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Urinary Infections in Pregnancy Conditions

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

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ABSTRACT

The urinary tract infections (UTI's) are common infections that can affect kidneys, ureters, and urethra. About 40% of urinary tract infections are caused during hospitalization and globally an estimated 600,000 patients are affected per year. Urinary tract infections are more prevalent in women due to their short urethra and its anatomical proximity to the anal orifice. A bladder infection may cause pelvic pain, increased urge to urinate, pain with urination and blood in the urine. A kidney infection may cause back pain, nausea, vomiting and fever. Bacteriuria is a major risk factor for the development of urinary tract infections during pregnancy and with further risk of preterm birth & pyelonephritis if untreated. This study was carried out to isolate and identify bacteria involved in the first trimester of pregnancy. A cross sectional study was conducted from February, 2019 to June 2019. Structured questionnaires were used to collect data from pregnant women. UTI was diagnosed by urine culture on standard culture media. Out of 25 pregnant women included in this study, 15 (60.0%) were symptomatic and 10 (40.0%) asymptomatic. *Escherichia coli(64%)* was the most commonly found bacterial isolate followed by *Psedomonas aeruginosa (20%), Klebsiella sp.* (12%) and *Proteus sp.* (0.4%). Antibiotic susceptibility test by Kirby-Bayer Disc diffusion method revealed that all the bacterial isolates subjected to antibiogram test were sensitive or susceptible to Gentamycin, Nalidixic acid, Nitrofurantoin, Amikacin and Co-trimoxazole, and resistant to Amoxicillin, Norfloxacin and erythromycin were resistant to all bacterial isolates.

Keywords: Urinary tract infections; Bacteriuria; Pregnancy; Antibiotic Susceptibility.

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1. INTRODUCTION

Urinary tract infection (UTI) is one of the most common infective sequels associated with pregnancy. The urinary tract is the system that includes kidneys, ureters, bladder and urethra. When a significant number of bacteria ($>10^5$cells/ml of urine) show up in the urine, this is called bacteriuria [1]. Increased incidence of UTI during pregnancy is due to the morphological and the physiological changes that take place in the genitourinary tract during pregnancy [2].

1.1 UTI is Classified into Two Categories

1. Asymptomatic: The involvement of lower urinary tract leads to asymptomatic bacteriuria. It is most common during pregnancy due to anatomical and physiological changes. Asymptomatic bacteriuria without any symptoms.
2. Symptomatic - The involvement of upper urinary tract can lead to symptomatic bacteriuria. It is characterized by acute pyelonephritis which is the most common cause of pre delivery hospitalization [3].

1.2 Symptoms

Urinary tract infections always do not have signs and symptoms, but when they occur it has the following symptoms:

- A burning sensation when urinating.
- A strong, persistent urge to urinate.
- Passing frequent, small amounts of urine.
- Urine that appears cloudy.
- Urine that appears red, bright pink or cola-colored — a sign of blood in the urine.
- Strong-smelling urine.
- Pelvic pain, in women — especially in the center of the pelvis and around the area of the pubic bone [4].

Human Chorionic Gonadotropin Hormone (HCG): HCG hormone is only produced during pregnancy almost exclusively in the placenta. HCG hormone levels in maternal blood and urine increase dramatically during the first trimester and may contribute to cause nausea and vomiting often associated with pregnancy. During pregnancy there is urinary stasis under the effect of progesterone which together with physiological and anatomical changes predispose to asymptomatic bacteruria which may progress to either acute cystitis and or acute pyelonephritis. When compared with non-pregnant, pregnant women have double risk to be affected with symptomatic urinary tract infections [5].

2. MATERIALS AND METHODS

A total of 25 pregnant women with UTI's are included in this study. A midstream urine sample was collected from the selected pregnant women in sterile wide mouth bottle, up to three-fourth of its capacity (approximately 10 ml). All the urine samples were plated onto the nutrient agar and Mac-Conkey agar within 2 hrs of collection following standard methods. The plates were then kept in an incubator at 37°C. Two checks for culture growth were done at 24 h and 48 h. On identification of growth, colony count was done by standard methods. The plates which did not show any growth even after 48 h of incubation were discarded [6]. Antibiotic sensitivity testing was done by emulsifying selected isolates in normal saline at a turbidity compared to 0.5 Mac Farland's standard. Using sterile swabs, suspensions were inoculated on Muller-Hinton agar in accordance with modified Kirby-Bauer method and incubated at 35-37^{O}C for 18-24 hrs. Single antibiotic impregnated discs such as Gentamicin (10 µg), Amoxicillin (25 µg), Augmentin (30 µg), Nalidixic acid (30 µg), Nitrofurantoin (300 µg), Erythromycin (5 µg), Co-trimoxazole (25 µg), Ceftazidime (30 µg) and Cefuroxime (30 µg) were tested against gram-positive and gram-negative organisms. Interpretation was done by comparing the diameter of zones of inhibition of test organisms by the above antibiotics with those of a standard table in three grades of susceptibility as sensitive, intermediate or resistant. All procedures were done as recommended by the Clinical Laboratory Standard Institute (CLSI) (7).

