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ETIOLOGY AND ANTIMICROBIAL SUSCEPTIBILITY PATTERN OF URINARY TRACT INFECTION IN OUTPATIENTS OF GYNAECOLOGY AND OBSTETRIC: A STUDY FROM NORTH INDIAN MEDICAL COLLEGE

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ABSTRACT

Background: Urinary tract Infection (UTI) is among the most common infections described in outpatient settings and hospital patients. In almost all cases empirical antimicrobial treatment initiates before the laboratory results of urine culture are available; thus antibiotic resistance may increase in uropathogens due to frequent use of antibiotics.

Material and Method: This retrospective study was conducted for the period of one year i.e from October 2021 to September 2022. Urine samples of Outpatients from the Department of Gynaecology and Obstetrics were sent to the department of Microbiology, Dr, Rajendra Prasad Govt. Medical college and were processed as per the standard guidelines.

Results: Out of these 945 samples only 261(28.6%) urine samples showed pathogenic growth and 684(72.4%) were sterile and showed insignificant growth. In 261 growth positive urine samples 55(21.1%) were gram positive bacteria and 188(72%)were gram negative bacteria and yeast were 18(6.9%). In gram positive bacteria the majority were Staphylococcus aureus 35(63.6%). Amongst gram negative bacteria majority were Escherichia coli 105 (55.9%). Antimicrobial susceptibility showed maximum sensitivity for Fosfomycin 73.9% and Nitrofurantoin 57.9% in gram negative bacteria and similarly for gram positive bacteria with maximum sensitivity for Fosfomycin 72.7% followed by Amoxyclav 67.2%

Discussion & Conclusion: Regular monitoring is required to establish reliable information about susceptibility patterns of urinary pathogens for optimal empirical therapy of patients with UTIs. On the other hand, widespread injudicious use of antibiotics and the subsequent development of antibiotic resistance are growing concerns. Therefore, health care workers should consider regular reviews of antibiograms and choose the appropriate antibiotic in each case.

Key words: Urinary tract infection, Antimicrobial susceptibility

INTRODUCTION

Urinary tract infections (UTIs) in women are one of the most prevalent infections occurring at various stages of life. Amongst which the asymptomatic bacteriuria (ASB) is most common. Symptomatic infection includes cystitis and pyelonephritis.(1)

Females are much more prone to UTIs than males, mainly due to the female lower urinary tract anatomy and its proximity to the reproductive organs. The female urethra is relatively short, reducing the distance for bacterial access.(2) The outer one-third of the female urethra, the urinary tract is normally sterile

In sexually active females excessive use of intimate hygiene products interfere with natural vaginal microbiome which may lead to urinary infection. On the other hand, the proximity of the anus facilitates the colonization of both the reproductive organs and distal parts of the urinary tract by enteric bacteria.(2)

Urinary tract infection includes both asymptomatic microbial colonization of the urine and symptomatic infection.(3). Colony counts of $>10^5$/mL of mid-stream clean catch urine sample refers to significant bacteriuria(4). Pregnancy and the perinatal period are marked out by frequent urinary tract infections. The increasing number of cesarean sections and perioperative catheterizations are yet another risk factor. (2)

In the postmenopausal period falling estrogen levels interfere with the vaginal epithelium, contributing to its gradual atrophy, while glycogen deficiency reduces the lactic acid bacteria counts which cause pathogenic bacteria to grow and result in urinary tract infection. These are believed to affect between 30% and 50% of women above the age of 50 years. It is estimated that every other woman will have had at least one UTI during her lifetime (5,6), with 10–60% of all women having a symptomatic UTI at least once in their lives (7, 8). The infection risk increases with age (9).

