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A STUDY OF UROPATHOGENS IN WOMEN OF REPRODUCTIVE AGE GROUP IN A TRIBAL AREA OF EASTERN INDIA

Microbiology

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ABSTRACT

Urinary tract infection (UTI) is one of the universal forms of infectious disease in human. Culture, habits, provision of sanitation, hygiene and health care service have great influence on the incidence and bacterial profile of the UTI in different settings.

A Cross-sectional study was done on 202 non pregnant women of reproductive age group (15-45 years) in a tribal area in Eastern part of India during July - August 2017.Clean catch midstream urine samples were collected from participants during home visit , irrespective of sign symptoms of UTI. Among the 202 urine samples 44 samples (21.78%) showed growth. Of these 44 patients, 61.36% had no urinary symptoms. *Escherechia.coli* (n=11) was found to be predominant uropathogen followed by *Staphylococcus aureus* (n= 7), *Klebsiella* sp(n=2), *Morganella morganii*(n=2), etc. Amikacin (96.8%) appeared as most effective drug both against Gram positive and Gram negative pathogenic isolates, followed by Meropenem (93.5%), Nitrofurantoin (83.9%), Ciprofloxacin (80.6%). Isolates showed least susceptibility to Cotrimoxazole (51.6%) and Amoxyclav (28.57%). Knowledge of incidence of UTI and distribution of organism along with their sensitivity pattern were essential for deciding empirical treatment of UTI of any population.

KEYWORDS

Antibiotic sensitivity, Bacteria, Urinary tract infection,

Introduction

Urinary tract infection (UTI) is one of the common infectious diseases in human which can compromise quality-of-life [1] .

Enterobacteriaceae like *Escherichia coli, Enterobacter sp. Citrobacter sp, Klebsiella sp, Proteus mirabilis, Proteus vulgaris etc and others like Enterococcus faecalis , Staphylococcus aureus, Pseudomonas sp* are the notorious pathogens causing infections of urinary tract [2]. Particularly E.coli, the predominant organism causing community acquired UTIs can adhere, invade, and replicate in the umbrella cells of the bladder epithelium which serves as reservoir of pathogens causing recurrent UTIs. *Klebsiella* sp and *Proteus s*p though commonly associated with nosocomial UTIs, they can be involved in the community acquired UTIs too. Pathogenic bacteria may remain in the urinary tract with or without symptoms and might lead to various complications. Growing incidence of resistance towards antibiotics, emergence of multidrug resistance strains have worsen the scenario. So, UTI once considered as an easy-going ailment to deal with now is converted into a colossal assignment due to difficulty in elimination of resistant uropathogens leading to increasing episodes, complications and recurrence [3] .

Different studies detect that the prevalence of community acquired UTI was high among the females. 40% to 50% of women would experience at least one incidence of UTI in their lifetime with maximum episodes in reproductive age group [4] . Location of urethral meatus near to anus, shortness of female urethra make them more vulnerable to bacterial infections caused by internal flora . Conjugal life contributes for introduction of external bacteria to female urinary tract [5]. Undernourishment, poor sanitation and low socioeconomic status are also linked with higher incidence of UTI. Culture and habits of the population, environmental diversity, standard of sanitation and hygiene and provision of health care service influence the rate and bacterial milieu of the UTI in different settings [6].

So, this study intended to reveal the significant pathogenic bacteria present in urine of women of reproductive age group, who belong to a cultural and traditional distinguishable community and may not be comfortable to seek health care facility for their own. So, the study was intended to determine the uropathogens present in the urine of the non pregnant women of reproductive age group of a tribal community and their sensitivity pattern.

