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Bacterial identification and drug susceptibility pattern of urinary tract infection in pregnant Women at Karamara Hospital Jigjiga, Eastern Ethiopia

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Urinary tract infections are the most common bacterial infections during pregnancy and if left untreated in pregnancy it may result in acute pyelonephritis, abortion, premature delivery, low birth baby and even still birth. Thus the aim of this study was to determine the bacterial profile and antibiotic susceptibility patterns of urinary tract infection in pregnant women at Karamara Hospital Jigjiga, Eastern Ethiopia. A cross-sectional study was carried out among 190 pregnant women at Karamara Hospital. Clean catch midstream urine was collected and cultured on MacConkey and Blood agar for isolation and on Muller Hinton agar media for antibiotic sensitivity tests. The present study showed that overall prevalence of UTI was 13.2%. *Escherichia coli* was the most frequently isolated organism [10 (40%)] followed by *Citrobacter spp.*, *Klebsiella spp.*, coagulase negative *Staphylococci* (CoNS) and *Staphylococcus aureus,* each 3 (12%), *Proteus species* [2 (8%)] and *Pseudomonas aeuroginosa* [*1* (4%)]. Gram-negative isolates showed high resistance rate of 89.5 and 84.2% to amoxicillin and ampicillin, respectively. All Gram-negative bacterial isolates revealed low level of resistance (26.3%) against ciprofloxacin. Among the total isolates (n=25), multi-drug resistance (resistance for two or more drugs) were observed in 24 (96%) of all bacterial pathogen from urine specimen. The present study revealed bacterial agents causing urinary tract infections amongst pregnant women were multidrug resistant. *E. coli* was the most common isolated bacteria from mid-stream urine specimen.

Key words: Pregnancy, urinary tract infection, antimicrobial sensitivity pattern.

INTRODUCTION

Urinary tract infections (UTI), which are caused by the presence and growth of microorganisms in the urinary tract, are perhaps the single commonest bacterial infections of mankind and in pregnancy which may involve the lower urinary tract or the bladder (Brook et al., 2001). UTI has been reported among 20% of the pregnant women and it is the most common cause of admission in obstetrical wards (Theodore, 2007).

Anatomically UTI can be classified into lower urinary tract infection which involve the bladder and urethra and

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upper urinary tract infection involving the kidneys, pelvis, and ureter (Delzell and Lefevre, 2000). The majority of the UTI occur due to ascending infection (Schaeffer et al., 2001). Three common clinical manifestations of UTIs in pregnancy are: asymptomatic bacteriuria, acute cystitis and acute pyelonephritis (Loh and Silvalingam, 2007).

Female gender itself is a risk factor because of short urethra, its proximity to vagina and anus and inability of women to empty their bladder completely. Sexual activity and certain contraceptive methods are also said to increase this risk. The anatomical relationship of female's urethra and the vagina makes it liable to trauma during sexual intercourse as well as bacteria been massaged up the urethra into the bladder during pregnancy/child birth (Imade et al., 2010). Bacteriuria is said to be significant in the presence of $\geq 10^5$ colony forming units (CFU)/L. The danger with bacteriuria is that it is not always present with symptoms. Occult infection occurs in about 2 to 7% of pregnancies and 30 to 40% of cases develop acute pyelonephritis later in pregnancy. Also there are associations between maternal complications of pregnancy and pyelonephritis including hypertension, preeclampsia, anaemic, amnionitis, and endometritis. Pyelonephritis can lead to renal scarring, hypertension and renal failure in the long run (Gupta and Trautner, 2008). UTI (perhaps if untreated) can lead to serious obstetric complications, poor maternal and perinatal outcomes e.g intrauterine growth restriction, preeclampsia, caesarean delivery and preterm deliveries. Furthermore, it has been observed that asymptomatic bacteriuria can lead to cystitis and pyelonephritis which can lead to acute respiratory distress, transient renal failure, sepsis and shock during pregnancy. Screening of pregnant women for UTI can minimize these UTI associated complications (Mazor-Dray et al., 2009; Schnarr and Smaill, 2008).