The organisms that cause UTIs in pregnant women are the same as those found in non-pregnant patients. Escherichia coli (E. coli) accounts for 80 to 90 percent of infections. Other organisms include Proteus mirabilis, Klebsiella pneumoniae (K. pneumoniae), Group B streptococcus (GBS), and Staphylococcus saprophyticus. However, less common organisms like Enterococci, Gardnerella vaginalis, and Ureaplasma ureolyticum can also cause UTI (10)

The prevalence and sensitivity pattern of antibiotics can differ between the areas in the same country, and can change at the same place over a period of time. Data on local scenarios helps in the formulation of guidelines, antibiotic stewardship, as well as improvement of fetal and maternal outcomes. Hence, this study aims at estimating the prevalence, studying the bacteriological profile, antibiotic susceptibility of organisms, in the government medical college, for obstetrics and gynecology at Kangra, Himachal Pradesh, India.

MATERIAL AND METHODS

This retrospective study was conducted for the period of one year i.e from October 2021 to September 2022. Urine samples of patients from the Department of Gynaecology and Obstetrics were sent to the department of Microbiology, Dr, Rajendra Prasad Govt. Medical college.

Specimens were received in sterile wide mouth universal containers. Samples were processed on the same day. A semi quantitative method was adopted for primary isolation of organisms using a calibrated loop of 4 mm diameter which delivers 10µl of urine. The specimens were inoculated on Mac Conkey agar plates and incubated aerobically at 37°C for 24-48 hours. Culture plates with colony counts of $\geq 10^5$ cfu/ml were considered positive for UTI. Cultures that showed no growth in 24 to 48 hours indicated absence of infection as sterile. From positive cultures, uropathogens were identified according to the standard biochemical reactions(11). A significant bacterium was considered if urine culture yielded $\geq 10^5$ CFU /ml and $<10^5$ CFU/ml is taken as insignificant.(12)

According to the standard operational procedures, in vitro antimicrobial susceptibility testing was done on Mueller-Hinton agar (Hi-Media Lab Ltd, India) using Kirby-Bauer disc diffusion method. A suspension of the test organism was made in sterile normal saline and turbidity adjusted to 0.5 McFarland standards. The test organism was uniformly seeded over the surface of Mueller Hinton agar plates. The plates were allowed to dry for 10 minutes before application of antibiotic discs. The plates were incubated at 37°C for 16-18 hours. After incubation clear zones around the antibiotic discs were measured with a ruler and recorded in millimeters. Susceptibility and resistance data was interpreted according to Clinical laboratory Standards Institute guidelines.(13)

RESULTS

In our study for a period of one year we received 945 urine samples from the department of Gynaecology and Obstetrics, Dr. Rajendra Prasad Govt. Medical College, Kangra at Tanda, Himachal Pradesh.

Out of these 945 samples only 261(28.6%) urine samples showed pathogenic growth and 684(72.4%) were sterile & showed insignificant growth. Out of these 945 samples only 261(28.6%) urine samples showed pathogenic growth and 684(72.4%) were sterile. In 261 growth positive urine samples 55(21.1%) were gram positive bacteria and 188(72%) were gram negative bacteria and yeast were 18(6.9%). fig.1

