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Clinical Profile of Urinary Tract Infections In Elderly Men

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Abstract:

Urinary tract infections are very common in elderly population. It is the most common cause of bacteraemia in older men. The structural and functional abnormalities of urinary tract like benign prostatic hypertrophy (BPH) and comorbidities like Diabetes mellitus contribute to this high incidence of urinary tract infection (UTI). The aim of this study was to find the clinical profile of UTI in elderly men -the risk factors and complications, and the relation between obstructive urinary symptoms and UTI in elderly men. This was a hospital based longitudinal study undertaken among elderly male patients admitted in a tertiary care hospital. 48 male patients aged more than 60 years who were admitted in medical wards with UTI were included in this study. Their clinical features, co morbidities, laboratory investigation results including urine culture and antibiotic sensitivity, complications and outcome were noted and analysed. IPSS was used to assess the severity of obstructive urinary symptoms. Majority of the patients (60.40%) were in the 60-69 years age group. Fever (79.2%) was the commonest presenting symptom followed by dysuria (52.10%) and frequency (43%). A significant proportion of patients in our study group (16.7%) had altered sensorium. 70.8% patients had co morbidities. Of these Diabetes Mellitus (68.8%) was the commonest followed by hypertension (22.9%) 52.1% of our patients reported to have bladder outlet symptoms. Of this only 25% patients were on drug treatment for BOO. Presence of tachycardia was significantly associated with complications with a p value of 0.025. Presence of flank pain (p value 0.017) and loin tenderness (p value 0.00) was significantly associated with development of upper UTI. 37.5% patients developed complications. Common complications observed in our study included acute kidney injury (37.50%), sepsis (12.60%), pyelonephritis (8.50%) and hypotension

(4.10%) Hyponatremia was common with 29.2% patients having serum sodium less than 130 meq/dl. E.coli (68.70%) was the commonest etiological agent isolated and most of the isolates were sensitive to Cefoperazone sulbactam. The study concluded that delirium, hyponatremia and acute kidney injury are common in elderly males with urinary tract infections. Presence of flank pain and loin tenderness is significantly associated with upper UTI. Although obstructive urinary symptoms are common in elderly males, many of them are not under treatment for this.

Keywords: 1. UTI 2. Elderly Males 3. Delirium 4. Hyponatremia 5. Acute Kidney Injury

Introduction

Urinary tract infections are uncommon in younger men, but the incidence of UTI increases after the age of 60 years in men^{1,4}. The incidence of urinary tract infections among older men is approximately half of that among older women^{5,6}. Urinary tract infection is the most common cause of bacteraemia in older men^{7,8}. As men age, they acquire structural and functional abnormalities of urinary tract that impair normal voiding which leads to turbulent urine flow and urinary obstruction leading to urinary tract infection⁹. Older people often have coexisting conditions such as Diabetes Mellitus that are associated with increased susceptibility to infection.

The common presenting symptoms of UTI are dysuria, frequency, lower abdominal pain, urgency, fever with chills and rigor, flank pain etc. Elderly are more likely to present with atypical signs and symptoms like delirium, anorexia, vomiting, tachycardia, hypotension, acidosis, renal failure etc^{10,11}. Bacteriuria suggests urinary tract infection¹. Pyuria is a nonspecific finding that is frequent in older people with or without bacteriuria and is not diagnostic of symptomatic UTI or indicates a need for treatment¹. E. Coli is the predominant pathogen in community acquired UTI¹².

Elderly are more likely to have complicated UTI also because of other comorbidities^{1,10}. Factors contributing to UTI in elderly men include diabetes mellitus, genitourinary abnormalities, neurological problems like cerebrovascular disease, Alzheimer's disease, Parkinson's disease, use of catheters, urinary calculi etc^{13,14}. Prostatic problems like BPH, prostatitis, urethral stricture etc. play a significant role in UTI in elderly men^{2,3,9}. Many of these men may not be receiving proper treatment for these problems predisposing them to development of UTI.

Methods

Based on the literature search we hypothesised that elderly men have more incidence of complicated UTI. Men with obstructive urinary symptoms have more incidence of UTI. The aim of this study was to find out the clinical profile of urinary tract infections in elderly

men. The objectives being, to study the risk factors and complications of UTI in elderly men and to study the relation between obstructive urinary symptoms and UTI in elderly men.