Urinary tract infection in pregnancy is associated with significant morbidity for both the mother and the baby (Assefa et al., 2008). In most developing countries including Ethiopia, screening for UTI in pregnancy using microbial culture is not considered as an essential part of antenatal care and therefore the picture of microbial etiologies and their antimicrobial susceptibility patterns are not well known. Current management of UTIs is also usually empirical, without the use of a urine culture or susceptibility testing to guide therapy. However, as with many community acquired infections, antimicrobial resistance among the pathogens that cause UTIs is increasing and is a major health problem in the treatment of UTI. Studies on early screening of pregnant woman for UTI causing bacterial uropathogens and determining their antibiotic susceptibility pattern is an important intervention to prevent complications that may endanger the life of both the pregnant women and the fetus. Therefore, the main objective of this study is to determine bacterial profile and antibiotic susceptibility patterns among pregnant women attending Karamara Hospital, Jigjiga, Eastern Ethiopia.

MATERIALS AND METHODS

Study site and design

A cross-sectional study was conducted at Karamara Hospital, Jigjiga, Ethiopia from September 2016 to December 2016. Karamara hospital is one of the public hospitals found in Jigjiga city and provides various health services for routine and referral cases. Jigjiga is one of the capital city of Ethio-Somali Regional States which is the second largest among the nine regions of Ethiopia. It is located 630 km away from Addis Ababa to eastern Ethiopia.

Sample size

A single proportion formula (Naing et al., 2006) was used to calculate the sample size, $n = Z^2 p (1-p) / d^2$. Where: Z = Z score for 95% confidence interval = 1.96, p = prevalence, d = tolerable error = 5% taking proportion as reference a study found 11.6% in Addis Ababa (Assefa et al., 2008). There by $n = (1.96)^2 0.116(1–0.116)/(0.05)^2$=158, adding 20% non-response rate giving the final sample size of 190.

Sampling technique

A convenient sampling method was employed and at least 10 pregnant women were recruited daily until the sample size was reached. Pre-designed and structured questionnaires were used for the collection of data on socio-demographic and associated risk factors. Collection of information on sign and symptoms of UTI and physical examination of pregnant women were done by experienced nurses working in ANC of Karamara Hospital.

Study population

The source population of this study was pregnant women of all age group attending antenatal care at Karamara, Hospital. The study subjects are those pregnant women who fulfill the inclusion criteria and willing for consent and sampling. Socio-demographic variables (Age, Sex, Education level, Residence and other relevant clinical data such as parity, gravidity, trimester, history of catheterization and UTI) were included in a pre-designed questionnaire.

Inclusion and exclusion criteria

Pregnant women who were taking antibiotics within seven days at the time of recruitment and who were not willing to participate were excluded from this study due to the fact that the antibiotic must have inhibited or destroyed the pathogens.

Laboratory method

Urine collection and analysis

About 10 ml freshly voided midstream urine specimens were collected. The participants were instructed on how to collect the urine sample through cleansing the gentalia and voided using leak proof, wide mouth sterile plastic containers. The urine specimens were then delivered to microbiology laboratory, Jigjiga University and processed within two hours. Most of the specimens were

analyzed within an hour of collection. Urinalysis using urine dipstick (Mannheim GmbH, Germany) was done following manufacturer's instructions. A 1 µl to 10 µl were used to inoculate urine samples on MacConkey and Blood agar plates (OXOID-England). Plates were incubated for 24 h at 37°C. A diagnosis of UTI was made when there were at least 10^5 colony forming unit (CFU)/ml of urine. High colony counts with more than one species of bacteria were considered as contaminations. Identification was done using in house biochemical testing (Murray et al*.,* 1995). All positive cultures with Stonebrink's (SB) were then identified at species level by their colony characteristics, gram-staining reaction and by the pattern of biochemical profiles using standard procedures. The enterobacteriaceae were identified by indole production, H2S production in KIA agar, citrate utilization, motility test, urease test, and oxidase and carbohydrate utilization tests. The gram-positive bacteria were identified using catalase and coagulase tests (Cheesbrough, 2006). All procedures were done as recommended by Clinical Laboratory Standard Institute (CLSI). For quality control, *E. coli* ATCC 25922 was used as control strains (Wayne, 2010).