3. RESULTS AND DISCUSSION

In this study out of 25 pregnant women 15 (60.0%) were symptomatic and 10 (40.0%) were asymptomatic.

Among the bacteria isolated from cases of significant bacteriuria Escherichia coli was the commonest cultured organism, followed by Pseudomonas aeruginosa (64%), Klebsiella spp. (20%) and Proteus spp. (04%). While Escherichia coli, showed sensitivity to Nalidixic acid, Gentamicin, and Nitrofurantoin,

Psedomonas aeruginosa showed sensitivity to Ceftazidime, co-trimoxazole and Gentamycin, Klebsiella sp.

to Nalidixic acid, Nitrofurantoin and ceftazidime and Proteus sp. to co-trimoxazole, gentamicin and ceftazidime (Fig.1 & Table-1).

The above antibiotics can be used to treat UTI's in pregnant women. While Nalidixic acid and Nitrofurantoin are effective to treat UTI's caused by *E.coli* and *Klebsiella.spp*., Gentamycin, Co-trimaxazole, Ceftazidime are effective against *Pseudomonas aeruginosa* and *Proteus spp*. Nalidixic acid, Gentamycin and Co-trimaxazole are commonly used because of their low price and human body's high tolerance to them [7].

In this study, incidence of bacteriuria was higher in pregnancy, which was similar to Roy et al. [8] and Obirikorang et al.) findings [9]. A higher rate of infection was observed in first trimester of pregnancy in this study, which was similar to the findings of Yahodara et al. [10]. Roy et al. [11] and Nath et al. [12] reported high rates of infection in first and second trimester. Turpin et al. [11] reported a high percentage of asymptomatic bacteriuria in the first and early second trimesters of pregnancy and attributed it to pregnant women reporting at the antenatal clinic during these periods. The higher incidence in first trimester could be caused by hormonal changes occurring prior to anatomical changes. Moreover, earliest study by Kass demonstrates that there is rare acquisition of bacteriuria after the second month of pregnancy [13].

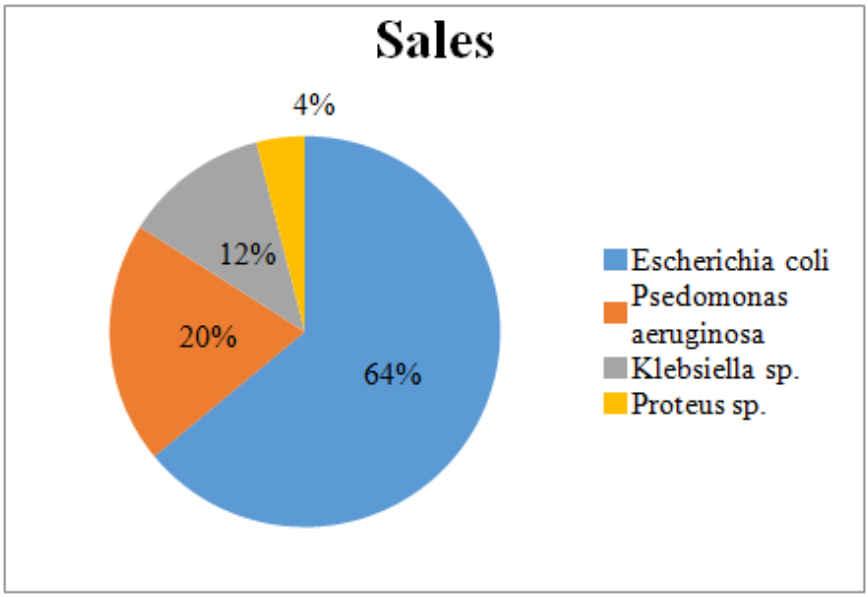
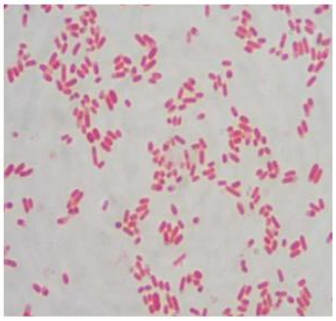


Fig. 1. Positive bacterial pathogens and its percentage

Table 1. Sensitivity pattern of organisms cultured from cases of significant bacteriuria

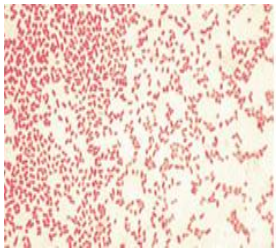
Name of the drug	*Escherichia coli*	*Pseudomonas aeruginosa*	*Klebsiella spp.*	*Proteus spp.*
Gentamycin	S-100	S-75	S-80	S-60
Amoxicillin	R-50	I-25	_	S-30
Norfloxacin	R-50	R-45	S-70	S-30
Nalidixic Acid	S-100	S-90	I-60	S-85
Nitrofurantoin	R-100	-	S-80	R-85
Erythromycin	I-50	R-30	S-70	R-50
Cotrimaxazole	I-50	S-85	_	S-100
Ceftazidime	S-100	S-100	S-100	S-85

S- Sensitive, R- Resistance, I-Intermediate, (-) No Reaction

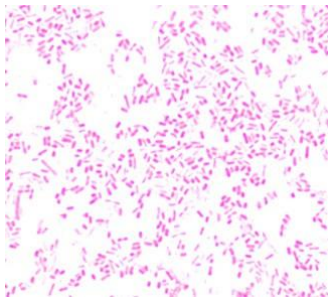


Klebsiella SPP.

