



SHOULD URINARY TRACT INFECTION WITH ESBL-PRODUCING ORGANISMS BE CONSIDERED AS A RISK FACTOR FOR ACUTE KIDNEY INJURY AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS?

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INTRODUCTION AND AIMS

Urinary tract infection (UTI) is one of the most common bacterial infections in adults. UTI due to extended-spectrum beta-lactamase (ESBL) producing organisms are increasing [1, 2]. Patients with diabetes mellitus (DM) are at increased risk for UTI. Long duration and poor control of DM are reported risk factors for UTI with ESBL-positive organisms [3]. UTI may be complicated by acute kidney injury (AKI) especially in diabetic population. This study was designed to evaluate whether UTI due to ESBL-positive organisms should be considered as a risk factor for AKI in type 2 diabetic subjects or not.

METHODS

This case-control study was done in BIRDEM General Hospital, a tertiary care hospital in Dhaka, Bangladesh from April to June 2016. Type 2 diabetic subjects with culture proven UTI were evaluated. Patients with UTI complicated by AKI were cases and those without AKI were taken as controls. AKI was diagnosed as per KDIGO Clinical Practice Guideline for Acute Kidney Injury. ESBL-positivity of the isolated organisms was then evaluated as risk factor for AKI.

RESULTS

During the study period, a total of 131 type 2 diabetic subjects (including 95 females) with UTI were enrolled. Mean age and mean duration of diabetes of the study participants were 56.07±13.30 and 8.70±5.39 years respectively. Sixty two (47.3%) of the study participants were complicated by AKI (cases). There was no significant difference regarding age, sex, duration and control of diabetes (HbA1c) between cases and controls (Table I). *Escherichia coli* (82, 62.6%) was the commonest aetiological agent followed by *Klebsiella pneumoniae* (14, 10.7%). Two-thirds (55/82, 67.1%) of *E. coli* and two-fifths (6/14, 42.9%) of *Klebsiella* were ESBL-positive. Total 64 (48.9%) of the cases were due to ESBL-positive organisms. Pattern of aetiological agents are shown in Table II. Out of 131 UTI cases, 62 (47.3%) had AKI; 40 (40/64, 62.5%) among ESBL-positive and 22 (22/67, 32.8%) among non-ESBL organisms. ESBL-positivity appeared as a significant risk factor for AKI among the study subjects (Table III).

Table I. Base-line characteristics of the study subjects (N=131)

Characteristics	Overall (n=131)	Cases (UTI with AKI) (n=62)	Controls (UTI with no AKI) (n=69)	p value
Mean age (years)	56.07 ±13.30	55.61 ±14.13	56.48 ±12.59	0.7100
Male: Female	1:2.6	1:2.1	1:3.3	0.2460
Mean duration of DM (years)	8.70 ±5.39	9.15 ±5.40	8.30 ±5.39	0.3696
Mean HbA1c (%)	8.93 ±1.96	9.0 ±1.78	8.86 ±2.13	0.6857

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Table II. Aetiological agents among the study subjects (N=131)

Bacteria	ESBL-positive	Non-ESBL	Total
<i>E. coli</i>	55 (42.0)	27 (20.6)	82 (62.6)
<i>K. pneumoniae</i>	6 (4.6)	8 (6.1)	14 (10.7)
<i>Pseudomonas</i>	---	3 (2.3)	3 (2.3)
<i>Citrobacter</i>	---	3 (2.3)	3 (2.3)
<i>Staphylococcus</i>	---	7 (5.3)	7 (5.3)
<i>Staph (MRSA)</i>	---	1 (0.8)	1 (0.8)
<i>Enterococcus</i>	---	10 (7.6)	10 (7.6)
<i>Acinetobacter</i>	---	6 (4.6)	6 (4.6)
<i>Citrobacter</i>	1 (0.8)	---	1 (0.8)
<i>Streptococcus</i>	---	2 (1.5)	2 (1.5)
<i>Enterobacter</i>	2 (1.5)	---	2 (1.5)
Total	64 (48.9)	67 (51.1)	131 (100)

Table III. Evaluation of UTI with ESBL-positive organisms as risk-factor for AKI among the study subjects (N=131)

Risk factor	Cases (UTI with AKI) (n=62)	Controls (UTI without AKI) (n=69)	Odds ratio	95% CI	p value
ESBL-positive (64)	40	24	3.4	1.66-6.99	0.008
Non-ESBL (67)	22	45			

DISCUSSION

UTI due to ESBL-positive organisms is an ever increasing problem. Diabetic patients are at increased risk for UTI due to ESBL-positive organisms [4, 5]. ESBL-positive organisms were associated with increased incidence of UTI complicated by AKI and septicaemia [6, 7].

CONCLUSION

Almost half of the type 2 diabetic subjects with UTI had ESBL-positive organisms as aetiological agents in this study. UTI due to ESBL-positive organisms was a significant risk factor for AKI.

ACKNOWLEDGEMENT: We express our acknowledgement to Dr. Lovely Barai, Associate Professor of Microbiology, BIRDEM General Hospital, Dhaka, Bangladesh.

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