DKA was 13.59% with *E. coli* being the commonest organism isolated.

KEYWORDS

Diabetic Ketoacidosis, Urosepsis, Diabetes Mellitus.

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INTRODUCTION

Diabetic ketoacidosis is one of the common medical emergencies of diabetes mellitus.¹ Of the various precipitating factors for the development of diabetic ketoacidosis, omission of insulin and infection are the common factors.² Among various infections, respiratory and urinary tract infections are the commonest precipitants of DKA. The incidence of urinary tract infection is very high among diabetic patients as compared with non-diabetic population.³ Impaired immune system and cystopathy are said to be the reasons for increased incidence of UTI in diabetic patients.⁴ The most common organisms implicated in urosepsis worldwide are gram negative bacilli, such as *E. coli* and *Klebsiella*.⁵

This study aims to determine the incidence of urosepsis in patients diagnosed with diabetic ketoacidosis who are admitted in the intensive care unit in Government Vellore Medical College Hospital. It also aims to determine the causative organisms and its antibiotic susceptibility.

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METHODOLOGY

Patients with diabetes mellitus admitted in IMCU with Diabetic Ketoacidosis was included in the study. Those who denied to give consent, patients on prior antibiotics before admission and gestational diabetes mellitus were excluded from the study. A total of 103 patients were included in the study over a period of 6 months from March 2016 to August 2016. After obtaining informed and written consent, detailed clinical history was taken and physical examination was done and the findings were properly documented. Individuals who had been managed at some point with diet or an oral anti-diabetic drug and with no prior history of DKA were classified as type 2 DM. Individuals whose medical records indicating continuous insulin treatment and prior diagnosis of type 1 DM were classified as type 1 DM. Capillary blood glucose was measured at admission and at required intervals. Urine sample was analysed for acetone and was sent for culture and antibiotic sensitivity. Blood sample was sent for culture and antibiotic sensitivity. Blood and urine culture samples were obtained before starting the patients on antibiotics. Patient's details regarding general information, physical examination and investigation results are entered in specially designed proforma.

Statistical Analysis

Statistical analysis was done by using SPSS 16 software. Quantitative data was expressed in mean, median, mode and standard deviation. Qualitative data was expressed by Chi square test. The difference was considered statistically significant when P value < 0.05 .

OPERATIONAL GUIDELINES/DEFINITIONS USED**Diabetic Ketoacidosis**

Capillary blood glucose >250 mg/dL, and
Urine sample positive for acetone.

SEPSIS

Criteria I: Proof of bacteraemia or clinical suspicion of sepsis.

Criteria II: Systemic Inflammatory Response Syndrome (SIRS).⁶

Two or More of the following Condition

- Fever (Oral temperature more than 38° C) or hypothermia (< 36° C).
- Tachypnoea (>24 breaths/min).
- Tachycardia (Heart rate > 90/min).
- Leucocytosis (WBC > 12000/μL) or leucopenia (WBC < 4000/μL).

Sepsis: Criteria I + ≥ 2 criteria II.⁷

Urosepsis

Sepsis caused by infection of the urinary tract.

RESULTS AND ANALYSIS

During the 6 months period, a total of 103 patients were admitted with diabetic ketoacidosis. Of the 103 patients, 40 (38.83%) were males and 63 (61.1%) were females.

Of the study population, 12 (11.6%) were type 1 DM and 91 (88.4%) were type 2 DM. The mean age of the patients was 21+4.6 years for type 1 DM and 43+15.4 years for type 2 DM.

5 patients (4.85%) presented with DKA without prior history of diabetes mellitus.

Among the study population, 36 patients (34.9%) had features of SIRS.