Antimicrobial susceptibility testing

Antimicrobial susceptibility pattern were determined by disk diffusion method using Muller Hinton according to CLSI (Wayne, 2010) using the Kirby–Bauer disc diffusion method on Muller-Hinton Agar (Oxoid, Ltd, England). A loop full of bacteria were taken from a pure culture colony and transferred to a tube containing 5 ml of saline and mixed gently until it forms a homogenous suspension. The turbidity of the suspension adjusted to the turbidity of McFarland 0.5 standard in a tube and then swabbed on Muller Hinton medium. The following antimicrobial agents were tested for Gram-positive bacteria, "Gentamicin (10 µg), Penicillin G (10 µg), Ampicillin (10 µg), Erythromycin (15 µg), Vancomycin (30 µg), Ciprofloxacin (5 µg), and Ceftriaxone (30 µg)". For Gram-negatives bacteria, "Ampicillin (10 µg), Ciprofloxacin (5 µg), Gentamicin (10 µg), Norfloxacin, Amoxicillin and ceftriaxone (30 µg)" discs were used.

Ethical consideration

This study was conducted after formal approval of the protocol obtained from the Research and Ethical Review Committee of Jigjiga University. Prior to data collection, communication was made with hospital director and written informed consent was obtained from the participants through detail explanation of the study objective and the study procedures. All laboratory tests included in study were done for the participant free of any payments. Apart from the inconvenience of taking time to answer the research questionnaire, participants were not exposed to any undue risk. Positive results were sent immediately to the attending clinician for appropriate medical consideration according to culture results and sensitivity patterns.

Quality control

The quality assurance of pre-analytical, analytical and post-analytical stages of urine culture was applied. All specimens were transported from the hospital to microbiology laboratory, Jigjiga University within cold box and those specimens which were not processed within 2 h were kept in refrigerator and processed no longer than 18 h after collection. Only specimens which produced ≥10^5 CFU/ml of urine were considered significant but specimen that produced <10^5 colonies/ml of urine was considered insignificant. Culture media were sterilized based on the manufactures instruction. Then the sterility of culture media were checked by incubating 3 to 5% of the batch at 35 to 37°C overnight and observed for bacterial growth. Those media which showed growth were discarded. The standard reference strains; *E. coli* (ATCC25922) were used for testing quality of culture media and antibiotic discs. Generally Standard operating procedures (SOPs) prepared based on the national infectious disease control and prevention guideline as well as CLSI bacteriological techniques were followed strictly.

Data processing and analysis

All data on each subject in the study were recorded on a standard registration format. Socio-demographic, clinical and laboratory data were entered and analyzed using SPSS version 23. Descriptive data was explained by tables and texts. Proportions for categorical variables were compared using Chi-square test. In all cases P-value less than 0.05 was taken as statistically significant.

RESULTS

Socio-demographic characteristics of study participants

A total of 190 pregnant women aged between 15 to 40 years were enrolled in this study with the mean plus standard deviation of 25 (+4.8) years. Among the study participants, 17 (8.9%) were educated up to secondary school and above. According to their monthly income about 108 (55.8%) of the study participants were in the category of medium income. Based on their family type, 171 (90.0%) belongs to monogamous family. 4 (38.9%), 47 (24.7%) and 69 (36.3%) of study subjects were in the 1st, 2nd and 3rd trimester of pregnancy. 45 (76.3%) of the study participants were multigravida. About 49.5% of the study participant had sexual intercourse for at least three times per week. 5 (2.6%), 34 (17.9%) and 39 (20.5%) of study subjects had history of previous catheterization, contraceptive use and urinary tract infection, respectively (Table 1).