It was a hospital based longitudinal study done in the Department of General Medicine, Government T.D. Medical College Hospital Alappuzha, Kerala. Permission to conduct the study was obtained from Institutional Research committee (Protocol No- S22/2019 dated 10/4/2019) and Institutional Ethics committee (EC 45/2019 dated 9/5/2019) of TDMC Alappuzha. Confidentiality of the patients was maintained during every stage of the study. Informed written consent was obtained from patient and relative. If patient was too sick to give consent, consent was obtained from immediate relative. Once sensorium became normal re-consent from the patient was taken. All the expenses for the study were met by the investigator. 48 consecutive male patients older than 60 years admitted in medical wards with urinary tract infection who satisfy the inclusion and exclusion criteria were included in the study, All male patients above age 60 years presenting with a primary diagnosis of symptomatic UTI who were willing to participate in the study were included in the study. The exclusion criteria were: 1. Patients who die or get discharged before the required investigation results are available 2. Patients whose urine culture reports are reported as improper sample collection. 3. Patients who had received antibiotics in the preceding 2 weeks of admission to hospital.

Definitions used in the study:

- **Positive urine culture** is defined as a quantitative count of $> 10^5$ colony forming units of bacteria per millilitre in one clean catch midstream urine specimen
- **Symptomatic UTI**-presence of clinical symptoms localized to the lower urinary tract (cystitis) like dysuria, frequency and urgency. Upper urinary tract infections (pyelonephritis) present with high grade fever, chills, obtunded sensorium and flank pain with pyuria-pus cells $>10/HPF$ and a positive urine culture⁴
- **Catheter associated UTI**- A positive growth of $> / = 10^3$ colony forming units/ ml of uropathogenic bacteria in culture associated with fever and signs of systemic inflammatory response syndrome and/or suprapubic or renal angle tenderness. No other nidus of infection should be present
- **Risk factors for UTI in men**-bladder outflow obstruction, Diabetes mellitus, urolithiasis, urinary catheter, anatomical abnormalities of urinary tract, urological procedures, neurological problems
- **Complications of UTI** -pyelonephritis, renal failure, hypotension, sepsis
- Obstructive urinary symptoms were ascertained using the International Prostate Symptom Score

- **Pharmacological treatment** of obstructive urinary symptoms include use of alpha adrenoreceptor blocker or 5 alpha reductase inhibitor alone or in combination

Study was conducted in Government Medical College Hospital, Alappuzha, a 1000 bedded teaching tertiary care hospital situated in coastal Kerala catering for the major group of low and middle class socioeconomic population of central Kerala. In this study, patients who were admitted in the Medical wards of Government Medical college Hospital, Alappuzha, Kerala between 10th May 2019 and 15th June 2019 were included after getting informed consent from patient or a close relative if patient is too sick to sign the consent form.

A detailed history to assess the co morbidities was done using the Charlson's co morbidity index¹⁶. History of chronic blood loss and history of current anti platelet use was recorded. History regarding the type of diet: whether vegetarian or non vegetarian was documented. Blood samples were drawn from the patient and sent for the following tests which include Haemoglobin, S.Ferritin, Total iron binding capacity(TIBC), Transferrin saturation(TSat), ESR, RBC indices(MCV,MCHC,MCH) and S.Creatinine. S .Folic acid and Vitamin B12 were done only in selected patients with a MCV >100fl. Stool occult blood for 3 consecutive days was also checked for any evidence of gastrointestinal blood loss. Colonoscopy or upper gastrointestinal endoscopy was done in patients with evidence of gastrointestinal blood loss. Bone marrow examination was done only in indicated patients with unexplained anaemia.

The primary objective of this study is to determine the different etiological subtypes of anaemia in a hospitalized geriatric patient population. Descriptive statistics are attained through the calculation of arithmetical means, standard deviations, and minimum and maximum values of all data. To test the significance of all categorical variables, the Chi-squared test (Pearson) is performed. Arithmetical means are calculated with χ^2 -tests for dependent and independent samples, and correlations are determined using the Spearman Rho method. All outcomes with a minimum of $p < 0.05$ are considered significant. Missing values are disregarded in all statistical tests. All statistical analyses are performed using IBM SPSS Statistics 20SPSS statistical software.