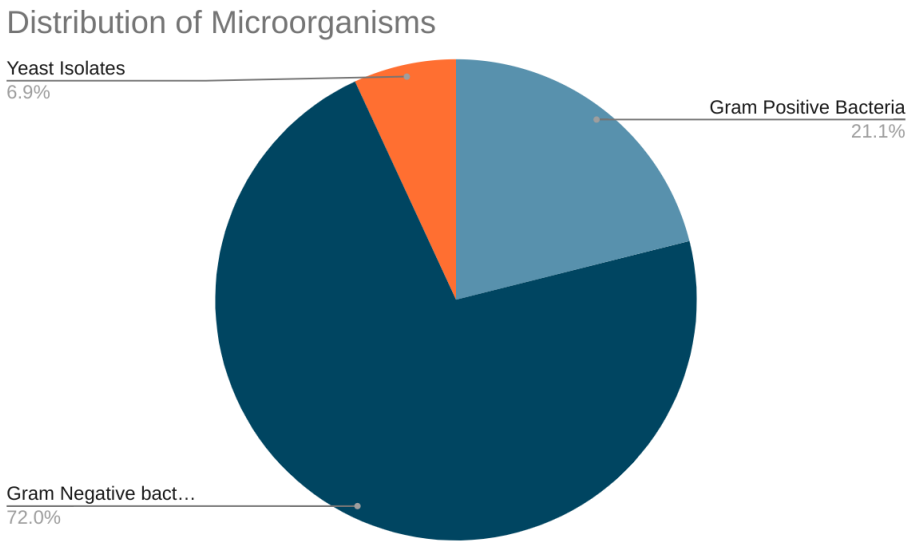

Fig. 1: Distribution of Microorganisms

In gram positive bacteria the majority was Staphylococcus aureus 35(63.6%) and Enterococcus species were 20(36.4%) respectively. Amongst gram negative bacteria majority were Escherichia coli 105 (55.9%) followed by Proteus species 24(12.7%) and least were Klebsiella species and Citrobacter 13(69%)isolates each. In yeast isolates the majority were Candida albicans 14(77.8%) and Candida glabrata and Candida tropicalis 2(11.1%) each. fig.2-4