Prevalence of urinary tract infection

The overall prevalence of UTI as confirmed by urine culture was 13.2%. The prevalence of infection in relation to age showed that individuals of between the age group 25 to 34 years (8.9%) had the highest incidence of infection followed by age group 15 to 24 years (3.7%). About 21 (11.1%) and 17 (7.9%) UTI prevalence was observed among asymptomatic and illiterate participants, respectively. Of all considered variables monthly income and frequency of sexual per week were significantly associated with UTI (P<0.005). There was no association between maternal age, address, parity, gravidity, trimester, history of catheterization and education with bacteriuria (Table 2).

Bacterial etiology of urinary tract infection

The number and percentage of each etiologic pathogen

Table 1. Prevalence of UTI associated with socio-demographic characteristics of pregnant women attending ANC in Karamara Hospital, Jigjiga, Ethiopia (September to December, 2016).

Variable	Culture (+ve, %)	Culture (-ve, %)	Total (%)	P-value	OR (95%CI)
Age of participants					
15-24	7 (3.7)	63 (33.2)	70 (36.8)	-	-
25-34	17 (8.9)	91 (47.9)	108 (56.8)	0.277	.595 (0.233-1.518)
35-44	1 (0.5)	11 (5.8)	12 (6.3)	0.858	1.222 (0.137-10.932)
Education status					
Illiterate	15 (7.9)	88 (46.3)	103 (54.2)	0.998	0.000 (0.000)
primary(1-8)	7 (3.7)	41 (21.6)	48 (25.3)	0.998	0.000 (0.000)
Secondary(9-12)	3 (1.6)	19 (10.0)	22 (11.6)	0.998	0.000 (0.000)
Higher(12+)	0 (0.0)	17 (8.9)	17 (8.9)	-	-
Religion					
Muslim	23 (12.1)	149 (78.4)	172 (90.5)		
Non-Muslim	2 (1.1)	16 (8.4)	18 (9.5)	0.788	1.235 (0.266-5.727)
Residence					
Urban	25 (13.2)	158 (83.2)	183 (96.3)	-	-
Rural	0 (0.0)	7 (3.7)	7 (3.7)	0.999	0.000 (0.000)
Participants monthly income					
Low (<500 Birr)	5 (2.6)	10 (5.3)	15 (7.9)	0.032	0.233 (0.062-.881)
Medium (500-1000)	13 (6.8)	95 (50.0)	108 (56.8)	0.748	0.853 (0.322-2.258)
High (>1000)	7 (3.7)	60 (31.6)	67 (35.3)	-	-
Family type					
Monogamy	24 (12.6)	147 (77.4)	171 (90.0)	-	-
polygamy	1 (0.5)	18 (9.5)	19 (10.0)	0.305	2.939 (0.375-23.043)
Gestation period					
1st trimester	9 (4.7)	65 (34.2)	74 (38.9)	-	-
2st trimester	4 (2.1)	43 (22.6)	47 (24.7)	0.529	1.488 (0.431-5.139)
3rd trimester	12 (6.3)	57 (30.0)	69 (36.3)	0.380	.658 (0.258-1.675)
Gravidity					
Prim gravid	5 (2.6)	40 (21.1)	45 (23.7)	0.643	1.280 (0.451-3.631)
Multigravid	20 (10.5)	125 (65.8)	145 (76.3)	-	-
History of UTI					
No	21 (11.1)	130 (68.4)	151 (79.5)	-	-
Yes	4 (2.1)	35 (18.4)	39 (20.5)	0.549	1.413 (0.455-4.387)
History of catheterization					
No	24 (12.6)	161 (84.7)	185 (97.4)	-	-
Yes	1 (0.5)	4 (2.1)	5 (2.6)	0.650	0.596 (0.64-5.561)
History of contraceptive use					
No	21 (11.1)	135 (71.1)	156 (82.1)		
Yes	4 (2.1)	30 (15.8)	34 (17.9)	0.791	1.167 (0.373-3.648)
History of sexual practice per week					
Once	6 (3.2)	16 (8.4)	22 (11.6)		
Twice	9 (4.7)	57 (30.0)	66 (34.7)	0.148	2.375 (0.735-7.671)
Three times	9 (4.7)	85 (44.7)	94 (49.5)	0.033	3.542 (1.107-11.331)
More than three times	1 (0.5)	7 (3.7)	8 (4.2)	0.410	2.625 (0264-26.072)