Results

Majority of the patients (60.40%) were in the 60-69 years age group. Fever (79.2%) was the commonest presenting complaint, followed by dysuria and frequency. 16.7% patients had altered sensorium.66.70% presented within 1-3 days of symptom onset. Diabetes Mellitus was the commonest comorbidity (68.8%). 29.2% patients didn't have any comorbidity.4% had a history of transurethral resection of prostate(TURP).37.55% had a history of use of catheter anywhere in the past.22.9% were taking pharmacological treatment for obstructive urinary symptoms.14.6% were having catheter associated UTI,where as 2.1% were on suprapubic catheter(SPC).18.8% gave a previous history of UTI.18.8% had neurological illness. Neurological problems included cerebrovascular disease, Parkinsonism and paraplegia.Majority (68.8%) had a history of Diabetes Mellitus.

The IPSS score was 0-7 in 47.9% which showed that majority had mild obstructive urinary symptoms. On examination fever (72.9%) was the commonest physical finding. 27.1% patients had delirium. Leucocytosis (TC > 11000) was present in 73 % of patients. One patient had leucopenia with total count less than 4000 and that patient expired. 33.4% had a S. Creatinine of >2 mg/dl. One patient had serum creatinine of 13 mg%. He had pre-existing CKD. 29.2% patients had hyponatremia with serum sodium less than 130 meq/dl. 21% had microscopic hematuria at the time of admission. Using ultrasound scan prostate volume <20cc was taken as normal, 20-40cc - Grade 1 prostatomegaly, 40-60 cc - Grade 2 prostatomegaly and >60 cc - Grade 3 prostatomegaly. 15.41.9% had grade 1 prostatomegaly in our study. In 20.8% patients residual volume could not be assessed due to various reasons. Some of them were on continuous bladder drainage, some were having incontinence. Residual volume of urine more than 60 ml after normal voiding in a normally distended bladder was taken as abnormal. 15 The ultrasound findings were as follows: 70.8% had normal kidneys, 8.4% had pyelonephritis, 10.4 % had hydronephrosis, and 12.5% had renal calculus. Acute kidney injury (37.5%) was the commonest complication observed during hospital stay. AKI was diagnosed based on KDIGO criteria.¹⁶ All the patients with pre-existing CKD developed Acute Kidney Injury. 8 patients (12%) required dialysis. Out of this 6 patients had CKD, one had carcinoma bladder with bilateral hydronephrosis and one had undergone TURP. One patient with CKD died.

Regarding the final outcome 2 patients died. One patient had multiple comorbidities like CKD, COPD, CAD and hypertension. Second patient was a 79 year old man with COPD and he developed acute kidney injury and sepsis and expired. In urine culture E. coli (68.70%) was the commonest organism isolated. 4.2% of E. coli isolates were drug resistant. Mixed growth was seen in 2 patients which may be due to improper sample collection. 50% of the MDR E Coli were sensitive to Cefoperazone sulbactam and the rest 50% was sensitive to Ceftriaxone.

All the MDR Klebsiella isolates were sensitive to both Cefoperazone sulbactam and Gentamicin. All the isolates of Pseudomonas were sensitive to Amikacin. Two patients had Pseudomonas infection. One patient was treated with Cefoperazone sulbactam and other patient was treated with Piperacillin tazobactam. Both these patients had elevated serum Creatinine so Amikacin was not used. All the Methicillin Resistant Staph Aureus (MRSA) were sensitive to Septran, Vancomycin and Linezolid. Cefoperazone sulbactam was the commonest antibiotic used. Even though MRSA was isolated in 2 patients, none of the patients were treated with vancomycin or linezolid. First patient was a patient with Chronic Myeloid Leukaemia and he was treated with Cefoperazone sulbactam and he improved.

Discussion:

A total of 48 male patients aged more than 60 years who were admitted to medical wards with urinary tract infection were included in the study. Majority of the patients (60.40%) were in the 60-69 years age group (fig:1).

Fever (79.2%) was the commonest presenting symptom followed by dysuria (52.10%) and frequency (43%)(fig:2). In a study conducted by Mahesh et al 17 fever was the most common symptom followed by dysuria . But another study by Kakade et al 18 had lower rates of fever. Fever was present 45.26% of study population. The higher prevalence of fever in our study may be because of more sick patients being included in the study as this was a hospital inpatient group based study. Most of our patients (66.7%) got admitted to hospital within 3 days of onset of symptoms. A significant proportion of patients in our study group (16.7%) had altered sensorium. In elderly a subtle change in the mental status may serve as a clue to UTI 19.

