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Urinary Tract Infection (UTI) In The Elderly - A Clinical and Microbiological Study

KEYWORDS: Urinary tract infection (UTI), Uropathogens, Antibiotic Susceptibility Pattern, ESBL

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ABSTRACT *Urinary tract infection (UTI) is the second most common infectious complaint in geriatric clinics overall. The presentation of UTI in elderly patients may differ significantly from that in younger ones. The elderly patients are also more likely to have asymptomatic bacteriuria as they get older. The aim of this study was to find out the common presenting symptoms and risk factors associated with UTI in the elderly and to find the distribution of isolated uropathogens and their antibiotic susceptibility pattern. A total sample size of 100 elderly patients aged 65 years and above with symptoms of UTI was included in this cross sectional study. A clean catch midstream specimen or catheterised urine specimen was collected. A dipstick was used to test for the presence of nitrites and leucocytes. Gram staining and urine culture and sensitivity was done. ESBL producers were detected by screening and phenotypic confirmatory methods and also by E test. Of the 100 samples, 28 were culture positive and 72 were negative. Klebsiella species was the predominant isolate in this study (12 isolates) followed by E.coli (4) and Proteus mirabilis (4). ESBL-positive organisms accounted for 84.6% of the total infection. Urinary tract infections present a significant problem in the elderly. Clinical presentation plays a minor role in establishing diagnosis in UTI. Diabetes and urogenital instrumentation were the major risk factors for UTI.*

Introduction

Urinary tract infection (UTI) is the second most common infectious complaint in geriatric clinics overall.[1]Urinary tract infection in the elderly poses a very serious problem. The common risk factors for UTI in the elderly are the use of urinary catheters, living in a long-term care facility or nursing home, hormonal factors such as oestrogen deficiency in women, anatomical factors such as an enlarged prostrate in men or a cystocele in women, functional factors such as Parkinsonism, Alzheimer's disease or dementia, metabolic factors such as diabetes.

The presentation of UTI in elderly patients may differ significantly from that in younger ones. Chronic urinary symptoms are common in elderly persons and the classic triad of UTI-frequency, urgency and dysuria occurs routinely in older persons without infection.[2] Many elderly women are incontinent, which can further confuse the presentation. A high index of suspicion is needed first to entertain the diagnosis and then to pursue a thorough evaluation.

The common organisms causing UTI are E.coli, Klebsiella, Proteus, Staphylococcus aureus etc. The range of potential uropathogens in elderly patients is considerably broader than in the younger adult population. The elderly patients are also more likely to have asymptomatic bacteriuria as they get older. Antimicrobial resistance among uropathogens is increasing. Extended Spectrum Beta Lactamase (ESBL) producing organisms are frequently resistant to many of the antimicrobial agents usually recommended for the treatment.

The knowledge of microbiology and antibiotic susceptibility of micro-organisms causing the disease is vital for defining the empirical treatment. There is not much information on the aetiology and resistance pattern of UTI in the elderly in India.

This study will be useful to find out the common symptoms and risk factors, the present uropathogen profile causing UTI among elderly patients in this hospital and their antibiotic resistance patterns.

Materials and Methods

Study population

A total of 100 elderly patients aged 65 years and above with symptoms of UTI (Both Outpatients and Inpatients) who were treated at Government Medical College Hospital Tirunelveli were included in this cross sectional study. The presenting symptoms and risk factors such as diabetes, catheterisation, incontinence, renal stones, immune suppression etc were identified.

Sample collection and processing

A clean catch midstream specimen or catheterised urine specimen was collected in a sterile, wide-mouth, leak-proof container. A dipstick (AGAPPE diagnostics) was used to test for the presence of nitrites and leucocyte as surrogate markers for UTI.