Table 2. Antimicrobial susceptibility patterns of Gram-negative bacteria and Gram positive bacteria isolated from urine culture in pregnant women at Karamara Hospital, East Ethiopia (September to December, 2016).

Gram negative bacteria, 19 (76%)	Pattern	AMP	CN	NOR	CRO	CIP	AMOX
Escherichia coli (N=10)	S	0 (0)	3 (30)	8 (80)	2 (20)	8 (80)	1 (10)
	I	0 (0)	1 (10)	0 (0)	1 (10)	0 (0)	0 (0)
	R	10 (100)	6 (60)	2 (20)	7 (70)	2 (20)	9 (90)
Citrobacter freundii (N=3)	S	0 (0)	0 (0)	1(33.3)	2 (66.7)	2 (66.7)	0 (0)
	I	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	R	3 (100)	3 (100)	2 (66.7)	1 (33.3)	1 (33.3)	3 (100)
Klebsiella pneumonia (N=3)	S	3 (100)	2 (66.7)	3 (100)	2 (66.7)	2 (66.7)	1 (33.3)
	I	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	R	0 (0)	1 (33.3)	0 (0)	1 (33.3)	1 (33.3)	2 (66.7)
Proteus species (N=2)	S	0 (0)	0 (0)	0 (0)	0 (0)	2 (100)	0 (0)
	I	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	R	2 (100)	2 (100)	2 (100)	2 (100)	0 (0)	2 (100)
Pseudomonas aeuroginosa (N=1)	S	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	I	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	R	1 (100)	1 (100)	1 (100)	1 (100)	1 (100)	1 (100)
Total=19	S	3 (15.8)	5 (26.3)	12 (63.2)	6 (31.6)	14 (73.7)	2 (10.5)
	I	0 (0)	1 (5.3)	0 (0)	1 (5.3)	0 (0)	0 (0)
	R	16 (84.2)	13 (68.4)	7 (36.8)	12 (63.2)	5 (26.3)	17 (89.5)
Gram positive bacteria, 6 (24%)	**Pattern**	**AMP**	**CN**	**E**	**P**	**CRO**	**V**
Staphylococcus aureus (N=3)	S	0 (0)	1 (33.3)	3 (100)	0 (0)	2 (66.7	3 (100)
	R	3 (100)	2 (66.7)	0 (0)	3 (100)	1 (33.3)	0 (0)
CONS (N=3)	S	0 (0)	1(33.3)	3(100)	1 (33.3)	3 (100)	3 (100)
	R	3 (100)	2 (66.7)	0 (0)	2 (66.7)	0 (0)	0 (0)
Total=6	S	0 (0)	2 (33.3)	6(100)	1 (16.7)	5 (83.3)	6 (100)
	R	6 (100)	4 (66.7)	0 (0)	5 (83.3)	1 (16.7)	0 (0)

R=Resistant, S=Sensitive, I=Intermediate.

isolated from mid-stream urine samples are presented in Figure 1. Of the total 25 isolates, Gram-negative bacteria were highly prevalent 19 (76%) than Gram-positive bacteria 6 (24%). The predominantly isolated bacteria were *E. coli* 10 (40%), followed by *Citrobacter spp.*, *Klebsiella* spp., coagulase negative Staphylococci (CoNS) and *Staphylococcus aureus* each 3 (12%), *Proteus* species 2 (8%) and *Pseudomonas aeuroginosa 1* (4%).