Materials and Methods

A cross sectional study was conducted on the non pregnant women of reproductive age group (15-45 years) in a tribal area in Nadia district of West Bengal between July to August 2017. During a home visit with public health nurse, the non pregnant women age between 15-45 years, regardless of whether they were symptomatic or not were recruited for urine analysis along with a case record form. Exclusion criteria were pregnancy, known anomalies in urinary tract and antibiotic usage within two weeks. Information on age, height, weight, marital status, contraceptive method used, parity, h/o previous UTI, education status, information regarding latrine used by them, presence or absence of symptoms related to UTI etc were obtained from the case record form. Total 202 non pregnant women were investigated. Sample size was calculated considering prevalence of UTI in women of reproductive age group as 58% [3], in 95% confidence label with allowable error 12% and 5% wastage. Informed consent was obtained from each of the study population prior to sample collection. Clean catch midstream urine samples in wide-mouthed sterile universal container (was supplied by the investigator) were brought to the bacteriology laboratory of the Department of Microbiology, of a teaching hospital of Nadia, West Bengal for analysis within 2 hours of collection of samples.Urine sample was inoculated using a standard loop which holds 0.004 ml of urine. Urine was inoculated on a plate of Blood agar media & Hichrome Urinary Tract Infection Media (Hi-Media Laboratories). The plates was incubated aerobically at 37°C overnight. Colonies were counted on Hichrome Urinary Tract Infection Media and multiplied by the loop volume. A bacterial count of $1x10^5$ per ml was considered significant for asymptomatic ones and 10^3 /ml was considered significant for symptomatic persons [7] .The colony was identified phenotypically by Gram staining, motility, biochemical tests as per standard protocol [8]. Antibiotic sensitivity test of pathogenic bacteria was done by Kirby Bauer Disc Diffusion method on Muller Hinton's media with proper standardization by ATCC control strains.The report of urine analysis was supplied to the participants maintaining confidentiality for further treatment when required. Graph Pad Instat 3 was used to do Chi square test. P value < 0.005 was considered as significant. Study was conducted after taking permission from Hospital Ethical Committee.

Result

Urine samples from 202 non pregnant women of reproductive age group of a tribal community were collected, among which 44 samples (21.78%) showed significant growth in culture.

Table 1. Relationship of symptoms with the presence of organisms in urine

	Symptomatic n= 35	Asymptomatic n=167	Statistics
Organism present n=44	17	27	Chi square =15.982 with df 1 P value =.000
Organism absent n=158	18	140	
Percentage of bacteruria	17/44=38.63	27/44=61.36	

Table 1 showed that only (35/202) 17.32% of women presents with symptoms. Women who had bacteria in their urine, 61.36% of them were asymptomatic. It is statistically also significant (p value 0.000).

Age wise distribution of bacteria was shown in Fig 1. There was no significant difference in presence of bacteria in urine in different age group. All the age groups between 15-45 years were almost equally vulnerable to UTI.

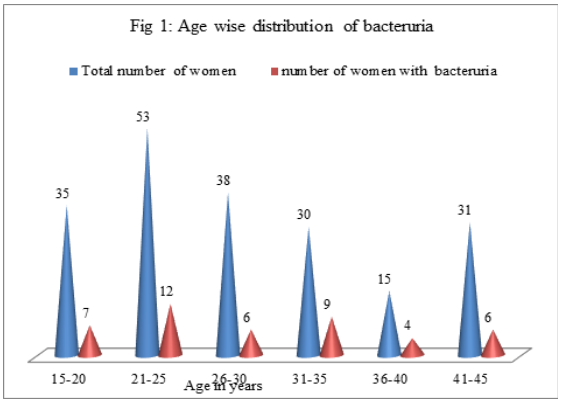


Table 2. Presence of bacteria in urine of women of different marital status

Marital status	Bacteria absent in urine	Bacteria present in urine	% of subjects having bacteruria	Statistics
Married n=159	124	35	35/44=79.54 %	Chi square =.003 with df 1 P value =0.956
Unmarried or widows n= 43	34	9	9/44=20.46 %	
	158	44		

Those who had bacteria in urine, 79.54% of them were married, though influence of marital status on the UTI in women was not statistically significant (table 2).