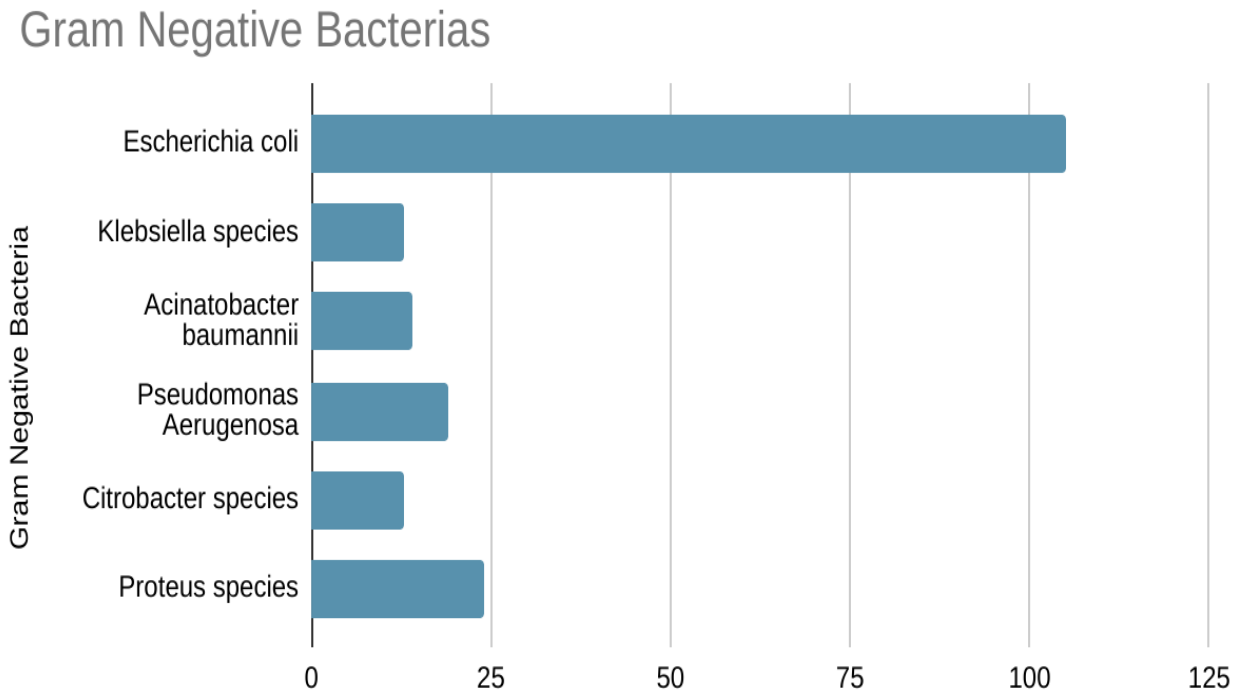

Fig. 2: Gram negative bacterial isolates

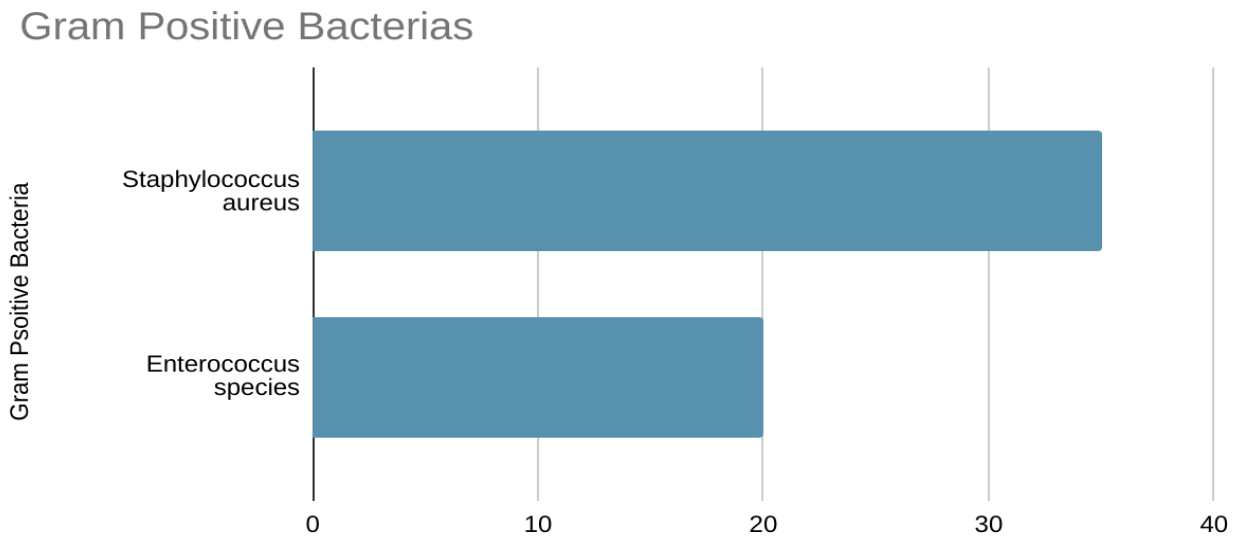

Fig. 3: Gram positive bacterial isolates

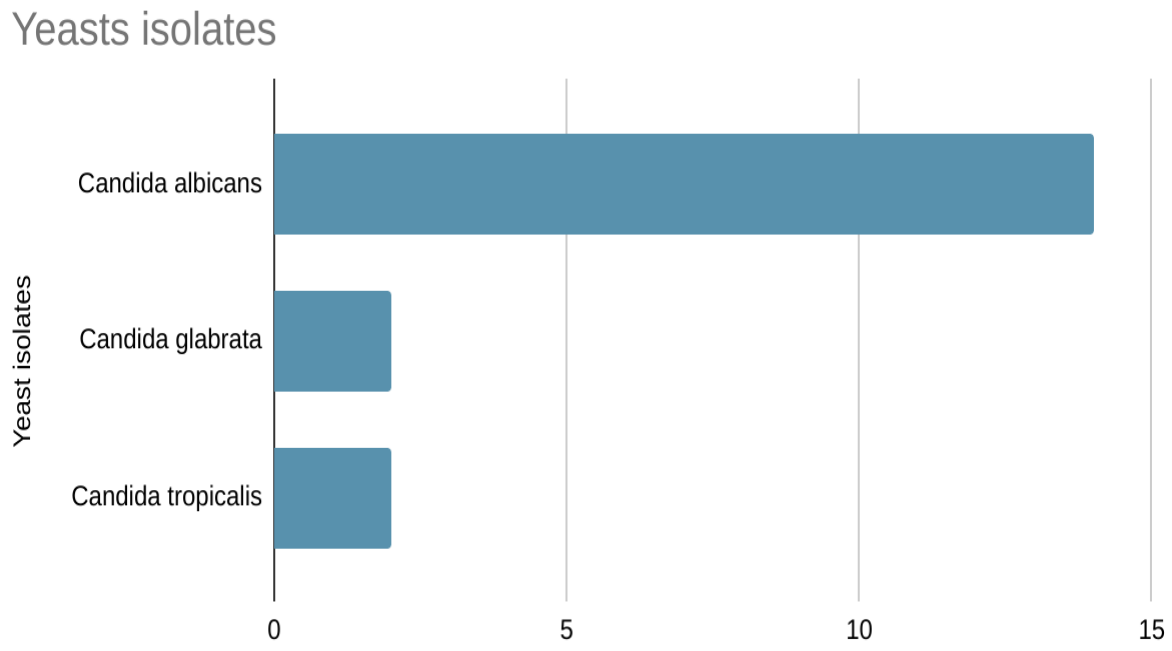

Fig. 4: Yeast isolates

Antimicrobial susceptibility for gram negative bacteria showed maximum susceptibility for fosfomycin 139(73.9%) followed by nitrofurantoin 109(57.9%) and least susceptibility was seen for ceftazidime 45(23.9%)table 1.

Table 1: Antibiotic susceptibility for Gram Negative Bacteria

Antibiotics in Gram Negative	**Sensitive isolates**
1. Fosfomycin	139(73.9%)
2. Ceftazidime	45(23.93%)
3. Nitrofurantoin	109(57.97%)
4. Norfloxacin	83(44.1%)
5. Cotrimoxazole	83(44.14%)
6. Amoxyclav	68(36.1%)

In gram positive bacteria the majority showed sensitivity towards Fosfomycin 40(72.7%) followed by amoxyclav 37(67.2%) and least susceptibility was for penicillin 18(32.7%) table 2.

Table 2: Antibiotic susceptibility for Gram Positive Bacteria

Antibiotics in Gram Positive		Sensitive isolates
1.	**Fosfomycin**	40(72.7%)
2.	**Nitrofurantoin**	32(58.1%)
3.	**Amoxyclav**	37(67.2%)
4.	**Cotrimoxazole**	22(40%)
5.	**Penicillin**	18(32.7%)

DISCUSSION

In our study the majority of the urine samples collected were sterile 72.4% and only 28.6% urine samples showed significant growth of pathogenic bacterias. Out of the 261 samples with pathogenic growth the majorities were gram negative bacteria 188 (72%) and in these gram negative bacteria the maximum was Escherichia coli 105(55.9%). Similar results were seen my Mahor et al in their study showing majority of bacteria isolates as Escherichia coli.(14) Most of the studies have identified E.coli as the commonest organism causing urinary tract infection(15,16)