Antimicrobial susceptibility pattern of bacterial pathogens of UTI

The susceptibility patterns of isolates from mid-stream urine against nine antimicrobial agents are presented (Table 3). The result of antimicrobial susceptibility pattern of the isolate is shown on rates of susceptibility range from 0 to 100%. Most Gram-positive and Gram-negative isolates were resistant to two or more antibiotics (multi-drug resistant). In general Gram-negative isolates showed resistance rate of 89.5% to amoxicillin, 84.2% to ampicillin, 68.4% to Gentamycin and 63.2% to ceftriaxone. Least Gram-negative bacteria resistance was observed against ciprofloxacin (26.3%) and Norfloxacin (36.8%). *E.coli* which constituted for 52.6% of the Gram-negative bacteria showed 100, 90, 70, and 60% resistance against Ampicillin, Amoxicillin, Ceftriaxone and Gentamycin, respectively. *Citrobacter freundii* the other Gram-negative bacteria showed 100% resistance to Ampicillin, Gentamicin and Amoxicillin. All *proteus spp* and *Pseudomonas aeroginosa* from Gram-negative showed resistance to all types of antibiotic used in this experiment. All staphylococcus from Gram-positive bacteria showed 100% sensitive for Erythromycin and Vancomycin while 100% resistance for Ampicillin. Among

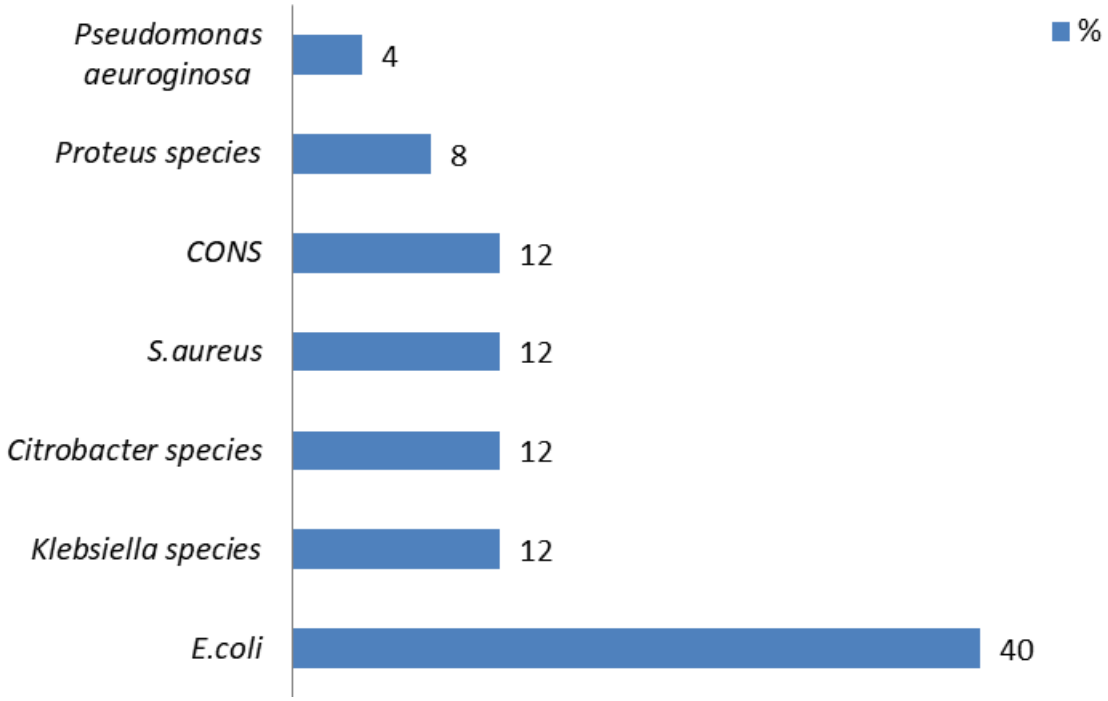

Figure 1. Distribution of Bacterial agent of urinary tract infection among pregnant women attending antenatal clinic at Karamara Hospital, East Ethiopia (September - December, 2016).

