



ANTIBIOTIC SUSCEPTIBILITY OF URINARY TRACT INFECTION IN LABOUR WARD AT GOVERNMENT MEDICAL COLLEGE HOSPITAL NAGAPATTINAM, TAMIL NADU

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ABSTRACT

Urinary tract infections (UTIs) are the most common infections after respiratory tract infections. UTIs are frequent during pregnancy, affecting as many as 8% of pregnant women. The presence of discernible bacteria in the urine is known as bacteriuria. The overall prevalence of bacteriuria in pregnancy is estimated to be 4–7%. Most importantly, UTI in pregnancy is mainly related to poor hygiene and the low socio-economic status of developing countries. A total of 38 urine samples were collected for the study. The samples were collected from the patients within the period of 01/10/2020–31/09/2021 at the Government medical College hospital, Nagapattinam, Tamil Nadu. For this study, pregnancy cases were taken. *Escherichia coli* is the common cause of UTI and is responsible for about 70-80% of acute infections in the general population and 50% of hospital-acquired infections. Gram-negative bacteria (78.9%) including *E. coli*, *Pseudomonas*, and *Klebsiella* species were identified. Gram-positive bacteria (21.0%), *Staphylococcus* and *Streptococcus* were identified. Antimicrobial resistance is one of the considerable causes of treatment failure for UTI. Antibiotic resistance highlights the need for stronger action and the adoption of rules that limit the use of antibiotics.

KEYWORDS : Urinary Tract Infection, Pregnancy, Bacteriuria, Antibiotic resistance

INTRODUCTION

UTIs are the second most common infection after respiratory tract infections [1]. The risk of UTI in the female population has been studied to be 14 times higher than in the male population [2]. It has a global annual incidence of nearly 250 million [3]. During pregnancy, up to 8% of pregnant women develop urinary tract infections [4]. UTI has been reported in 20% of pregnant women and is the most common cause of admission to obstetrical wards [5]. The presence of detectable bacteria in the urine is known as bacteriuria [1]. The clinical presentation of urinary tract infection is Dysuria, urgency, polyuria, nocturia, suprapubic heaviness, and gross hematuria [7]. Symptomatic bacteriuria (SB) and asymptomatic bacteriuria (ASB) have been reported among 17.9% and 13.0% of pregnant women, respectively [6]. The overall prevalence of bacteriuria in pregnancy is estimated to be 4–7% [8]. Urinary tract infections are a common health problem among pregnant women [9].

This usually begins in week 6 and peaks during weeks 20 to 24 of pregnancy due to a number of factors including urethral dilation, increased bladder volume. Up to 70% of pregnant women develop glycosuria, which encourages bacterial growth in the urine [10]. Asymptomatic bacteriuria has been reported in 5-7 percent of women, which if left untreated can lead to symptomatic infection later in pregnancy, pyelonephritis, and hypertension in pregnant women, resulting in prematurity and prenatal death of the fetus [1].

UTI is mainly caused by gram-negative bacteria such as *Escherichia coli*, *Proteus* species, *Klebsiella* spp., *Pseudomonas aeruginosa*, and slightly by gram-positive bacteria, which include *Staphylococcus* and *Streptococcus* [11]. *Escherichia coli* is the commonest cause of UTI and is responsible for about 70-80% of acute infections in the general population and 50% of hospital-acquired infections [1]. A UTI can be treated with appropriate antibiotics to obtain a proper outcome. There is growing concern regarding antimicrobial resistance worldwide among causative agents of UTI in pregnant women [12]. Antimicrobial resistance is one of the major causes of treatment failure for UTI [13]. Most importantly, UTI in pregnancy is mainly related to poor

hygiene and the low socio-economic status of developing countries [14]. This study was carried out to examine antibacterial agent resistance by the isolated microbes among the pregnant women in the Labor Ward at Nagapattinam Government medical College hospital, Nagapattinam, Tamil Nadu. In pregnancy, certain categories of drugs have been classified. A, B, C, D, and X are different categories.