Isolation and identification of uropathogens:

A gram stained direct smear of the specimen was examined for the presence of bacteria and pus cells. Using a calibrated loop method, uncentrifuged specimen was streaked onto the Cysteine Lactose Electrolyte Deficient (CLED) agar, MacConkey and Blood agar plates and incubated at 35-370C for 24 hours. For midstream urine samples, 10^5 CFU / ml was taken as significant. For catheterised specimens and gram positive bacteria lower colony counts were considered significant. The culture isolates were further identified by using various biochemical reactions up to genus/species level .Antibiotic sensitivity testing was done by the Modified Kirby-Bauer disc diffusion method according to the Clinical and Laboratory Standards Institute (CLSI) guidelines[3]

Extended spectrum beta lactamase detection:

The screening for extended spectrum beta lactamase (ESBL) was done using ceftazidime (30 µg) and cefotaxime (30 µg).The phenotypic confirmation was done by testing the strain against ceftazidime and ceftazidime with clavulanic acid discs. A >5 mm diameter of the zone of inhibition for ceftazidime with clavulanic acid in comparison to ceftazidime was considered indicative of ESBL production4.

E test for ESBL:

The E test ESBL screen used stable gradient technology to

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evaluate the MIC of ceftazidime alone compared with the MIC of ceftazidime with clavulanic acid. The MIC was interpreted as the point of intersection of the inhibition ellipse with the E test strip edge[5].A ratio of ceftazidime MIC to ceftazidime-clavulanic acid MIC equal to or greater than 8 indicated the presence of ESBL.

Results

Total number of patients in this study was 100.out of which 69 were male and 31 were female. The mean age of the patients was 68 years. 70 were inpatients and 30 were outpatients. Painful burning micturition was the most common symptom found in the present study. The next common symptom was urgency. Fever was observed among 8 patients.

Out of the 100 samples subjected for aerobic culture, 28 samples were culture Positive of which, 20 were male and 8 were female. 72 patients were culture negative in this study. Among the 28 culture positive patients, 17 had more than one risk factor. Among the 72 culture negative patients, 31 patients had more than one risk factor. Diabetes and catheterisation were the predominant risk factors among the patients with UTI.

Table-1summarises the prevalent risk factors among patients with UTI.

Among the 28 culture positive samples 39.2 % were nitrite positive in the strip test. 35.7. % were positive for leucocyte esterase. Among the 72 culture negative 16.6 % were nitrite positive and 19% were leucocyte esterase positive. Strip test for nitrites had a specificity of 83 % and negative predictive value of 78%. Strip test for leucocyte esterase had a specificity of 81 % and negative predictive value of 76%. Table 2 shows the performance characteristics of the strip test.

Klebsiella species (12) was the most frequent isolate followed by E.coli and Proteus mirabilis. The antibiotic resistance of the organisms isolated in this study was unusually high. In this study, most isolates were resistant to Fluroquinolones.85% of the study subjects were resistant to Cotrimoxazole. Nitrofurantoin resistance was observed among 78% of the isolates. The most troublesome finding of the present study is that Extended Spectrum Beta Lactamase (ESBL) positive organisms accounted for 84.6% of the total Infection. Among the most frequent UTI pathogens, Klebsiella pneumoniae. (42.3 %) was the most prevalent ESBL producer.

Discussion

Out of the 100 samples subjected for aerobic culture, 28 samples were culture positive of which, 20 were male and 8 were female. Culture positivity in this study was also higher among males.72 patients were culture negative in this study. In a retrospective analysis of urine culture results in a teaching hospital, Edirisinghe et al in their study found that there was a high percentage (69 %) of culture negative

samples.[6]

The diagnosis of infection in an older patient is often complicated by the lack of typical symptoms and a clear history. The presence of cognitive impairment and communication difficulties can make it difficult to obtain an accurate history. Many older patients have chronic genitourinary symptoms and it is important to recognize that this is not synonymous with infection.