Table 3. Antibiogram showing resistance of the most common isolates of urinary tract infection from pregnant women to one or more antibiotics in pregnant women at Karamara Hospital, East Ethiopia (September to December, 2016).

Organism (Total No.)	No.	Pattern of resistance to antimicrobials
Escherichia coli (10)	1	AMP
	1	AMP, AMOX
	4	AMP, AMOX, CRO
	1	AMP, AMOX, CN
	1	AMP, AMOX, CRO,CIP
	1	AMP, AMOX, CN, CRO
	1	AMP, AMOX, CRO,GM, CIP, NOR
Citrobacter freundii (3)	1	AMP, AMOX, CN, CRO
	2	AMP, AMOX, CN, CRO, CIP, NOR
Klebsiella pneumonia (3)	2	AMP, AMOX
	1	AMP, AMOX, CN, CRO, CIP, NOR
Staphylococcus aureus (3)	1	AMP, CN
	2	AMP, CN, P
CoNS (3)	2	AMP, CN, P
	1	AMP, CRO
Proteus species (2)	2	AMP, AMOX, CN, CRO, CIP, NOR
Psedomonas aeroginosa (1)	1	AMP, AMOX, CN, CRO, CIP, NOR

AMP: Ampicillin, CN: gentamicin, NOR: norfloxacin, CRO: ceftriaxone, CIP: ciprofloxacin, AMOX: amoxicillin, VA: vancomycin, P: penicillin, E: erythromycin.

the total isolates multi-drug resistance (MDR) were observed in 24 (96%) of all bacterial pathogen from urine specimen. All isolates of Gram-positive bacteria and 94.7% of Gram-negative bacteria showed resistance to two or more drugs.

DISCUSSION

It is a potentially life threatening condition when the urinary tract is infected especially when it develops in pregnant women. Despite advances in diagnosis and treatment, bacterial urinary tract infection remains a major cause of pregnancy related morbidity and mortality worldwide (Rizvi et al., 2011). The causative agents of urinary tract infection and their antibiotic susceptibility patterns also become varying from time and geography hence this data is important to provide information used to formulate infection control measures and develop antibiotic polices everywhere. In this study, the overall prevalence of urinary tract infection in pregnant women attending antenatal clinic was 13.2%. Similar findings of 10.4% have been reported in previous study conducted at University of Gonder Teaching Hospital, Ethiopia (Alemu et al., 2012) and other countries at Tanzania (14.6%) (Masinde et al., 2009) and Khartoum (14%) (Hamdan et al., 2011).

However lower prevalence was reported by different studies conducted on pregnant women from FelegeHiwot Referral Hospital (9.5%) (Tazebew et al., 2012) and Nepal (9.8%) (Marahatta et al., 2012). There were other studies which reported higher prevalence of UTI among pregnant women from Southern Nigeria (25%) (Lawani et al., 2015), Nairobi (26.7%) (Fred et al., 2015) and Benin City, Nigeria (55%) (Oladeinde et al., 2015). Variations in prevalence of urinary tract infections may be explained by differences exist in socio-economic of the community, pregnancy associated physiological changes, educational level, environmental and personal hygiene.