CATEGORY

- A- Appropriate human studies offer no risk
- B- Human trials are limited, although animal evidence suggests safety.
- C- Insufficient human studies; but, animal studies suggest hazards.
- D- Human studies, with or without animal research, indicate prenatal dangers, but the drug is important to certain women to cure their conditions.
- X- Fetal hazards are clear; there are no conditions in which the risk/benefit ratio justifies usage.

METHODOLOGY

A retrospective study was planned in a microbiology laboratory situated in the Government medical College hospital, Nagapattinam, Tamil Nadu with the objectives of determining the etiological bacterial pathogens of the UTI and determining the antibiotic susceptibility pattern of pathogens isolated. The study duration spanned from October 2020 to September 2021. The mean age of pregnant women was 18–35 years. The urine samples are collected from the patients. Clean-catch mid-stream urine samples were obtained from each participant in the sterile wide mouth container after informing-proper urine collection methods. Cleans the stream of the stream from the middle part of the urine flow and cleans the caught urine specimen. The container was labeled with a unique number and the date of collection. The samples were processed and reported in a timely manner.

BACTERIAL CULTIVATION AND ISOLATION

The bacteria need a suitable medium to grow. The MacConkey agar is used to isolate the bacteria. The method for preparing the medium involves suspending 38 grams of agar in 1000 ml of purified water. Heat it by boiling until it dissolves

in the medium completely. Sterilize for 15 minutes at 15 pounds of pressure (121 degrees Celsius) in an autoclave. Cool to 45–50°C. Mix together the ingredients well and pour into a sterile Petri dish. The Mac Conkey Agar method is according to the Clinical and Laboratory Standards Institute (CLSI) guidelines, using the following antimicrobial drugs: Amikacin, Cefotaxime, Ciprofloxacin, Ceftriaxone, Imipenem, Amoxicillin, Doxycycline, Cotrimazole, and Ampicillin for both gram positive and negative bacterial isolates.

ANTIBIOTIC SUSCEPTIBILITY

In the current study, antimicrobial susceptibility testing was done on Mueller-Hinton agar using the disk diffusion (Kirby Bauer's) method. The identification was produced by studying the susceptibility of antibiotics in laboratory media. Muller Hinton agar is taken and 1000ml of purified water is boiled to dissolve the medium completely. Sterilize for 15 minutes in an autoclave at 15 pounds of pressure (121 degrees Celsius). Avoid overheating the medium. Cool to 45–50 degrees Celsius; stir well, then pour into sterile Petri Plates. The medium's surface should be dry and inoculated.

INCLUSION CRITERIA

- A pregnant woman who was admitted to a hospital for UTI and underwent a culture test.
- Pregnant women between the ages of 18-35 were included.

EXCLUSION CRITERIA

- Other than pregnant women, they were excluded.
- Pregnant women for whom culture tests were not performed were excluded.

RESULT

A total of 38 urine samples were collected for the study. The samples were collected from the patients within the period of 01/10/2020 – 31/09/2021 at the Government medical College hospital, Nagapattinam, Tamil Nadu. A urinary tract infection occurs in a different age group, Ages between 21-25 were (44.7%) highly affected by urinary tract infections.

**TABLE – 1
CATEGORY OF DRUG**

Category	DRUG Drug
B	Ceftriaxone, Cefotaxime, Ampicillin, Amoxicillin, Clotrimazole
C	Ciprofloxacin, Imipenem
D	Doxycycline, Amikacin

In Nagapattinam government headquarters hospital, they are facilitated with specific antibiotics to treat UTI. These are Ceftriaxone, Cefotaxime, Ciprofloxacin, Amikacin, Ampicillin, Amoxicillin, Doxycycline, Imipenem, Clotrimazole.