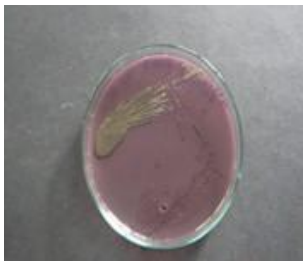
Escherichia Coli



Pseudomonas Spp.



Proteus Spp.



Escherichia Coli in EMB

Klebsiella Spp. in macconkey Agar

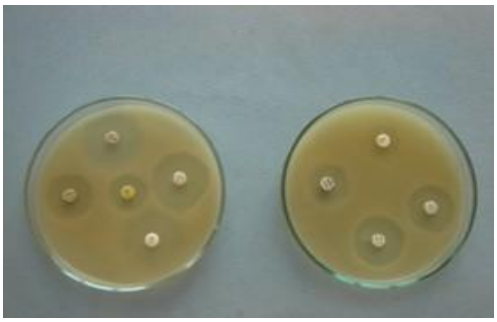
Pseuomonas Spp. in Cetrimide Agar

Proteus Spp.in EMB Agar

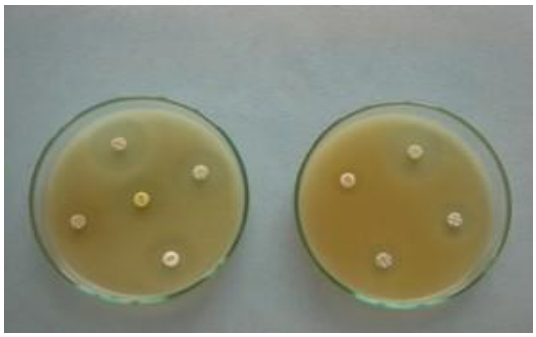
Fig. 2. Images of positive organisms

Escherichia Coli

Pseudomonas Spp



Klebsiella SPP



Proteus SPP.

Fig. 3. Antibiogram

The bacteria which are responsible for asymptomatic bacteriuria are of faecal origin, which colonize the periurethral area. Previous studies by Enayat et al. [14], Obirikorang et al. [9], Imade et al. [15], Khattak et al. [16], Jain et al. [17], and Senthinath et al. [18] have shown that *Escherichia coli* was the commonest isolate found in the pregnant women. In this study also, *E.coli* was the predominantly found organism of UTIs in pregnant women. The antimicrobial sensitivity and resistance pattern vary from community to community and from hospital to hospital. Antibiograms in this study were correlated with those of other studies [14]. Most of the organisms were very sensitive to nitrofurantoin, gentamicin and ceftazidime. Resistance to cotrimoxazole and amoxicillin were relatively high. Our results showed that *Klebsiella* and *Escherichia coli* were sensitive to Nitrofurantoin and *Proteus sp.* And *Psedomonas aeurigonosa* were sensitivity to Gentamycin. Both antibiotics were also found to be highly effective in studies by Enugu et al. [19] also reported that Nitrofurantoin is relatively safe in pregnancy and is effective against most urinary tract infections but may cause hemolysis in glucose-6-phosphate dehydrogenase deficient infants if used close to term. There is some reluctance among doctors to prescribe Nitrofurantoin and this may be due to its side effect profile, but it is clearly an important drug for urinary tract infections [20,21].

4. CONCLUSION

Bacteriuria is associated with complications in pregnancy, it is therefore imperative that pregnant women must be screened for bacteriuria, periodically in every trimester of the gestational period.

Routine urine culture tests should be carried out for all antenatal women to detect bacteriuria, and every positive case should be treated with appropriate antibiotic therapy, to prevent any obstetric complication which is associated with pregnancy. Unsatisfactory personal hygiene, history of UTI, diabetes mellitus and anemia were the most important reasons for UTI during pregnancy and should be carefully monitored. Therefore, the study recommends health education on personal sanitary hygiene and complete urine analysis in order to prevent UTI's related complications during pregnancy.

DISCLAIMER

The products used for this research are c ommonly and predominantly use products in our area of research and country. There is absolutely n o conflict of interest between the authors and producers of the products because we do not intend to u se these products as an avenue for any litigation but for the advancement of knowledge. Also, the r esearch was not funded by the producing company rather it was funded by personal efforts of the a uthors.

CONSENT AND ETHICAL APPROVAL

As per international standard or university standard guideline Patient's consent and ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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