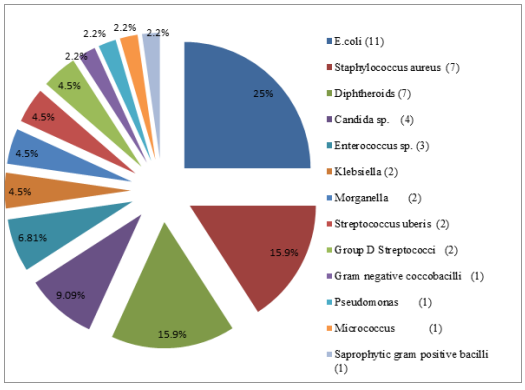
Table 3: Presence of bacteria in urine of women and educational status

Educational level	Bacteria absent in urine	Bacteria present in urine	% of subjects having bacteruria	Statistics
No schooling n=61	50	11	11/61=18.0%	Chi square =14.491 with df 3 P value =0.003
Primary school level n=56	34	22	22/56=39.3%	
High school level n=71	62	9	9/71=12.7%	
Graduation n=14	12	2	2/14=14.3%	
	158	44		

57.3% samples from women upto primary level of education showed growth of organism. It was statistically significant(Table 3).

Among the 44 organisms isolated from urine of women, Escherechia. coli(n=11) was found predominant uropathogen followed by *Staphylococcus aureus* (n=7) Klebsiella sp(n=2), Morganella morganii(n=2), Gram negative non fermenter coccobacilli(n=1), Enterococcus faecalis (n=3), Staphylococcus epidermidis (n=1) , Pseudomonas sp (n=1) , Gr D Streptococcus (n=2), Streptococcus uberis (n=2)[confirmed by VITEK 2], and Candida albicans (n=4). These were considered as potential pathogen for UTI. Non-pathogenic or commensals like Diphtheroids (n=7), Gram positive bacilli (n=1), Micrococcus sp(n=1) were exempted from further processing for sensitivity patterns. (Fig 2)

Fig 2: Distribution of organisms in urine



Amikacin (96.8%) appeared as most effective drug both against Gram positive and Gram negative pathogenic isolates, followed by meropenem (93.5%),Nitrofurantoin (83.9%). Isolates showed least susceptibility to Cotrimoxazole ((51.6%) and amoxyclav ((35.5%). (Table 4)

Table 4: Sensitivity patterns of organisms

ORGANISMS N= 31	AK S(%)	CIP S(%)	AMC S(%)	COT S(%)	Mrp S(%)	NIT S(%)	G S(%)	CAZ S(%)	Va S(%)	LZ S(%)
Escherechia coli (11)	11/11 (100)	8/11 (72.7)	0/11 (0)	6/11 (54.5)	9/11 (81.8)	11/11 (100)	8/11 (72.7)	9/11 (81.8)	-	-
Staphylococcus aureus (7)	7/7 (100)	6/7 (85.7)	2/7 (28.6)	3/7 (42.9)	7/7 (100)	6/7 (85.7)	6/7 (85.7%)	7/7 (100)	7/7 (100)	7/7 (100)
Klebsiella (2)	2/2 (100)	2/2 (100)	1 /2 (50)	2/2 (100)	2/2 (100)	1/2 (50)	1/ 2 (50%)	2/2 (100)	-	-
Morganella (2)	2/2 (100)	2/2 (100)	1 /2 (50)	0/2 (0)	2/2 (0)	0/2 (0)	2/2 (100%)	1 /2 (50)	-	-
Enterococcus (3)	2/3 (66.6)	1/3(33.3)	3/3 (100)	3/3 (100)	3/3 (100)	3/3 (100)	2/3 (66.6%)	3/3 (100)	3/3 (100)	3/3 (100)
Group D streptococci (2)	2/2 (100)	2/2 (100)	2/2 (100)	2/2 (100)	2/2 (100)	2/2 (100)	1/ 2 (50%)	2/2 (100)	2/2 (100)	2/2 (100)
Streptococcus uberis (2)	2/2 (100)	2/2 (100)	2/2 (100)	2/2 (100)	2/2 (100)	2/2 (100)	2/2 (100)	2/2 (100)	2/2 (100)	2/2 (100)
Pseudomonas (1)	1/1 (100)	1/1 (100)	1/1 (100)	0/1 (0)	1/1 (100)	1/1 (100)	1/1 (100%)	1/1 (100)	-	-
Gram negative coccobacilli (1)	1/1 (100)	1/1 (100)	1/1 (100)	0/1 (0)	1/1 (100)	0/1 (0%)	0/1 (0%)	0/1 (0)	-	-
Total	30/31 (96.8)	25/31 (80.6)	13/31 (35.5)	18/31 (51.6)	29/31 (93.5)	26/31(83.9)	23/31 (74.2)	27/31 (87.1)	14 /14 (100)	14 /14 (100)