The precipitating features seen were poor drug compliance in 30 patients (29.1%), newly diagnosed diabetes in 5 patients (4.85%); 14 patients (13.59%) had urosepsis of which 11 (78.57%) were females and 3 (21.42%) were males ($p < 0.05$). Of these 14 patients with urosepsis, 1 (7.14%) was type 1 DM and 13 (92.85%) were type 2 DM and this difference is statistically significant ($p < 0.05$). This shows that urosepsis is a common precipitating factor for DKA in type 2 DM than type 1 DM ($p < 0.05$).

6 patients expired and the mortality percentage is 5.8%. All these fatal cases were type 2 DM.

Among the 14 patients with urosepsis, E. coli was grown in 9 patients (64.28%), Klebsiella in 2 patients (14.28%) and pseudomonas aeruginosa in 1 patient (7.14%), staphylococcus epidermidis in 1 patient (7.14%) and candida glabrata in 1 patient (7.14%). The gender wise distribution of the organisms causing urosepsis in DKA is shown in table 1.

Organism Grown	No. of Males (%)	No. of Females (%)
E. coli	2	7
Klebsiella pneumoniae	1	1
Pseudomonas aeruginosa	0	1
Staphylococcus epidermidis	0	1
Candida glabrata	0	1

Table 1: Distribution of Organisms causing Urosepsis

Gender wise distribution of organisms causing urosepsis in DKA.

The antibiotic resistance pattern for the isolated organisms were as follows:

Organism Isolated	Resistance Pattern
E. coli	Cotrimoxazole (58%), amikacin (9%), ofloxacin (44%), amoxicillin clavulanic acid (36%), cefotaxime (47%), ciprofloxacin (47%), nitrofurantoin (6%), imipenem (5%), cephalothin (36%), ceftazidime (27%).
Klebsiella pneumonia	Cotrimoxazole (50%), nitrofurantoin (50%), ciprofloxacin, ceftriaxone, cefotaxime.
Pseudomonas aeruginosa	Cotrimoxazole, ciprofloxacin, cefotaxime, ampicillin-sulbactam, ceftriaxone.
Staphylococcus epidermidis	Clindamycin, erythromycin, cotrimoxazole, ampicillin.

Table 2

DISCUSSION

Diabetic ketoacidosis is one of the common emergencies of diabetes mellitus. In our study, the mean age of patients was 21+4.6 years for type 1 DM and 43+15.4 years for type 2 DM. Of the study population, 36 patients (34.9%) presented with features of SIRS. DKA as the presentation of Diabetes, which is known as DKA onset. Diabetes is seen in 5 patients (4.85%).⁸ As per literature, the common precipitating factors for DKA are infection, poor drug compliance, newly diagnosed diabetes mellitus without any obvious precipitating factor.⁹ Respiratory and urinary tract infection are the common infections precipitating DKA.⁹ In our study, the incidence of urosepsis in DKA was 13.59%. E. coli followed by Klebsiella pneumonia and pseudomonas aeruginosa were the organisms causing urosepsis in our patients. This observation is similar to the previous studies done by Srinivas et al, Chin-Hsun Chu et al and Acharya et al.^{9,10,11,12} The antibiotic resistance pattern of the isolated organisms is shown in the table (Table 1). E. coli which is the most common organism causing urosepsis is resistant to antibiotics such as cotrimoxazole, ofloxacin, cefotaxime, ciprofloxacin and sensitive to amikacin and nitrofurantoin. This observation is similar to the observations in the study done by Acharya et al.¹²

The incidence of urosepsis is significantly higher in people with type 2 DM than type 1 DM. This observation suggests that patients with type 2 DM transiently develop insulin deficiency during periods of stress (infection) and

recover when the insult is subsided. On the contrary, people with type 1 DM easily worsen to DKA on omission of medication. The other common precipitating factor is respiratory infection, which is not studied in our study.

The fatality rate of DKA was 5.8% in our hospital and all these fatalities were patients with type 2 DM.

CONCLUSION

In conclusion, our study exposes the fact that urosepsis is one of the common precipitating factors of DKA in patients with *E. coli* being the commonest organism.

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