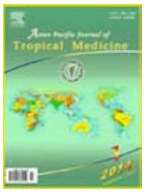
Contents lists available at ScienceDirect

Asian Pacific Journal of Tropical Medicine

journal homepage:www.elsevier.com/locate/apjtm



Document heading doi: 10.1016/S1995-7645(14)60216-9

Antibiotic sensitivity pattern from pregnant women with urinary tract infection in Bangalore, India

Sibi G*, Pinki Kumari, Kabungulundabungi Neema

Department of Biotechnology, Indian Academy Degree College, Centre for Research and Post Graduate Studies, Bangalore, India

ARTICLE INFO

Article history:
Received 23 Jun 2014
Received in revised form 10 Sep 2014
Accepted 15 Sep 2014
Available online 19 Sep 2014

Keywords:
Urinary tract infection
Pregnancy
Uropathogens
Amikacin

ABSTRACT

Objective: To determine the antibacterial profile of pregnant women with urinaty tract infections and analyze the antibiotic sensitivity pattern for the effective treatment.

Methods: A total of 395 urine samples from pregnant women with different gestational age were processed for the isolation of uropathogens and tested against eight groups of antibiotics namely penicillins, cephalosporins, fluoroquinolones, aminoglycosides, macrolides, lincosamides, glycopeptides and sulfonamides.

Results: A positive culture percentage of 46.6% was obtained with the highest urinary tract infection in third trimester gestational age. Among the uropathogens isolated, 85.6% were Gram negative and 14.4% were Gram positive with *Escherichia coli* as the predominant bacteria (43.9%) followed by *Klebsiella oxytoca* (19.4%) and *Klebsiella pneumoniae* (13.3%). Antibiotic sensitivity assay revealed that amikacin had the highest overall sensitivity (n=136; 76.7%) and the subsequent highest sensitivity was observed with ciprofloxacin (n=132; 73.3%), clindamycin (n=124; 68.9%), cefotaxime (n=117; 65%) and nalidixic acid (n=115; 63.9%).

Conclusions: The findings revealed that uropathogens were more resistant to penicillins, macrolides and glycopeptides which restrict their use in treating urinaty tract infections during pregnancy. In conclusion, common causative bacteria and their antibiotic sensitivity pattern are to be determined along with their safety to mother and fetus for the effective treatment of urinary tract infections during pregnancy.

1. Introduction

Urinary tract infection (UTI) in women are more prevalent due to their short urethra and its anatomical proximity to the anal orifice[1,2]. UTIs are most common bacterial infection which complicates pregnancy[3]. Pregnancy causes numerous hormonal and mechanical changes in the body. Beginning in the sixth week, with peak incidence during 22nd to 24th weeks, 90% of the pregnant females develop urethral dialatation increasing the risk of urinary stasis and vesicouretral reflux[4]. Further, glycosuria and aminoaciduria during pregnancy are additional factors to facilitate bacterial growth[5]. UTIs in pregnancy left untreated leads to maternal and perinatal morbidity and mortality[6]. Untreated bacteriruia during pregnancy is associated with low birth-weight and premature delivery[7].

Resistance development to previously effective antibiotics by the uropathogens has been reported globally in recent years[8,9], and their susceptibility vary from place and time[10]. There are two major challenges while treating UTIs in pregnancy; protection of fetus and resistance development of uropathogens. Physicians must consider possible side effects from drugs to protect maternal and fetal safety while prescribing antibiotics[11,12]. At the same time the chosen antibiotic should have efficacy and low resistance rates in a given population[13,14].

Isolation of pathogens associated with UTIs and determining their antibiotic sensitive pattern will

*Corresponding author: Sibi G, Department of Biotechnology, Indian Academy Degree College, Centre for Research and Post Graduate Studies, Bangalore, India.
E-mail: gsibii@gmail.com

potentially reduce the inappropriate prescription of antibiotics and resistance development. Further, detection of changing susceptibility pattern by the uropathogens against commonly used antibiotics is one effective strategy for empirical treatment. This study evaluates the antibiotic susceptibility pattern of uropathogens from pregnancy.

