

Study of pyelonephritis in patients with diabetes mellitus at tertiary care hospital

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Abstract

Background: The presence of diabetes predisposes to much more severe acute pyelonephritis, especially in patients with poor diabetic control, and may present as septicemia with acute kidney injury. **Aim:** To study clinical features and outcome of pyelonephritis in patients with diabetes mellitus at tertiary care hospital. **Material and Methods:** A total of 40 diabetic patients who were referred for the pyelonephritis were studied for clinical features and outcome after management. **Results:** Most of the patients presented with fever and chills i.e. 92.5% followed by nausea and vomiting 85%, dysuria in 82.5%, flank pain in 77.5%. Poor glycemic control was seen in all 40 (100%) patients. The commonest organism was *E. coli* - 72.5%, *K. pneumoniae* in 12.5%, *Proteus* spp. 7.5%. Polymicrobial growth was seen in 10% and fungal growth of *Candida albicans* was seen in 5% samples. Majority of the patients survived with nephrectomy i.e., 67.5%, 27.5% patients survived without nephrectomy and 5% patients expired. **Conclusion:** Acute pyelonephritis in uncontrolled diabetic patients is common and potentially life-threatening condition. Early diagnosis, knowledge of common predisposing factors, appropriate clinical diagnosis and management are mandatory to improve prognosis.

Key Words: Diabetes mellitus, pyelonephritis, nephrectomy, outcome

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INTRODUCTION

Urinary tract infections rank first among the infections of patients with diabetes mellitus (DM). Renal tract infections such as candidiasis, emphysematous pyelonephritis and cystitis show close association with diabetes mellitus.¹ Urinary tract is the most important and most common site of infection in diabetic patients. Diabetic patients have been found to have 5-fold frequency of acute pyelonephritis at autopsy than nondiabetics.² Acute pyelonephritis is a bacterial or fungal infection of renal parenchyma and collecting system. The

presence of diabetes predisposes to much more severe acute pyelonephritis, especially in patients with poor diabetic control, and may present as septicemia with acute kidney injury (AKI).³ The present study was conducted to study clinical features and outcome of pyelonephritis in patients with diabetes mellitus at tertiary care hospital.

MATERIAL AND METHODS

This cross-sectional study was carried out in the Department of Medicine at Tertiary Health Care Centre over a period of two years. A total of 40 diabetic patients who were referred for the pyelonephritis were studied after approval from institutional ethical committee and by taking the informed consent of the patients.

Definition

- Acute pyelonephritis: It was said to be present when patient complained of fever with chills and rigors, flank pain, nausea, and vomiting.
- Ultrasound imaging studies were done and was considered to be suggestive of pyelonephritis if there was a combination of enlarged kidney, presence of collection and/or perinephric stranding. Computed tomography was diagnostic of pyelonephritis if single or multiple hypodense areas were evidenced after

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contrast medium injection along with above-mentioned clinical features.⁴

- *Renal dysfunction*: Presenting serum creatinine >1.5 mg/dl
- *Urine culture positive*: >10³ colony-forming units/ml of bacteria were found
- *Glycemic control*: defined as good if HbA1c <7%, moderate if HbA1c 7-7.5% and poor if HbA1c >7.5%.

All the patients were examined thoroughly and details like age, sex, clinical features were noted. Urine was sent for culture and routine microscopy. All the patients received treatment as per the standard protocols and at the end outcome in the patients like survival with nephrectomy survival without nephrectomy, expired etc. were seen.

RESULTS

In present study, majority of the patients were in the age group of 51-60 i.e., 40%, followed by 41-50 and more than 60 years i.e., 20%, 31-40 were 13.9%. Most of the patients were male i.e. 65% and female were 35%.

Table 1: Patient characteristics

Patient characteristics	No. of patients	Percentage
Age in years		
20-30	03	8.3%
31-40	05	13.9%
41-50	08	20%
51-60	16	40%
>60	08	20%
Sex		
Male	26	65%
Female	14	35%

Most of the patients presented with fever and chills i.e. 92.5% followed by nausea and vomiting 85%, dysuria in 82.5%, flank pain in 77.5%.