In our study Staphylococcus aureus 35(63.6%) was in majority in gram positive bacteria followed by Enterococcus species 20(36.4%). Similarly to our study my Mohamad et al showed the majority of gram positive bacteria was Staphylococcus aureus. (17)

Antimicrobial susceptibility showed maximum sensitivity for Fosfomycin 73.9% and Nitrofurantoin 57.9% in gram negative bacteria and similarly for gram positive bacteria with maximum sensitivity for Fosfomycin 72.7% followed by Amoxyclav 67.2%. Least sensitivity was seen for ceftazidime 23.9% in gram negative bacteria and penicillin 32.7% for gram positive bacteria. Similar results were seen in the study by Shaifali et al and Ali et al.(18,19)

CONCLUSION

The need for accurate and updated surveillance data regarding variable antimicrobial susceptibility patterns. Regular monitoring is required to establish reliable information about susceptibility patterns of urinary pathogens for optimal empirical therapy of patients with UTIs. We suggest that empirical antibiotic selection should be based on the knowledge of local prevalence of bacterial organisms and antibiotic sensitivities rather than on universal guidelines. On the other hand, widespread injudicious use of antibiotics and the subsequent development of antibiotic resistance are growing concerns. Therefore, health care workers should consider regular reviews of antibiograms and choose the appropriate antibiotic in each case.

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