2. Materials and methods

2.1. Study population

A total of 395 urine samples from pregnant women with or without having symptoms of UTI were collected during October 2012 to January 2014. The age of people included in the study ranged from 25-40 years. Verbal informed consent from target population and approval from institutional research ethical committee were obtained before starting the experiment.

2.2. Inclusion and exclusion criteria

Female patients aged between 25-40 years with uncomplicated UTI symptoms like frequency, urgency and dysuria were included in the study. Pregnant women on antibiotics within the last 2 weeks and those who could not give consent to participate in the study were excluded.

2.3. Sample collection and processing

Clean catch midstream urine samples were collected into a sterile screw capped universal container by standard method. The samples were labeled and 0.2 mg of boric acid was added to prevent the bacterial growth in urine samples. The samples were cultured on cysteine-lactose electrolyte deficient agar and blood agar using a sterile 4 mm platinum wired calibrated loop for the isolation of microorganisms. The plates were incubated for overnight at 37 °C and the samples were considered positive when an organism was cultured at a concentration of 10^4 CFU/mL which was estimated through multiplying the isolated colonies by 1 000. The isolates were identified up to the species level by standard biochemical tests[15].

2.4. Antibiotic sensitivity assay

Antibiotic sensitivity testing was performed by the modified disc diffusion method as per the recommendations[16]. Inoculums adjusted to 0.5 McFarland standard was swabbed on Mueller Hinton agar plates for antibiotic sensitivity assay. Eight groups of antimicrobials such as penicillins, cephalosporins, fluoroquinolones, aminoglycosides, macrolides, lincosamides, glycopeptides and sulfonamides were selected based on frequent prescription and used in this study. Among the group, the antibiotics tested were amoxicillin (10 μg), oxacillin (10 μg), cloxacillin (5 μg), cefotaxime (10 μg), ceftriaxone (30 μg), nalidixic acid (30 μg), ciprofloxacin (5 μg), norfloxacin (10 μg), amikacin (30 μg), gentamycin (10 μg), erythromycin (10 μg), clindamycin (2 μg), vancomycin (30 μg) and co-trimoxazole (30 μg). Statistical analysis was done using *Chi*-square test and student's *t*-test.

3. Results

Among the 395 samples collected, 180 were laboratory confirmed cases of UTI with a positive culture percentage of 46.6% (Table 1). The age of the pregnant women ranged from 25-40 years. Majority (50.6%) of the study participants were in the age group of 30-34 years. The highest UTI were observed at third trimester gestational age (n=103; 57.2%).

Table 1
Characteristics of UTI in pregnant women.

Variables		Numbers (n=180)	Percentage
Age	25-29 years	87	48.3
	30-34 years	91	50.6
	⩾35 years	2	1.1
Gestational period	First trimester	21	11.7
	Second trimester	56	31.1
	Third trimester	103	57.2

From the 180 isolates, 154 were Gram negative while 26 were Gram positive bacteria (Figure 1). *Escherichia coli* (*E. coli*) was the most common organism isolated accounting for 79 (43.9%) and the second highest organism was *Klebsiella oxytoca* (*K. oxytoca*) (n=35; 19.4%) followed by *Klebiella pneumoniae* (*K. pneumoniae*) (n=24; 13.3%). The other bacterial isolates obtained in the study were *Enterococcus faecalis* (*E. faecalis*), *Staphylococcus saprophyticus* (*S. saprophyticus*), *Staphylococcus aureus* (*S. aureus*), *Proteus mirabilis* (*P. mirabilis*), *Proteus vulgaris* (*P. vulgaris*), *Pseudomonas aeruginosa* (*P. aeruginosa*), *Citrobacter koseri* (*C. koseri*) and *Citrobacter amalonaticus* (*C. amalonaticus*). The frequency of occurrence of other bacterial isolates were *E. faecalis* (n=12; 6.7%), *S. saprophyticus* (n=10; 5.5%),