

Prevalence of intestinal parasites and urinary pathogens among prison inmates in central jail of Bhopal (MP)

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Abstract

Introduction: Jail lacks adequate health facilities resulting in greater burden of illness than other members of society due to the factors like poor sanitation, poor personal hygiene and ignorance. Prevalence of Intestinal parasitic infections and urinary tract infections have been studied extensively in community in various set up and different age groups, but yet to be explored in prison inmates whose health problems are often neglected.

Methodology: A Cross sectional study was conducted at central Jail of Bhopal for a period of 2 months among 114 prison inmates. Proforma containing structured questionnaire was also filled. 114 stool samples and 111 urine samples were obtained. Stool samples examined using saline, iodine wet mount. Urine samples processed for aerobic bacterial culture, isolates identified by standard microbiology techniques. Antimicrobial susceptibility testing was performed by Kirby Bauer disc diffusion method as per CLSI guidelines.

Results: Intestinal parasites found among 7.9% prison inmates. Protozoan parasites contributed 7.0% and intestinal helminth 0.9%. Significant growth of uropathogens obtained in 9.91% urine samples. 6.31% were gram negative bacilli (GNB) and 3.60% gram positive cocci (GPC). GNB isolates were more sensitive for imipenem followed by amikacin. GPC showed maximum sensitivity for vancomycin and linezolid.

Conclusions Our study showed low prevalence rate of both intestinal and urinary tract infections among prison inmates of central jail Bhopal. This may be attributed to maintenance of adequate sanitary conditions in jail premises.

Keywords: Gram negative bacilli, Gram positive cocci, Intestinal parasites, Prison inmates, Urinary pathogens

Access this article online	
Quick Response Code: 	Website: www.innovativepublication.com
	DOI: 10.5958/2394-5478.2016.00013.3

Introduction

“Prison” means any jail and place used permanently or temporarily under the general or special order of the state for the confinement of prisoners. Prison and jail environment are being recognized as place in which society’s diseases are concentrated. It is seen either as punishment or mode of rehabilitation. The normal life of inmates is restricted, freedom of movement is curtailed and private space is limited. Prison serves as mirrors of society.¹

In the walls of jail, due to lack of adequate health facilities, the prisoners suffer from much greater burden of illness than other members of the society. They harbor disease that is determined both by environment from which they come and prison in which they live. The prevalence of the intestinal parasites are influenced by several epidemiological factors, such as poor sanitation, poor personal and community hygiene, ignorance, climatic condition and other socio-cultural practices such as the use of night soil for fertilizer.²

Prevalence of parasitic infections and urinary tract infections have been studied extensively in community in various set up and in different age groups, but it is yet to be explored in prison inmates whose health problems are often neglected. Understanding health conditions in prisons would help us to improve the public health system. Therefore the aim of the study was to determine the prevalence of intestinal parasitic infections and urinary tract infections with the antimicrobial susceptibility pattern of the urinary pathogens among the prison inmates of Bhopal Central jail.

Materials and Methods

Study type: Cross sectional study

Study site: Central jail, Bhopal and Microbiology laboratory, LNMC & J. K. Hospital Bhopal

Study duration: 10th July 2014 to 10th September 2014

Number of subjects: 114 subjects

Sample: Urine and Stool.

Inclusion criteria: prison inmates living more than 6 month in Bhopal jail

Exclusion criteria: prison inmates less than 6 months in Bhopal jail

Choice of subjects: prison inmates of Bhopal Central Jail

Urinary tract infections

Of the 111 urine specimens processed, 11 (9.91%) gave significant growth of pathogens. 6.31% isolates were gram negative bacteria while 3.6% were gram positive cocci [Table 3]. *E. coli* was the predominant isolates (2.70 %) followed by *K. pneumoniae* (1.80%), *S. aureus* (1.80%), CONS (1.80%). Other bacterial isolates were *P. vulgaris* (0.9 %) and *P. aeruginosa* (0.9%) [Table 4].

As shown in the Table 5, antimicrobial susceptibility pattern of gram negative bacilli revealed

maximum sensitivity pattern for imipenem (85.71 %) and amikacin (85.71 %) and least sensitivity was observed for ampicillin (14.28%), amoxicillin-clavulanic acid (14.28%), cefuroxime (14.28%), ceftriaxone (14.28%), nalidixic acid (14.28%). Table 6 depicts antimicrobial susceptibility pattern of isolated gram positive cocci. All gram positive cocci were found sensitive for vancomycin, linezolid and amikacin. 75% of isolates were sensitive for trimethoprim-sulfamethoxazole, gentamicin, nitrofurantoin, norfloxacin.