Table 2: Distribution of clinical features in patients

Clinical feature	No.	Percentage (%)
Fever with chills	37	92.5%
Nausea and vomiting	34	85%
Dysuria	33	82.5%
Flank pain	31	77.5%
Renal dysfunction	28	70%
Leucocytosis	17	42.5%
Altered sensorium	14	35%
Renal Stone	10	25%
Thrombocytopenia	09	22.5%
Shock	08	20%

(*More than one clinical features were present in the patients)

The urine culture grew growth in 85% samples whereas in 10% samples there was no growth. The commonest organism was *E. coli* - 72.5%, *K. pneumoniae* in 12.5%, *Proteus* spp. 7.5%. Polymicrobial growth was seen in 10% and fungal growth of *Candida albicans* was seen in 5% samples.

Table 3: Distribution of the patients as per the culture

Culture	No.	Percentage
Culture -ve	04	10%
Culture +ve	34	85%
<i>E. coli</i>	29	72.5%
<i>K. pneumoniae</i>	05	12.5%
<i>Proteus</i> spp.	03	7.5%
Polymicrobial	04	10%
Fungal growth	02	5%

Poor glycemic control was seen in all 40 (100%) patients. However, diabetic ketoacidosis was not seen in any of the patient. Majority of the patients survived with nephrectomy i.e., 67.5%, 27.5% patients survived without nephrectomy and 5% patients expired.

Table 4: Distribution of the patients as per the outcome

Outcome	No.	Percentage
Survival with Nephrectomy	27	67.5%
Survival without Nephrectomy	11	27.5%
Expired	02	5%

DISCUSSION

Urinary tract infections in diabetic patients are more common due to chronic hyperglycaemia and occur more frequently in diabetic women aged over 50 who suffer from disorders of the autonomic nervous system responsible for disturbances of bladder voiding. The increased frequency of UTIs in diabetic patients is likely due to several mechanisms including the presence of glycosuria, neutrophil dysfunction and increased adherence of the bacteria to uroepithelial cells.⁵ Acute pyelonephritis is more dangerous than in non-diabetic populations, being often painless and therefore neglected. An unexplained blood glucose imbalance may be the only manifestation of acute pyelonephritis. Among hospitalized patients with acute pyelonephritis, DM has been shown to be the single most common predisposing cause.⁶ The severity of UTIs is also increased in DM; the mean hospitalization rate in patients with acute pyelonephritis was found to be 3.4-24. One times higher in diabetics than nondiabetics.⁷ In present study, most of the patients presented with fever and chills i.e. 92.5% followed by nausea and vomiting 85%, dysuria in 82.5%, flank pain in 77.5%. The diagnosis of pyelonephritis is often delayed because the clinical manifestations are nonspecific and not different from the classic triad of upper UTI (i.e., fever, flank pain and pyuria).⁸ Poor glycemic control was seen in all 40 (100%) patients. However, diabetic ketoacidosis was not seen in any of the patient. Diabetic ketoacidosis is a very uncommon presentation, and only few cases has been reported so far.⁹⁻¹¹ In present study, the commonest organism was *E. coli* - 72.5%, *K. pneumoniae* in 12.5%,

Proteus spp. 7.5%. Polymicrobial growth was seen in 10% and fungal growth of *Candida albicans* was seen in 5% samples. Pontin AR, Barnes RD also found that the commonest offending organisms are *Escherichia coli* and *Klebsiella* followed by *Proteus*.⁸ In a study by Kumar *et al*, *E. coli* was isolated in urine culture in 77% of patients.⁴ Treatment of acute pyelonephritis in diabetic patients involves broad-spectrum antimicrobial therapy, hyperglycemic control, and adequate urinary drainage with correction of any outlet obstruction. Patients with necrotizing infections will require more aggressive treatment that includes surgery.¹² In our study, majority of the patients survived with nephrectomy i.e., 67.5%, 27.5% patients survived without nephrectomy and 5% patients expired. These findings are similar with Datta *et al* study.

CONCLUSION

Acute pyelonephritis in uncontrolled diabetic patients is common and potentially life-threatening condition. Early diagnosis, knowledge of common predisposing factors, appropriate clinical diagnosis and management are mandatory to improve prognosis.

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