**TABLE – 2
AGE WISE DISTRIBUTION**

AGE	PREGNANT WOMEN (cases)	PERCENTAGE
18-20	10	26.3%
21-25	17	44.7%
26-30	5	13.1%
>30	6	15.7%

From the isolation of bacteria, the Gram-negative bacteria (78.9%) were E. coli, Pseudomonas, and Klebsiella species were identified. In gram-positive bacteria (21.0%), staphylococcus and streptococcus were identified. The gram-negative bacteria were dominating the gram-positive bacteria. E. coli (44.7%) was the gram-negative bacteria that most commonly caused infection.

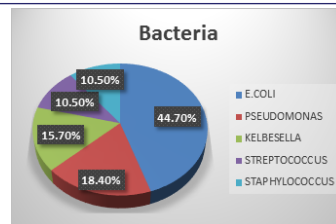


Figure 1: Bacteria Present

GRAM POSITIVE BACTERIA SENSITIVE AND RESISTANCE TO DRUG

Amikacin and Imipenem were highly sensitive to gram-positive bacteria. There were 4 patients who were sensitive to Imipenem and 5 patients who were sensitive to Amikacin. There were 4 patients who were resistant to Ceftriaxone. Ceftriaxone was highly resistant to gram-positive bacteria.

**TABLE – 3
Gram Positive Bacteria Sensitive and Resistance to drug**

DRUG	STAPHYLOCOCCUS		STREPTOCOCCUS	
	S	R	S	R
COT	0	1	0	0
CTX	1	0	0	3
CTR	1	0	1	2
CIP	1	0	2	1
AK	2	0	3	0
AMP	0	1	1	0
AMC	1	1	1	0
DOX	1	1	1	0
IMP	3	0	1	0

COT – Clotrimazole, CTX – Cefotaxime, CTR – Ceftriaxone, CIP – Ciprofloxacin, AK – Amikacin, AMP – Ampicillin, AMC – Amoxicillin, DOX – Doxycycline, IMP – Imipenem

GRAM NEGATIVE BACTERIA SENSITIVE AND RESISTANCE TO DRUG

Amikacin and Imipenem were also highly sensitive to gram-negative bacteria. There were 13 patients who were sensitive to Imipenem and 16 patients who were sensitive to Amikacin. Ampicillin and cefotaxime were highly resistant to gram-negative bacteria. There were 11 patients who were resistant to Ampicillin and 9 patients who were sensitive to Cefotaxime.

**TABLE – 4
Gram Negative Bacteria Sensitive and Resistance to drug**

DRUG	E. COLI		KELBESILLA		PSEUDOMONAS	
	S	R	S	R	S	R
COT	0	3	1	1	2	3
CTX	2	4	1	2	0	2
CTR	2	6	1	0	2	2
CIP	6	3	3	2	3	2
AK	7	5	4	0	5	0
AMP	1	8	0	2	1	1
AMC	5	6	1	0	1	0
DOX	6	2	1	0	2	0
IMP	10	0	2	0	2	0

DISCUSSION

A urinary tract infection is one of the most common infections encountered by clinicians, and despite the widespread availability of antimicrobial agents. UTI have become difficult to treat because of the appearance of pathogens with increasing resistance to antimicrobial agents. The age-wise distribution of pregnant women in the study group has been shown in (Tab.no.2). In the pregnancy age group of 21–25 years (44.7%), people were found susceptible to having urinary tract infections, followed by 18–20 years (26.3%), > 30 years (15.7%) and 26–30 years (13.7%). Gram-negative

bacteria (78.9%) outnumber Gram-positive bacteria (21.0%). The overall sensitivity and resistance of each bacteria was demonstrated in (Tab.3, 4).

CONCLUSION

Common bacteria were found: Staphylococcus, Streptococcus, E. coli, Klebsiella, and Pseudomonas. The good efficacy of Imipenem and Amikacin has been noted. However, both are contraindicated in pregnancy, so neither antibiotic was used. Other pregnancy-safer drugs such as Ceftriaxone, Cefotaxime, Ampicillin, and Amoxicillin reported moderate efficacy.

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