Table 1: Prevalence of parasitic infection among prison inmates

Total stool samples tested	No. of samples positive for parasites n (%)	No. of samples negative for parasites n (%)
114	09(7.89)	105(92.11)

Table 2: Distribution of intestinal parasites among prison inmates

Total no. of parasites n (%)	<i>Entameoba histolytica</i> n (%)	<i>Giardia intestinalis</i> n (%)	<i>Taenia sps.</i> n (%)
9(7.9)	6(5.30)	2(1.70)	1(0.9)

Table 3: Prevalence of urinary tract infection among prison inmates

Total urine samples tested	No. of samples positive for UTI n (%)	No. of gram positive cocci isolated n (%)	No. of gram negative bacilli isolated n (%)	Total no. of samples negative for UTI n (%)
111	11 (9.91%)	4 (3.60%)	7 (6.31%)	100 (90.09%)

Table 4: Distribution of urinary pathogens among prison inmates

Total no. of bacteria isolated n (%)	<i>E.coli</i> n (%)	<i>K. pneumoniae</i> n (%)	<i>S. aureus</i> n (%)	CONS n (%)	<i>P.aeruginosa</i> n (%)	<i>P. vulgaris</i> n (%)
11(9.91%)	3(2.70)	2(1.80)	2(1.80)	2(1.80)	1(0.9)	1(0.9)

Table 5: Antimicrobial susceptibility pattern of isolated gram negative bacilli

Antibiotics	<i>E.coli</i> (n=3)	<i>K.pneumoniae</i> (n=2)	<i>P.vulgaris</i> (n=1)	<i>P.aeruginosa</i> (n=1)	Total (%)
Ampicillin	1	0	0	NR	1(14.28)
Amoxicillin-clavulanic acid	0	0	1	NR	1(14.28)
Ampicillin- sulbactam	1	0	1	NR	2(28.57)
Cefotaxime	1	0	1	NR	2(28.57)
Cefuroxime	0	0	1	NR	1(14.28)
Ceftriaxone	0	0	1	NR	1(14.28)
Ceftazidime	1	0	1	1	3(42.86)
Cefepime	1	0	1	1	3(42.86)
Trimethoprim-sulfamethoxazole	1	0	1	NR	2(28.57)
Gentamicin	1	2	1	1	5(71.43)
Amikacin	2	2	1	1	6(85.71)
Nitrofurantoin	2	0	0	NR	2(28.57)
Nalidixic acid	1	0	0	NR	1(14.28)
Norfloxacin	1	0	0	1	2(28.57)
Piperacillin- tazobactam	1	0	1	1	3(42.86)
Imipenem	2	2	1	1	6(85.71)
Meropenem	1	0	0	1	2(28.57)
Aztreonam	1	0	1	1	3(42.86)
Cefoxitin	2	1	0	NR	3(42.86)

NR= not recommended by CLSI; hence not tested

Table 6: Antimicrobial susceptibility pattern of isolated gram positive cocci

Antibiotics	<i>S. aureus</i> (n=2)	CONS (n=2)	Total (%)
Penicillin	0	0	0(0.0)
Ampicillin	0	0	0(0.0)
Amoxicillin-clavulanic acid	0	0	0(0.0)
Trimethoprim-sulfamethoxazole	1	2	3(75.0)
Gentamicin	1	2	3(75.0)
Amikacin	2	2	4(100.0)
Nitrofurantoin	2	1	3(75.0)
Norfloxacin	1	2	3(75.0)
Vancomycin	2	2	4(100.0)
Linezolid	2	2	4(100.0)

Discussion

The prison inmates are susceptible to diseases in general and intestinal parasitic infections due to poor health care, overcrowding high risk behaviors, low level immunity because of stress and inadequate or poor nutritional quality, and overall low living standard compared to the general population. The present study was conducted to determine the prevalence of intestinal parasites among the prison inmates.

The distribution of intestinal parasites are influenced by several factors such as quality of the potable water, level of sanitary condition and the personal hygiene of the prison population. In our study, the prevalence of intestinal parasites among prison inmates was found to be 7.89% [Table 1]. Gupta et al¹⁰ found high prevalence of intestinal parasites (42.8%) among prison inmates of Yerwada jail, Pune, Maharashtra. Prevalence rate of 20.67% was reported in a similar study conducted by Kumar et al¹ at Gulbarga, Karnataka. Central jail of Bhopal is the first ISO certified jail of the country. It is spread over 151.22 acres with all types of medical and health facilities. This might be the reason for low prevalence of parasitic infection in the present study.

As shown in the Table 2, the prevalence of protozoan infection in our study was higher (7.0%) as compared to helminth infection (0.9%). In a similar study conducted by Okolie¹¹ in 2009 reported higher prevalence rate of protozoan infection (44.6%) than helminth infection (32.40%). Distribution of intestinal parasites in prison inmates showed that *Entamoeba histolytica* was the predominant protozoan parasite (5.26%) and *Taenia* spp was only 0.87% whereas in a study conducted by Colman et al¹² among prison inmates revealed that *Entamoeba coli* (9.95%) was predominant parasite and *Taenia* spp was found least (1.01%). The decrease in prevalence of *Taenia* infection may be due to unavailability of non-vegetarian food.