70.8% patients had co morbidities.(fig:4) Of these Diabetes Mellitus (68.8%) was the commonest followed by hypertension (22.9%). We had a higher incidence of DM compared to study by Kakade et al 18 (46.3%). Study by Venkatesh et al 23 also reported higher prevalence of DM (64.1%) similar to our study. 23% patients had high blood sugar more than 200 mg% at the time of admission to hospital. This uncontrolled Diabetes may be a reason for UTI. But we were not able to find any statistically significant association between high blood sugar level at admission and development of complications.

52.1% of our patients reported to have bladder outlet symptoms (fig:3-5). Of this only 25% patients were on drug treatment for BOO.

Physical examination findings in our patients included fever (72.9%), tachycardia (33.3%), delirium (27.1%) loin tenderness (10.4%) and hypotension (8.3%). (fig:4-14) Presence of tachycardia was significantly associated with complications with a p value of 0.025 (table:1-2). Presence of flank pain (p value 0.017) and loin tenderness (p value 0.00) was significantly associated with development of upper UTI (table 2-4).

Leucocytosis was present in 73% of patients, but there was no relation between leucocytosis and development of complications. This was observed in study by Kakade et al also. But other studies have shown that leucocytosis was related to development of complications like sepsis 20. 37.5% patients developed complications.(fig 5-:24) . Common complications observed in our study included acute kidney injury (37.50%), sepsis (12.60%), pyelonephritis (8.50%) and hypotension (4.10%) 48.3% patients had elevated serum Creatinine >1.2mg% and 37.5% patients developed acute kidney injury. Development of AKI was observed in other studies also 20. Hyponatremia was common with 29.2% patients having serum sodium less than 130 meq/dl. Hyponatremia and fever might be contributing to the high rates of delirium in our study population. Prostatomegaly was present in 94.4% patients and 16.7% patients had significant residual urine.

Gram negative organisms were the etiological agents in majority of our patients (fig:6-27). E.coli (68.70%) was the commonest followed by klebsiella (12.5%) and pseudomonas (6.3%). Other studies also have reported similar findings 18, 22. In majority of bacterial UTIs the initial empirical treatments with broad-spectrum antibiotics 19. Unfortunately this leads to antibiotic

resistance 21. In our study cefoperazone sulbactam was the most common antibiotic used (52%)(table:3-1).In study by Venkatesh et al also cephalosporin with beta lactamase inhibitor was the commonest antibiotic used (36%). This may be because of the broad spectrum of activity as well as the culture and sensitivity .Since E.coli was the commonest organism isolated and most of the isolates were sensitive to cefoperazone and ceftriaxone, it will be better to start these as the initial empiric antibiotic in elderly patients admitted with UTI. E.coli isolates were least sensitive to cefotaxime. Other studies also have shown resistance of E.coli to cefotaxime¹⁸.So it will be better not to use cefotaxime as the initial empiric antibiotic in UTI. There was a high incidence of AKI, so aminoglycosides should be used with caution in elderly patients with UTI. Elderly with UTI are at high risk of delirium due to multiple risk factors, it will be better to avoid quinolones in such patients.

Even though this was a properly conducted study,there were certain limitation The study population was small so the statistical power of study is less. Only hospitalised patients were included in the study. Usually only sick patients, patients with complications or those with other comorbidities will be admitted. This selection bias may contribute to the higher rates of fever, delirium, hyponatremia, acute kidney injury etc. seen in the study group. Our hospital does not follow a uniform antibiotic policy and antibiotics are prescribed depending on the treating doctor's preference. So it is not possible to find the effectiveness of a particular antibiotic for a particular organism. In 2 patients urine culture reported mixed growth which indicates improper sample collection and possible contamination of urine sample.

Conclusion:

This study was done to find the clinical profile of urinary tract infections in elderly males. The study population was from hospitalised patients admitted in a tertiary care hospital with UTI. Fever was the commonest symptom and a significant proportion of patients had altered sensorium. Comorbidities were common, Diabetes mellitus being the commonest. Even though 52% patients had bladder outlet symptoms, nearly half of them were not taking any treatment. Presence of flank pain and loin tenderness was significantly associated with upper UTI. Acute kidney injury and hyponatremia were common; all the patients with pre-existing CKD developed AKI. So in elderly we should be cautious about development of these. We should ensure adequate hydration; avoid nephrotoxic agents like aminoglycosides and NSAIDs as far as possible. Many elderly patients may be having hypertension and may be on a salt restricted diet and thiazides. When they develop infections their dietary intake further reduces and nausea and vomiting further contributes to hyponatremia. Delirium is common and it is of multifactorial Etiology. E.coli was the commonest etiological agent and it is better to start cefoperazone sulbactam as the initial empirical antibiotic in elderly patients admitted with UTI. It is better to have an antibiotic policy for each hospital to avoid the indiscriminate use of antibiotics and the development of antibiotic resistance.