Discussion

The present study was conducted to determine the incidence of UTI among women of reproductive age group in a tribal community of Eastern Part West Bengal. The tribal people have different traditions, ritual, and life style and most of them rely upon natural medicine. Social inhibition or economic constrain hold them back to avail the facility of modern medicinal system. Women most of the time are stressed by the demands of the family and society and by nature more reluctant about their own health problems. Therefore this study addressed the women in tribal area to find out the organism for UTI and related antibiotic sensitivity. Among the 202 women recruited in the study 44 (21.78%) showed growth of microorganisms in their urine collected during their home visit. Of these 35 were either established uropathogens or potential pathogens for UTI . So, following the case definition of this study, incidence of UTI was 21.78% (44/202) which was similar to that was observed in a study done in Jaipur,

Rajasthan(17.19%) to determine community acquired UTIs [9] and in Panama(21.15%) among women of reproductive age group [10]. But a much higher incidence of UTI was noticed among women in studies done in Salem, Karnataka(56%) [3], Calicut Kerala (65%) [11] and north Kerala (66.86%) [12].

In current study, samples were collected during home visit and in other studies samples were collected from women who seek medical help due to urinary problem. This might be the main factor for huge discrepancy.

The current study reinforced the fact that UTI might be present in women silently i.e.,without symptoms. Presence of asymptomatic bacteruria among 61.36% women might be an alarming condition for periodic urine analysis of the women of the study population.

While considering age wise distribution of bacteruria in reproductive age group of women, no significant difference had been revealed in this study. All the age groups between 15-45 years were almost equally vulnerable to UTI. This was in contradictory with the study of Jaipur, Rajasthan [9] where 1/4th cases of UTI occurred at the age group of 21-30years, in Salem [3] the highest isolation rate was found in the age group 40-49 yrs .

35 (79.54%) samples which showed growth of bacteria were collected from married women. Use of contraceptive device or conjugal life might manipulate bacterial colonization in urinary tract.

The study revealed that women educated more than primary school level had significantly less incidence of bacteruria. This might be due to better understanding of cleanliness ensuing hygienic behaviours among them.

In the present study 13 different types of organisms were isolated, *E. coli* being the predominant one(25%). *Staphylococcus aureus* and *Diphtheroids* shared the second most common position (15.9%). The infection rate of other Gram negative bacteria like *Klebsiella* sp, *Morganella morganii, P. aeruginosa* were 4.5%, 4.5%, 2.2% respectively. *Enterococcus faecalis* was identified from 6.81% of total growth. Unconventional bacteria like *Streptococcus uberis* were isolated from 2 samples (4.5%). There was evidence, where *Streptococcus uberis* has been isolated as causative agent of infection. Candida sp had been isolated in 9.09 % of culture positive samples. Associated vaginitis might be the source of the candida in urine.

In Jaipur, Rajasthan[9] and Midnapur, West Bengal [13], Salem Karnataka [3], Nepal [14] E.coli appeared as the most common microorganism causing UTI, but second one was different in various population[9,15,14].

Amikacin (96.8%) emerged as most effective drug against all the isolates that was in concordance with the study in Midanapur West Bengal [13] and in Nepal [14] though percentage of sensitivity varies. The isolates showed a good sensitivity to Meropenem (93.5%)and Ceftazidime (87.1 %). Nitrofurantoin was found to be the oral antimicrobial of choice as seen in the study in Nepal[14] Kerala [12] . Ciprofloxacin (80.6%) was also quite effective oral antibiotic which was similar to the study in Rajasthan [3]. But Sensitivity to Amoxyclav and Cotrimoxazole was quite low in this study as seen in Kerala [12] . Gram positive bacteria were 100% sensitive to vancomycin.