Urinary tract infection may vary from asymptomatic presence of bacteria in urine to severe infection of the kidney with sepsis. It is a major cause of morbidity in both the hospital and community settings, the situation is further complicated if the bacteria causing UTI develops drug resistance. Out of 111 urine samples received during study period, uropathogens were isolated from 11(9.91%) samples as shown in Table 3. This study was in contrast to the study conducted by Kumar et al¹ where lower number of growth positivity and urinary calculus (0.67%) was recorded. In this study, the gram negative bacilli constituted (6.31%) of the total bacterial isolates while gram positive cocci constituted (3.60%) [Table 3]. To the best of our knowledge no studies were conducted regarding urinary pathogen among prison inmates so far. The study conducted in community by Prakash et al¹³ revealed gram negative bacilli to be (90.32%) and gram positive cocci was constituted (9.68%) which was much higher than our findings. The higher prevalence of gram negative bacilli among prison inmates and community is attributed to the fact that gram negative bacilli related to enterobacteriaceae are the primary agents causing urinary tract infection and has many factors responsible for their attachment to the uroepithelium. In addition, they are able to colonize in the urogenital mucosa with adhesins, pili, fimbriae, and P-I blood group phenotype receptor.¹⁴

In the present study *E.coli* (2.70%) was the most common isolated uropathogen among prison inmates. *K. pneumoniae* (1.80%), *S.aureus* (1.80%) and CONS (1.80%) are the second commonest uropathogens causing UTI in the prisoners [Table 4]. These findings were consistent with the study conducted by Prakash et al,¹³ where *E.coli* (42.58%) was found more prevalent followed by *K.pneumoniae* (18.7%), *P.aeruginosa* (12.90%), *S.aureus* (9.68%), *Proteus spp* (9.03%) and *Enterobacter spp* (7.10%). In another study conducted by Khameneh et al¹⁵, in a combined population of community as well as in hospital setting showed *E.coli*

(78.5%) as the commonest isolate followed by *Klebsiella*, *Proteus* and *Staphylococcus*.

Antimicrobial susceptibility pattern of isolated gram negative bacteria are shown in Table 5. Among the various antibiotics used against gram negative isolates imipenem (85.71%) and amikacin (85.71%) were found to be most effective followed by gentamicin (71.43%). These findings are comparable with the previous study conducted by Nema et al¹⁶ where gram negative uropathogens showed (94.44%) susceptibility to imipenem, 80.24% susceptibility to amikacin followed by gentamicin (64.19%). Similar findings were also reported by Saleh et al.¹⁷ In a study conducted by Alzohairy et al,¹⁸ highest susceptibility was reported to imipenem, amikacin, ciprofloxacin and gentamicin. In our study, high degree of resistance was observed to β lactam group of antibiotics like ampicillin, 2nd and 3rd generation cephalosporins and aztroenam which was comparable to the study conducted by Murugan et al.¹⁹ Low level of susceptibility to trimethoprim-sulfamethoxazole (28.57%) norfloxacin (28.57%) and nalidixic acid (14.28%) was observed. Similar finding in gram negative uropathogens was also reported by Nema et al¹⁶ with low sensitivity to oral antimicrobial agents like trimethoprim sulfamethoxazole (39.72%), norfloxacin (34.56%) and nalidixic acid (19.85%). Vakilwala et al²⁰ also reported lower susceptibility to trimethoprim sulfamethoxazole (26.66%). These findings in gram negative isolates of uropathogens indicate that these drugs no longer be useful in the treatment of UTI.

All the isolates of Gram positive cocci were found to be sensitive to vancomycin, linezolid and amikacin [Table 6]. Nema et al¹⁶ also found similar pattern of susceptibility to gram positive uropathogens to vancomycin (100%), linezolid (100%) and amikacin (84.78%). It was observed that there was only one isolate of *S. aureus* resistant to methicilin. In a study conducted by Murugan K et al¹⁹ at Tamilnadu significant vancomycin resistance (20%) was reported among *Staphylococcus spp* which was contrast to our study. The least sensitivity was observed to trimethoprim-sulfamethoxazole, gentamicin, nitrofurantoin & norfloxacin.

Conclusions

IPIs and UTIs are an important public health problem in tropical countries. The prison population consists of most vulnerable groups who are underprivileged members of society. These victims are often people with poor health and chronic untreated conditions. Although low prevalence rate of both intestinal parasites and UTI were found in our study, similar periodical studies are necessary to know their health status. This will help the prison authorities to plan intervention strategies for improving health of prison inmates.

Acknowledgement

We are thankful to Indian Council of Medical Research (ICMR) for accepting this topic for Short Term Studentship ICMR Project.

Conflict of Interest: None

Source of Support: Nil

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How to cite this article: Amit D, Kiran T, Shashwati N. Prevalence of intestinal parasites and urinary pathogens among prison inmates in central jail of Bhopal (MP). *Indian J Microbiol Res* 2016;3(1):47-52.