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Conflict of interest: None declared

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Table:1 Co-relation between various parameters and complications

VARIABLE		COMPLICATIONS		P VALUE
		NO	YES	
TACHYCARDIA	NO	24	8	0.025
	YES	6	10	
FEVER	NO	7	3	0.722
	YES	23	15	
BLADDER OUTFLOW OBSTRUCTION	NO	15	8	0.772
	YES	15	10	
TOTAL COUNT	<11000/MM3	25	15	1.000
	>11000/MM3	5	3	
BLOOD SUGAR LEVEL AT ADMISSION	<200MG/DL	21	9	0.222
	>200MG/DL	9	9	
IPSS SCORE	<19	27	15	0.547
	20-35	3	3	
PROSTATE VOLUME	NORMAL	2	5	0.157
	PROSTATOMEGALY	28	12	
	POST TURP	0	1	
RESIDUAL URINE	NOT ASSESSED	7	3	0.178
	< 60 ML	16	14	
	>60 ML	7	1	

Table:2 Co-relation between various parameters and ultra sound evidence of upper UTI

VARIABLE		ULTRASOUND EVIDENCE OF UPPER UTI		P VALUE
		NO	YES	
DYSURIA	NO	20	3	0.466
	YES	19	6	
FEVER	NO	8	2	1.000
	YES	31	7	
BLADDER OUTFLOW OBSTRUCTION	NO	19	4	1.000
	YES	20	5	
TOTAL COUNT	<11000/MM3	33	7	0.633
	>110000/MM3	6	2	
BLOOD SUGAR LEVEL AT ADMISSION	<200MG/DL	25	5	0.711
	>200MG/DL	14	4	
IPSS SCORE	<19	34	8	0.964
	20-35	5	1	
PROSTATE VOLUME	NORMAL	4	3	0.390
	PROSTATOMEGALY	34	6	
	POST TURP	1	0	
RESIDUAL URINE	NOT ASSESSED	8	2	0.884
	< 60 ML	24	6	
	>60 ML	7	1	
PAST UTI	NO	32	7	1.000
	YES	7	2	
FLANK PAIN	NO	38	6	0.017
	YES	1	3	
LOIN TENDERNESS	NO	39	4	0.000
	YES	0	5	

Table: 3

	Frequency	Percentage
Cefotaxime	12	25
Cefpodoxime	1	2.1
Ceftriaxone	2	4.2
Ciprofloxacin	1	2.1
Cefoperazone sulbactam	25	52
Nitrofurantoin	2	4.2
Piperacillin tazobactam	5	10.4
Total	48	100.00

