Prospective study of Antibiotic Resistance in Urinary Tract Infection in Pregnant Women

Dr.Swathi Boddupally[1*], A.Vaishnavi[1], R.Sandhya[1], P.Durgaparameshwari, [2] L.priyanka[2]

[1*]*Assistant Professor, Bharat School of Pharmacy, Mangalpally, Ibrahimpatnam, Hyderabad*
[1]*Assistant Professor, Bharat School of Pharmacy, Mangalpally, Ibrahimpatnam, Hyderabad*
[1,2]*Department of Pharm D, Bharat School of Pharmacy, Mangalpally, Ibrahimpatnam, Hyderabad-501510*

ABSTRACT:
Aims: This study aimed to determine antibiotic resistance in urinary tract infections in pregnant women.
Materials and methods: A prospective study was carried out on pregnant women with UTI to find out the resistance pattern of antibiotics in the Department of Gynaecology, Durgabai Deshmukh Hospital, a 300 bedded multi-specialty hospital from September 2021 to March 2022.
Results: Based on culture and sensitivity reports, 74% of the pregnant women (150) with UTI who were studied for antibiotic resistance were found to be highly resistant to ampicillin and 22% least resistant to nitrofurantoin. The results were analyzed using a mean tool, A six-month study on 150 subjects was conducted, and the results were interpreted. Parameters like age, weight, gravida, parity, gestational age, bacteria, and comorbidities were observed and analyzed. Each patient's recorded data was entered into a data collection form designed to meet our study's requirements. Results have been depicted in the form of pie charts, histograms, and graphs based on the objective of the study.
Conclusion: From this study, we have concluded that the antibiotic showing maximum resistance is ampicillin, and the antibiotic showing the least resistance is nitrofurantoin. Hence, nitrofurantoin can be given the highest preference for the treatment of UTI in pregnant women when compared to ampicillin.
KEYWORDS: Urinary tract infection, antibiotic resistance, Ampicillin, Nitrofurantoin, pregnant women.

I. INTRODUCTION:

Urinary tract infection is caused by pathogenic invasion of the urinary tract, which results in urothelium inflammation[1]. The presence of bacteria in the urinary tract, (1 million bacteria per ml of urine) as well as signs and symptoms of inflammation, is defined as a urinary tract infection. In one ml of urine, the normal bacterial count is 1000. 1 million bacteria per ml of urine are found in UTI cases[2]. Various types of UTIs include ureteritis, cystitis, pyelitis, and pyelonephritis. Some of the effects of a UTI on pregnancy and the fetus include kidney infections, low birth weight, and premature birth. In rare cases, UTI complications may also cause miscarriage. For diagnosing urinary tract infections, some of the evaluations made are a complete urine examination, the ingrowth of UTI-causing organisms, and antibiotic sensitivity.[6] Antibiotic resistance develops when bacteria evolve while antibiotics are being used. It happens naturally, but human abuse of antibiotics hastens the process. As medicines become less efficient, a rising number of infections are becoming more difficult to cure. Longer hospital stays, higher medical costs, and increased death consequences. Even if new treatments are found, it will remain a severe threat if there is no behavioral change.[3]

The importance of antibiotic sensitivity testing is that it is done to estimate the possibility that a specific antibiotic will be effective in preventing the growth of bacteria that cause infection. This test may also aid in the discovery of antibiotic-resistant infection therapy.[5] This test is also known as an antimicrobial susceptibility test, and it detects typical antibiotic resistance pathways accurately. Some of the causes of UTIs include antibiotic overuse, patients who do not complete the entire antibiotic course, antibiotic overuse in cattle and fish farming, lack of infection control in healthcare settings, and poor sanitation and hygiene. Mechanisms of resistance are of four different types which include limiting a drug's uptake, changing the drug's target, drug

inactivation, and efflux of active drugs. Drugs in the study include Nitrofurantoin-C $_8$H $_6$N$_4$O $_5$, Ampicillin-C $_{16}$H$_{18}$ N $_3$NaO $_4$ S, and co-Trimoxozole C$_{14}$H$_{18}$N$_4$O$_3$. C$_{10}$H$_{11}$N$_3$O$_3$S, Cefepime-C $_{19}$H $_{14}$N $_6$O$_5$S $_2$ ciprofloxacin-C $_{17}$H $_{18}$FN $_3$O $_3$ fosfomycin-C$_3$H$_7$O$_4$P Amikacin-C$_{22}$H$_{43}$N$_5$O$_{13}$[4]

II.   MATERIALS AND METHODS:

For the present study, approval of the Institutional Ethics Committee, Durgabai Deshmukh Hospital (Registration No: ECR/477/Inst/AP/2013/RR-20) was taken. This prospective study was conducted for six months in the Department of Gynaecology, Durgabai Deshmukh Hospital, a 300 bedded multi-specialty hospital.[7]

Mean is used as a statistical tool to analyze the percentage of antibiotic resistance to Urinary tract infection in pregnant women[7].

III.   RESULTS:

Table-1 Incidence based on age group:

Age	No.of patients	Percentage
18-24	34	22.6%
25-30	82	54.6%
31-35	28	18.6%
36-40	5	3.33%
41-45	1	0.6%

Out of 150 patients taken, the mean age group of pregnant women affected with urinary tract infection is found to be 27.5 years .