Painful burning micturition was the most common symptom found in the present study. The next common symptom was urgency. Fever was observed among 8 patients. Increased frequency was the most common symptom among acute uncomplicated UTI in a study done by Little et al.[7] These findings indicate that clinical presentation plays a very minor role, if any, in diagnosing UTI, reconfirming the fact that urine culture is essential to diagnose UTI. Thus in the absence of clear urinary tract localizing symptoms and signs, older patients should be systematically assessed with a full clinical evaluation performed to arrive at a differential diagnosis.

In the study by Paul et al on catheterised patients, 90 % of the patients were asymptomatic .and there were no significant differences in signs and symptoms in catheterised and non catheterised patients.[8]Risk factor assessment of the study group revealed that among the patients who were culture positive, 14 patients had Diabetes, 12 had indwelling catheters, 8 had associated renal stones, 6 had Incontinence and 5 were immunosuppressed More than one risk factor was noted in 17 of these patients. Three patients did not have any of the above risk factors.

Among the 72 patients who were culture negative, 21 patients had Diabetes,

21 were catheterised, 7 had renal stones and 15 were immunosuppressed, 14 had incontinence. 31 of these patients had more than one risk factor. 25 of these patients did not have any risk factor.

Among the 28 culture positive samples 39.2 % were nitrite positive in the strip test. 35.7. % were positive for leucocyte esterase. Among the 72 culture negative 16.6 % were nitrite positive and 19% were leucocyte esterase positive. False negative results may be due to increased urobilinogen, high specific gravity of urine or due to bacteria which lack the nitrate reductase enzyme. False-positive nitrite may occur when a urine specimen has remained at room temperature for an extended period of time and bacterial contaminants are allowed to multiply and produce measurable levels of nitrites. Other causes of false-positive results have been reported. Hyperbilirubinemia is a potential cause of a false-positive nitrite test.[9]Additionally, Gallagher et al. demonstrated that the nitrite reagent rapidly loses accuracy when stored in uncapped vials[10]

Klebsiella species was the predominant isolate in this study (12 isolates) followed by E.coli (4) and Proteus (4). In a study by Mahesh et al among the elderly, E.coli was the predominant isolate followed by Klebsiella [11].In the study conducted by Md.Hamsa saber et al in Bangladesh E.coli was the most frequent pathogen[12]

In this study, most isolates were resistant to Fluroquinolones. (81.4%). Akram et al. reported Ciprofloxacin resistance rates ranging from 47% to 69% among the Gram-negative organisms in their study in India[13]. Cotrimoxazole is the recommended drug for treating UTI. However, 85% of the study subjects were resistant to the first-line drug. Nitrofurantoin resistance was observed among 78% of the isolates.

The most troublesome finding of the present study is that Extended Spectrum Beta Lactamase (ESBL) positive organisms accounted for 84.6% of the total Infection. A study conducted in Kuwait revealed that the most common infections associated with ESBL producing pathogens were urinary tract infection (68.2%), followed by wound infection (14.4%) and bloodstream infection (6.1%)[14] ESBL-producing organisms are frequently resistant to many of the antimicrobial agents usually recommended for the treatment. As lesser new antibiotics are available for their management, we need to be concerned of this issue in years to come especially in tertiary care centres. A unified antibiotic protocol is necessary to limit the morbidity and mortality associated with inappropriate and under-treatment of UTI.

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Table 1: Frequency of risk factors among the subjects with UTI

Risk factor	Culture positive		Culture negative	
	Number	Percentage	Number	Percentage
Diabetes	14	50%	21	29.1%
Catheterisation	12	42.8%	21	29.1%
Renal stones	8	28.5%	7	9.7%
Immuno suppression	5	17.8%	15	20.8%
Incontinence	6	21.4%	14	19.4%
None of the above	3	10.7%	25	34.7%

Table 2: Performance characteristics of the strip test

Strip test	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
Nitrite	39 %	83%	48%	78%
Leucocyte esterase	36%	81%	42%	76%

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