Figure: 1

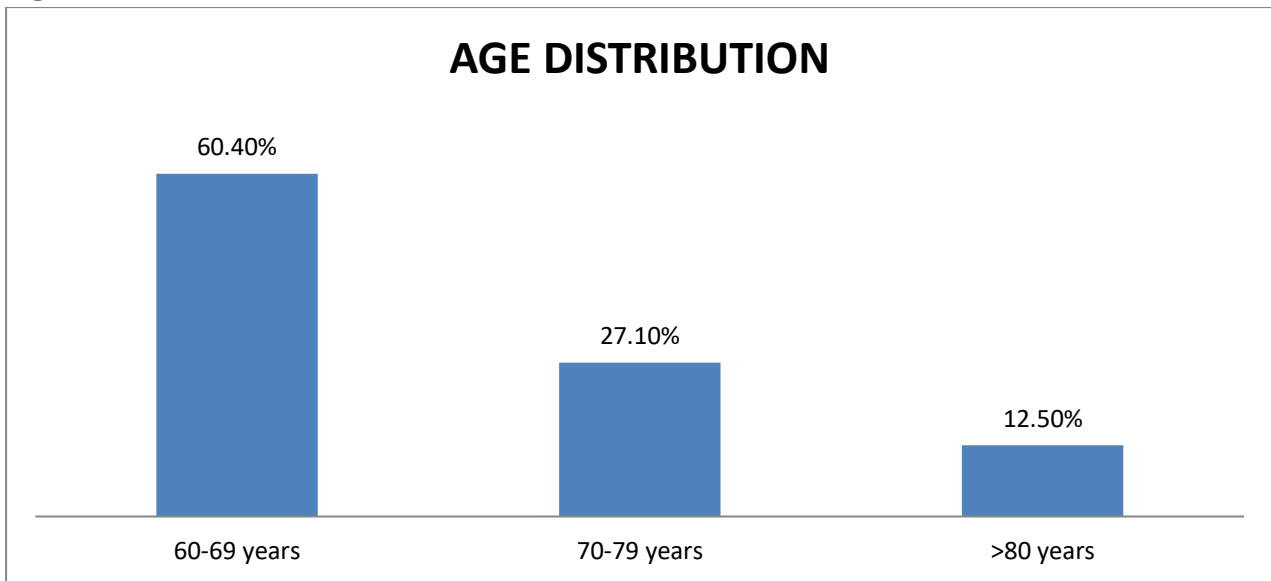


Figure: 2 Presenting complaints

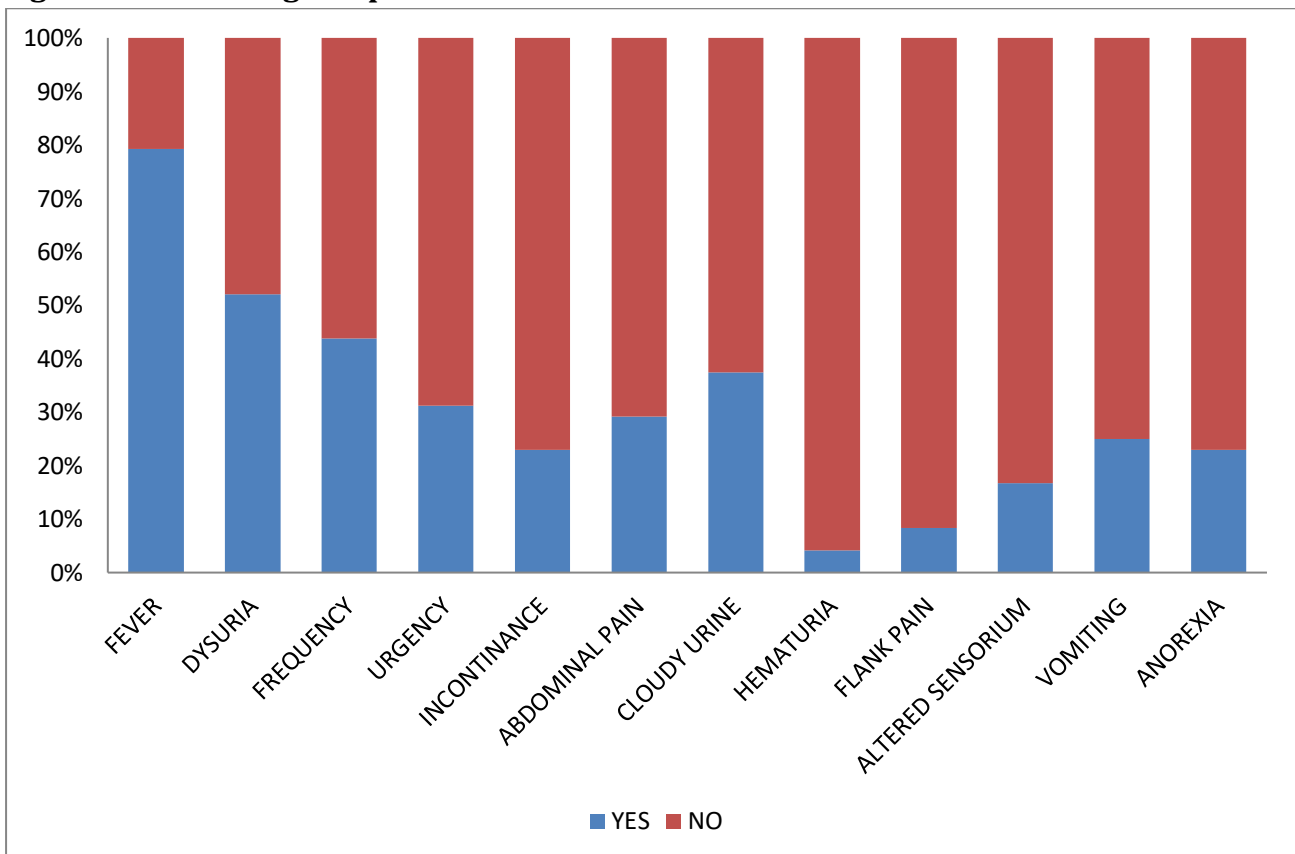


