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The Pattern of Aerobic Microorganisms Causing Hospital: Acquired Urinary Tract Infection

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ABSTRACT

Background: Hospital-acquired Urinary Tract Infections (UTIs) account for up to 40% of all hospital-acquired infections. The associated morbidity and mortality are a major drain on hospital resources. Among UTIs acquired in the hospital, approximately 75% are associated with indwelling catheters in the urinary tract. The main aim of this study was to isolate and identify the aerobic microorganisms that are responsible for hospital-acquired urinary tract infections.

Materials and methods: This cross sectional study was conducted in the Department of Microbiology, Sylhet MAG Osmani Medical College, Sylhet from January 2019 to December 2019. A total of 31 urine samples were collected from catheterized patients admitted to Sylhet MAG Osmani Medical College Hospital Inpatients Department and incubated in blood agar media and MacConkey agar media. Isolates were identified by different biochemical tests.

Results: Bacteria were isolated from 10 specimens and *Escherichia coli* was the commonest organism found. Organisms responsible usually originate from the patient's endogenous intestinal flora, but occasionally from a moist site in the hospital environment. Nosocomial pathogens causing UTIs tend to have a higher antibiotic resistance than simple UTIs. Infection control policies are important in limiting the number of hospital-acquired UTIs.

Conclusion: A high infection rate coupled with a variety of resistant nosocomial pathogens emphasizes the importance of meticulous surveillance of nosocomial infections in the hospital with due attention to antibiotic prescription practices.

KEY WORDS

Hospital acquired Infection; Nosocomial pathogens; Urinary tract infection.

INTRODUCTION

Urinary Tract Infection (UTI) is the most common hospital-acquired infection, accounting for 35% of all hospital-acquired infections[1]. More than 80% of these infections are attributable to the use of an indwelling urethral catheter[2]. Catheter-Acquired Urinary Infections (CUTIs) have received significantly less attention than other healthcare-acquired infections, such as surgical site infections, ventilator-associated pneumonia, and bacteremia. Among UTIs acquired in the hospital, approximately 75% are associated with a urinary catheter, which is a tube inserted into the bladder through the urethra to drain urine. Between 15-25% of hospitalized patients receive urinary catheters during their hospital stay.[2] The most common cause of UTI in men and women is bacterial and mostly by *Escherichia coli.* Antimicrobial resistance among bacteria causing UTI is increasing. The present study was undertaken to determine the pattern of organisms causing UTI and their antibiotic sensitivity pattern.

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MATERIALS AND METHODS

This cross-sectional study was carried out in the Department of Microbiology, Sylhet MAG Osmani Medical College (SOMC) Sylhet during the period January-December 2019. Approval was obtained from the Ethical committee of SOMC. A total of 31 urine specimens were collected from catheterized patients in different wards of the inpatient department. Bacteria

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were isolated from the specimens. Urine samples were collected aseptically from the patients who were catheterized after admission. 1st sample was collected immediately after catheterization and 2nd sample was collected at least three days after catheterization. About 10-20 ml of urine was collected into a sterile container from the rubber connector between the Foley catheter and the urine collection bag under aseptic conditions. A clamp was applied a few centimeters distal to the connection for 10 minutes. The cases which showed significant growth of bacteria in the 1st sample were excluded from the study. The cases which showed either insignificant or no growth in 1st sample but yielded substantial growth in the subsequent 2nd sample were included in this study. The organisms were isolated from the specimen by inoculation and culture on blood agar and MacConkey agar media. Identification of the organisms was done by colony morphology, Gram staining and standard biochemical tests. The collected data were checked, verified, and edited daily. The data were coded and entered into the computer by using the SPSS data entry program. Statistical significance was tested with appropriate tests.

RESULTS

A total of 31 catheterized urine samples were tested. The samples were collected from different departments of different age groups.

The most frequent age group of the patients with catheter-associated UTI was 11-20 years, with 8 (25.8%) patients, followed by 21-30 years and 51-60 years age groups having 22.6% of the patients in each group (Table I).