In the present study, there was no statistical significant association between culture positive urine (UTI) and maternal age, religion, residence, education, gestational period, history of catheterization and gravidity. This is in agreement with several studies in Ethiopia (Tazebew et al., 2012; Alemu et al., 2012) and Sudan (Hamdan et al., 2011). However, a previous finding showed that maternal age and gravidity are risk factors for UTI among pregnant women (Haider et al., 2010). Prevalence of UTI in pregnant women with previous history of urinary tract infection not showed a significant association. In contrast to this finding, previous studies conducted in Ethiopia (Alemu et al., 2012) and Pakistan (Sheikh et al., 2000) confirmed significant association with previous history of UTI. This might be due to effective treatment or presence of resistance strains from various environments. In this study, gram-negative bacterial isolates were more prevalent than gram-positive bacterial isolates (76 and 24%, respectively). Similar findings were reported by previous studies in TikurAnbessa Specialized Hospital Addis Ababa (60 and 40%) (Assefa et al., 2008), in Gondar University Hospital (58.4 and 41.6%) (Alemu et al., 2012) and elsewhere in the world (Delzell and Lefevre, 2000). This finding also showed that the most common bacteria isolated from the mid-stream urine samples of the pregnant women was *E. coli* (40%), followed by *Klebsiella spp.* (12%), *Citrobacter spp.* (12%), *Stapylococcus aureus* (12%) and *Staphylococcus coagulase negative* (12%). This result is similar in majority of isolates to the separate findings of other study in Ethiopia and elsewhere (Tazebew et al., 2012; Alemu et al., 2012).

Currently many microorganisms have become resistant to different antimicrobial agents and in some cases to nearly all agents. Antibiotic resistance is a problem that has been caused by ineffectiveness of current empirical treatment against bacterial infections of the urinary tract infection. Based on *in-vitro* susceptibility tests in the present study; we observed that, *E. coli*, *Citrobacter spp., Proteus spp.* and *Pseudomonas aeuroginosa* isolates were resistant to Ampicillin (100%) and this implies that ampicillin cannot be used as empirical therapy for urinary tract infection particularly in the study area. Similarly high resistance was also observed against gentamycin. On the other hand, low levels of resistance were observed against ciprofloxacin and norfloxacillin. Similar findings have been reported in previous studies done at Ethiopia (Tazebew et al., 2012; Alemu et al., 2012). Tanzania (Raka et al., 2004) and Iran (Farajnia et al., 2009). Among Gram-positive bacteria tested all were sensitive to vancomycin and erythromycin (100%). However, more resistance was observed against ampicillin (100%) and gentamycin (66.7%). The possible explanation for different level of resistance may be due to frequent usage of antibiotic. Thus, Ciprofloxacillin and norfloxaclilin could be considered as alternative options in the treatment of UTIs.

Multi-drug resistance was observed in 96% of bacterial isolates from mid-stream urine of pregnant women. This finding is comparable with the study findings from Gondar 95% (Alemu et al., 2012) and Tikur Anbessa Specialized Hospital, Addis Ababa 74% (Assefa et al., 2008). Reasons for such alarming MDR might be inappropriate and incorrect administration of antimicrobial agents as empirical treatment, lack of health education and lack of appropriate infection control strategies, which can cause a shift to increase prevalence of resistant organism in the community.

Conclusion

The finding of this study revealed that urinary tract infection is common during pregnancy as it enhanced due to a variety of physiological changes during the period of pregnancy. This study has shown that the prevalence of UTI in pregnant women at Karamara

Hospital is similar with other previous studies in Ethiopia and other developing countries elsewhere in the world. The present study has shown the isolated bacterial pathogens of urinary tract infection are resistance for commonly used antimicrobial agents. Therefore, early screening of pregnant woman for UTI causing bacterial pathogens and determining their antibiotic susceptibility pattern is an important intervention to prevent complications that may endanger the life of both the pregnant women and the foetus. Health education about personal hygiene and antibiotic resistance should be emphasized by the antenatal care physician to all pregnant women.

CONFLICTS OF INTERESTS

The authors have not declared any conflict of interests.

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