Figure: 3 Bladder outlet obstruction symptoms

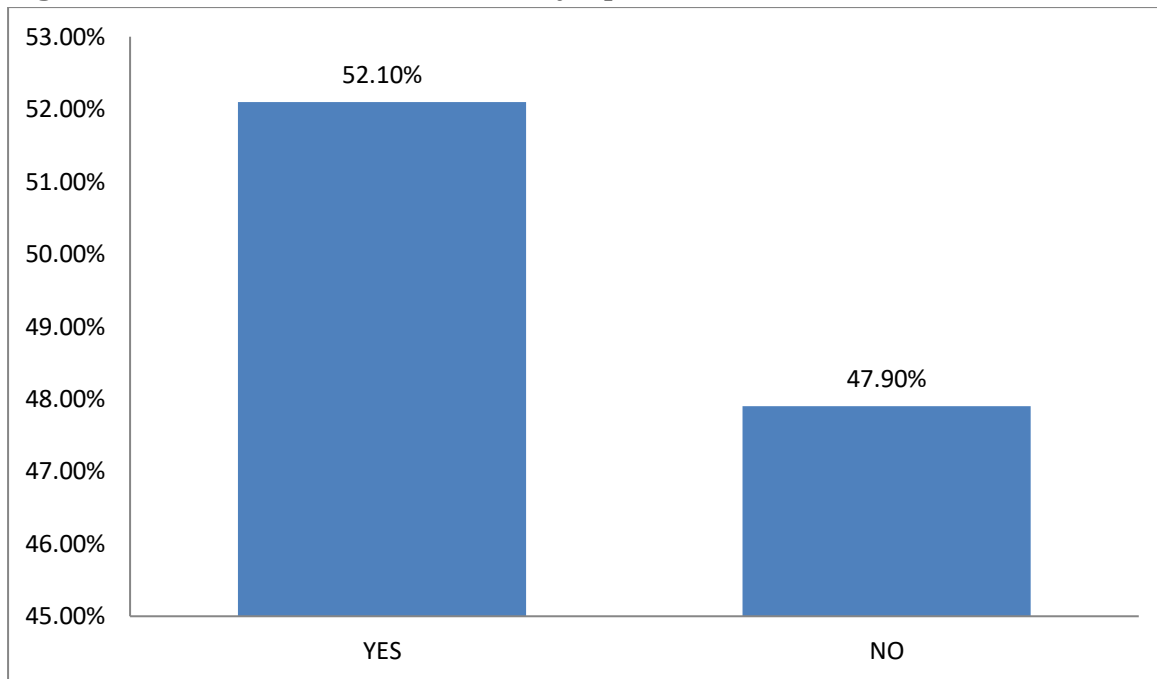


Figure: 4 Physical Examination Findings

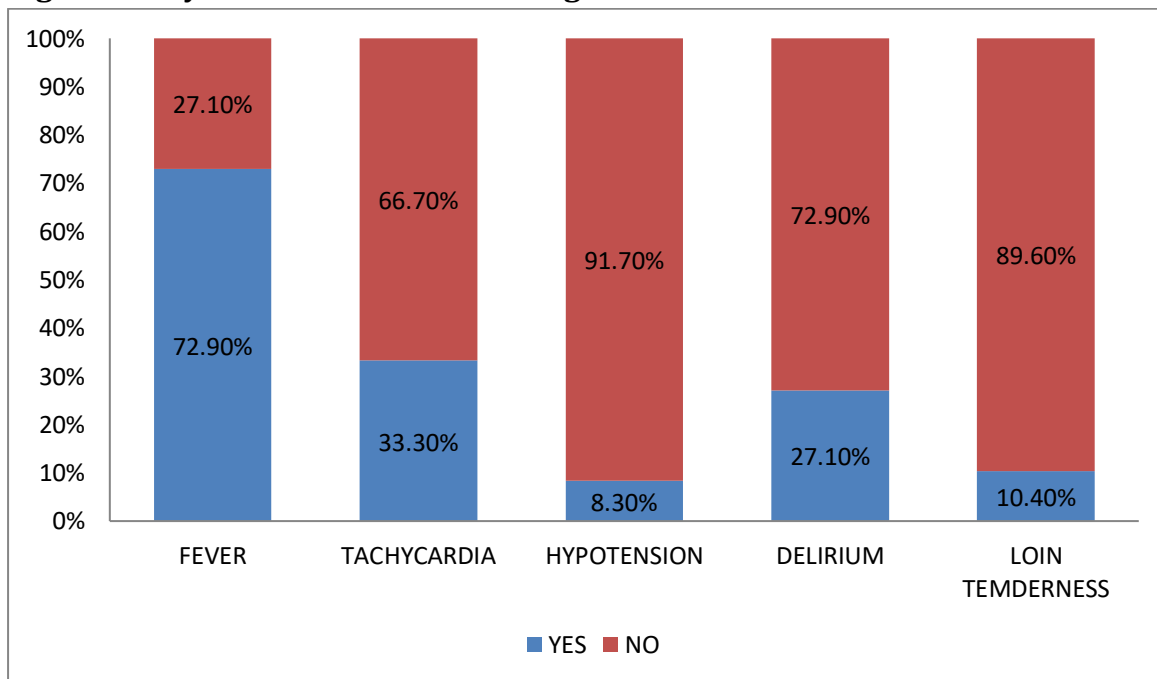