A surprising observation was that a majority of the isolates showed a higher sensitivity pattern towards usual antibiotics than the sensitivity shown by them in studies in different parts of India [9,3, 12,13] . The reason might be that this study population was less exposed to the antibiotics due to less accessibility to medical facility and they might be restrained from the over the counter sale of the antimicrobials and self medication.

Conclusion: This study disclosed the significant pathogenic bacteria present in urine of tribal women of reproductive age group, who may not be comfortable to seek health care facility for their own. High incidence of asymptomatic bacteruria in the study population is a concern. So, there must be a regular surveillance and necessary health facility must be provided to them to mitigate complications related to bacteruria. Treatment of such population may be based on previous experiences.

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REFERENCES

[1] Ellis AK, Verma S. Quality of life in women with urinary tract infections: is benign disease a misnomer? J Am Board Fam Pract 2000;13(6):392-7.
[2] Watring NJ, Mason JD. Deciphering dysuria. Emerg Med 2008;40(9):29-34
[3] Shanthi J .Kayathri S. Incidence, distribution and antibiogram of uropathogens isolated from patients with urinary tract infections. Adv. Appl. Sci. Res., 2012; 3(6):3410-3414
[4] D. Leigh "Urinary Tract Infections," In: G. R. Smith and S. F. Easma Charles, Eds., Topley and Wilson's Princi-ples of Bacteriology, Virology and Immunity, Butler and Tanler Ltd., Frome and London, 1990, 197-214.
[5] Litza JA, Brill JR. Urinary tract infections. Prim Care2010;37(3):491-507
[6] Hooton T. M. "Recurrent Urinary Tract Infection in Women," Antimicrobial Agents; 2001.Vol. 17(4): 259-268. doi:10.1016/S0924-8579(00)00350-2
[7] EAU (European Association of Urology). Guidelines on Urological Infections. European Association of Urology, 2009. http://www.uro web.org/nc/professional resources/guidelines/online/
[8] Colle JG, Miles RS, Watt B. Tests for identification of Bacteria. In Mackie and Mc Cartney's Practical Medical Microbiology. 14th ed. Edinburgh: Churchill Livingston;1996. p. 14
[9] Sood S, Gupta R. Antibiotic resistance pattern of community acquired uropathogens at a tertiary care hospital in Jaipur, Rajasthan. Indian J Community Med 2012;37:39-44.
[10] August SL, De Rosa MJ (2012) Evaluation of the Prevalence of Urinary Tract Infection in Rural Panamanian Women. PLoS ONE 7(10): e47752. doi:10.1371/ journal.pone.0047752
[11] Arul Prakasam K.C., K. G. Dileesh Kumar, M. Vijayan. A Cross Sectional Study on Distribution of Urinary Tract Infection and Their Antibiotic Utilisation Pattern In Kerala. International Journal of PharmTech Research. 2012;4(3):1309-1316
[12] Ahmed Syed Mustaq, Pai Ramakrishna, , shaniya koyakutty Jakribettu, Arya B, Shakir V PA. Urinary Tract Infection –a Preview of the Prevalence and the Anti-biogramof Gram Negative Uropathogens in A Tertiary Care Centre in North Kerala,India. Journal of Clinical and Diagnostic Research, 2012; Vol-6(7): 1192-1195
[13] Maji Suman Kumar, Maity Chinranjit , Halder Suman Kumar ,Paul Tanmoy et al .Studies of drug sensitivity and bacterial prevalence of UTI in Tribal Population of Paschim Medinipur, West Bengal, India. Jundishapur J Microbiol. 2013;6(1):42-46
[14] Thapa P, Parajuli K , Poudel A, Thapa A, Manandhar B, Laudari D, Malla HB, Katiwada R.Causative agents and susceptibility of antimicrobials among suspected females with urnary tract infection in tertiary care hospitals of western Nepal. Journal of Chitwan Medical College 2013; 3(4): 16-19
[15] Hotchandani Ramesh., AggarwaL K K . Urinary Tract Infections in Women. Indian Journal of Clinical Practice. 2012;23(4) :187-192