Table-2 Incidence based on trimesters (gestational age)

Trimester	No. of patients	% of patients
1st Trimester (1-12weeks)	42	28%
2$^{nd.}$ Trimester (13-24weeks)	25	16.6%
3rd Trimester (25-40weeks)	83	53.3%

Out of 150 patients taken, the mean value of 22 weeks gestation patients are found to be more affected with urinary tract infection.

Table-3 Incidence based on gravida

Gravida	No.of patients	% of patients
1st gravida	57	38%
2nd gravida	42	28%
3rd gravida	26	17.3%
4th gravida	17	11.3%
5th gravida	8	5.3%

Among 150 patients taken in the study, the mean gravida in the pregnant women with urinary tract infection is found to be 2.12 i.e., 2nd gravida patients are more affected.

Table-4 Incidence based on parity

Parity	No.of patients	Percentage
0 parity	65	43.3%
1st parity	43	28%
2nd parity	26	17.3%
3rd parity	10	6.6%
4th parity	6	4%

Out of 150 patients, the pregnant women with 0 parity (65) are more affected with urinary tract infection.

Table 5 Incidence based on bacteria

Bacteria	No.of Patients	Percentage
E.coli	48	32%
Klebsiella	45	30%
Staphylococcus saprophyticus	03	2%
Enterobacter faecalis	21	14%
Staphylococcus aureus	04	2.66%
Citrobacter	03	2%
Non-albicans candida	04	2.66%
Pseudomonas	12	8%
Coagulase(-)ve staphylococcus	04	2.66%
Acenitobacter	06	4%

Out of 150 patients taken, the most common bacteria with which 48 pregnant women affected with UTI is E.coli(32%).

Table 6 Incidence based on comobidities

Comorbid condition	No.of patients	Percentage
Hypertension	24	16%
Diabetes Mellitus	40	26.6%
Hypothyroidism	22	24.5%
Asthma	4	2.6%
Epilepsy	3	2%
Thrombocytopenia	3	2%
No condition	54	36%

Among 150 patients taken, 40(26.6%) pregnant women with diabetes mellitus are more affected to Urinary tract infection.

Table 7 Incidence based on weight

Weight in Kgs	No of patients	Percentage
35-45	4	2.66%
46-55	16	10.66%
56-65	65	43.33%
66-75	28	18.66%
76-85	37	24.66%

Out of 150 patients taken in the study, 65(43.3%) pregnant women between the age group 56-65 are more affected with UTI.

TABLE 8 Incidence of resistance to different Antibiotics

ANTIBIOTICS	No.of patients showing Resistance	Percentage
Nitrofurantoin	32	22%
Ampicillin	112	74.6%
Co-trimoxazole	74	49.3%
Cefepime	45	30%
Ciprofloxacin	39	26%
Fosfomycin	35	23%
Amikacin	40	27%

Out of 150 patients taken, the mean of 0.74 (112patients) i.e, 74% are showing high resistance to ampicillin and least resistance to nitrofurantoin (22%)
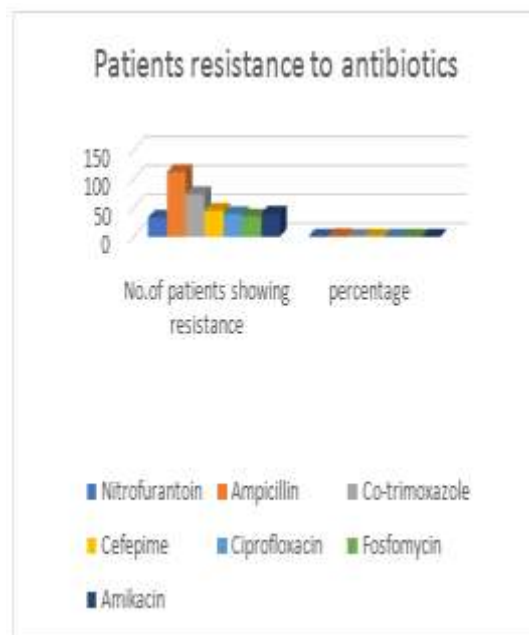
Figure 1: Incidence of resistance to different Antibiotics

Table-9 Mean values of parameters and their percentages:

Category	Age	Gravida	Parity	Gestational age	Weight
Mean values of parameters	27.56	2.12	0.91	22	61.41
Percentage	19.95%	20%	20%	33%	20%

IV.   DISCUSSION:
From the present study, we concluded that Subjects are found to be highly resistant to ampicillin and less resistant to nitrofurantoin.

CONFLICT OF INTEREST:
The authors have no conflicts of interest regarding this investigation.

REFERENCES:
[1]. Dipiro:Pharmacotherapy 7th edition (Page no-1899)
[2]. Roger Walker and Cate Whittlesta, Churchill Livingstone EL Sevier 4th Edition (Page no-510)

[3].   https://www.who.int › ... › Detail Antibiotic resistance - WHO | World Health Organization

[4].   KD.Tripathi MD. Essentials of medical pharmacology 7th edition India, Published by Jaypee brothers medical publishers 2013 Page no: 627-715.

[5].   S.S.Randhawa Atul Kabra Human Anatomy and Physiology-II 27th Edition Page No: 195.

[6].   Harsh Mohan, Text book of Pathophysiology , Published by Jaypee brothers medical publishers 2005 Page no: 180-196.

[7].   Vishweswar Rao K Biostatistics in Brief Made Easy 1st Edition. Published by Jaypee brothers medical publishers 2010.