Figure: 5 Complications During Hospital Stay

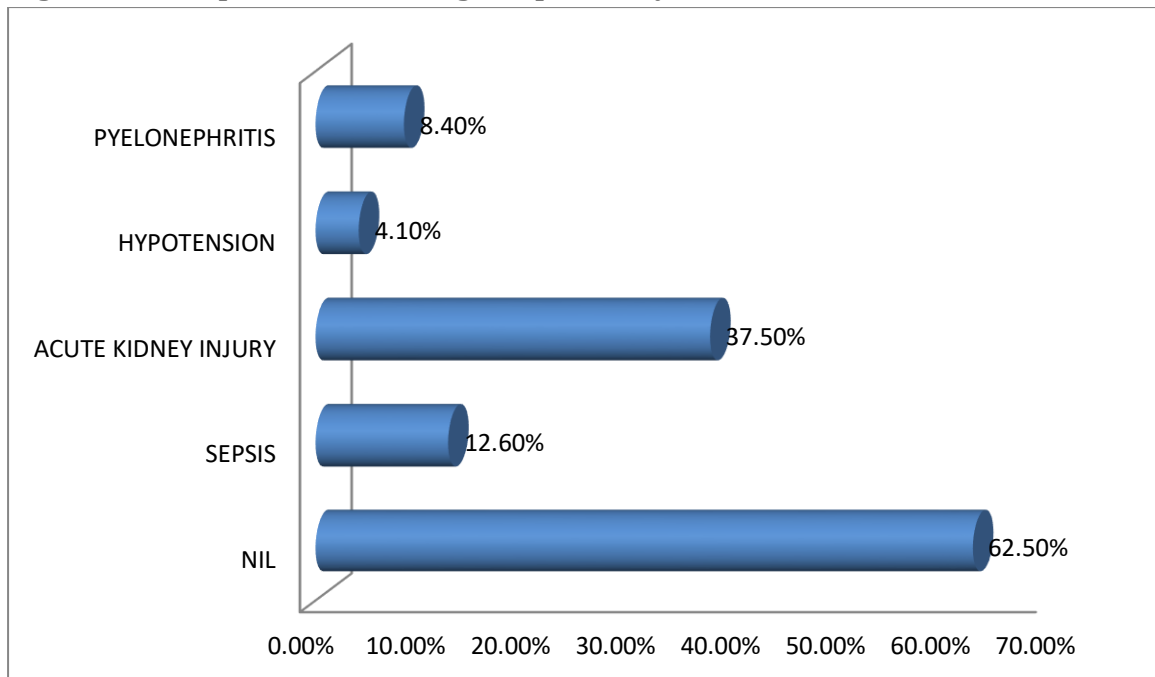


Figure: 6 Isolate On Urine Culture