Table I The distribution of patients according to the different age groups

Age group	Frequency	Percent	Valid Percent
11-20	8	25.8	25.8
21-30	7	22.6	22.6
31-40	4	12.9	12.9
41-50	2	6.5	6.5
51-60	7	22.6	22.6
61-70	1	3.2	3.2
71-80	2	6.5	6.5
Total	31	100.0	100.0

There was a female preponderance in the study (26/31). Among males, 2 out of 5 samples yielded positive growth and among females, 8 out of 18 samples yielded positive growth (Table II)

Table II Distribution of patients according to Sex, Frequency, Growth and no growth

Sex	Frequency	Growth	No growth
Male	5	2	3
Female	26	8	18
Total	31	10	21

Urine samples were collected from the Department of Surgery, Gynae and Medicine. The highest growth was observed in the sample from Medicine Department (5/6) followed by the Gynae (3/7) and Surgery (2/8) (Table III).

Table III Distribution of specimens

	Culture		
Department	Growth	No growth	Total
Surgery	2	8	10
Obs & Gyn	3	7	10
Medicine	5	6	11
Total	10	21	31

The most frequently isolated organism causing cathere-induced UTI was E. coli (30%) (Table IV).

Table IV The list of bacteria causing catheter induced urinary tract infection

Organisim	Frequency	Percent	Valid Percent
Escherichia coli	3	9.7	30.0
Pseudomonas aeruginosa	1	3.2	10.0
Staphylococcus aureus	1	3.2	10.0
Aeromonas spp.	1	3.2	10.0
Klebsiella spp.	1	3.2	10.0
Enterobacter spp.	1	3.2	10.0
Morganella morganii	1	3.2	10.0
Candida spp.	1	3.2	10.0
Total	10	32.3	100.0

DISCUSSION

In this study, Urine from catheterized patients was collected from 31 patients. Among them, 10 samples were found to be culture-positive. The patients who tested positive were mostly females and belong to the age group 11-20 years. A similar result was seen in another study where females were more affected by hospital-acquired urinary tract infections in Portugal.[3] Specimens were collected from Medicine, Surgery, Obstetrics & Gynecology departments. Among them, most of the positive cases belong to the Medicine department which is similar to a study conducted in the UK by Melzer et al.[4] In this study, the most dominant bacteria to cause UTI was Escherichia coli which was about 30% of the bacterial causes. A similar result was found in a study conducted by Tasbakan et al where it was 45.5%[5]. The other organisms responsible for hospital-acquired urinary tract infections were *Pseudomonas aeruginosa, Staphylococcus aureus, Aeromonas* spp., *Klebsiella* spp., *Enterobacter* spp., *Morganella morganii* and *Candida* spp. The same result was found by Ahmed et al.[6] One of the causative agents was Candida spp. in this study. *Candida* spp. was found as a causative agent for UTI in another study conducted

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by Kundu et al.[7] *Candida* spp. is one of the normal floras of the skin and genital system. It may cause UTI in an immuno compromised person or person with an indwelling bladder catheter.[8]

LIMITATION

The limitations of this study are as it is a one-centered study, and the sample size was small due to the limitation of time and resources.

CONCLUSION

UTIs are one of the main sites for hospital-acquired infections. It is more associated with bladder catheterization. In the present study, the causative agents for hospital-acquired infection were Gram-negative and Gram-positive bacteria along with Candida spp. Some rare microorganism like *Morganella morganii* was also found to be the cause. So, it can be said that the microorganism causing hospital-acquired UTIs can vary a wide range.

RECOMMENDATION

Hospital-acquired urinary tract infections are very common nowadays. This study was an initiative to identify the causative agents causing Hospital Acquired Urinary Tract Infection (HAUTI). But as it was a one-centered study and due to time limitations, the study could not include a big sample size. Further, a more efficient study including several centers and a big sample size is necessary to identify the causative agents.

DISCLOSURE

All the authors declared no competing interest.

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