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Prevalence of *Escherichia coli* in urinary tract infections in the people of Hajipur (rural area)

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Abstract: *Escherichia coli* (*E. coli*) is one of the most common pathogen causing 60 to 90% of Urinary tract infection. UTI is one of the health problems in the rural area in all ages and both sexes. This study focused on the prevalence of *E. coli* in different gender and age presenting with signs and symptoms of UTI in the rural area of Hajipur (Bihar). In 82 urine samples 55 from females and 27 from males, the found cases showed that *E. coli* was prevalent in UTI of the both females and males patients. It was significantly occurred and more frequently in females (66%) than males (34%). It was found that the *E. coli* and then *Klebsiella* sp. was the most common gram negative and *Streptococcus* was the most frequent gram positive isolates. There was significant increase in the UTI of *E. coli*, *Klebsiella*, *Staphylococcus*, *Pseudomonas* and *Proteus* spp; was found more in females than males due to anatomical, poor hygiene and sanitary conditions in females. All urine sample was- fulfill the criteria for significant bacteriuria ($>10^5$ colony-forming units (CFU)/ ml.)

Keywords: *Escherichia coli*, urinary tract infection, females and males, Hajipur

INTRODUCTION

Urinary tract infection (UTI) is broadly defined as an infection of the urinary system, and may involve the lower urinary tract or both the lower and upper urinary tracts.¹ Anatomically, UTI can be classified into lower urinary tract infection involving the bladder and urethra and upper urinary tract infection involving the kidney, pelvis and ureter. The majority of the UTI occurs due to ascending infection.^{2, 3} The infections can affect several parts of the urinary tract, but the most common type is a bladder infection (cystitis).

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UTIs are among the most common bacterial infections in humans both in the females and males, and they occur in all age groups. Most common cause of urinary tract infections is *Escherichia coli*, which uses panoply of virulence factors to cling to epithelial cells and cause inflammation. Other frequently encountered urinary pathogens are *Klebsiella*, *Staphylococcus*, *Pseudomonas* spp and *Proteus* spp., *E. coli* often gains entry into the urinary tract via stool. Females are more prone to UTIs than males because their urethra is much shorter and closer to the anus,⁴ giving the bacteria easier access to the bladder, where the majority of UTI occur.

Urinary tract infections may be asymptomatic, symptomatic, acute and chronic in both male and females.

Asymptomatic infection can be diagnosed by culture. Asymptomatic bacteriuria may be defined as the “presence of actively multiplying bacteria within the urinary tract excluding the distal urethra”, at a time when the patient has no urinary tract symptoms.^{5,6} The definition of a symptomatic UTI generally requires the presence of urinary tract-specific symptoms in the setting of significant bacteriuria with a quantitative count of $\geq 10^5$ colony forming units of bacteria per milliliter (CFU/ml) in one urine specimen.⁶

Bacteriuria is defined as the presence of bacteria in urine. Acute UTI is more frequently seen in female of all ages; these patients are usually treated on an outpatient basis and are rarely admitted to hospital. Chronic UTI in both males and females of all ages is usually associated with underlying diseases (e.g. pyelonephritis, prostatic disease, or congenital anomalies of the genitourinary tract) and these are most often hospitalized.

Against this background, as well as the paucity of reports of urinary tract infections in our rural community (surrounding Hajipur), this study was undertaken. The aim of this study is to determine the prevalence of *E. coli* in urinary tract infection in rural community as well as the effect of gender and age on its prevalence.

MATERIALS & METHODS

This study was conducted in some neighboring rural communities (villages) Hajipur. After giving questionnaires about their lifestyle two hundred and sixty-seven (267) morning clean catch midstream urine samples were randomly collected from peoples of different rural areas in Hajipur.

Significant bacteriuria was observed in 82/267 (30.8%). A “clean catch” midstream urine sample was collected from each patient into sterile screw-capped universal container, containing few crystals of boric acid as preservative. The specimen was mixed, labeled and transported to the laboratory for processing.

A total of 82 patient’s sample from said rural areas with signs and symptoms of UTI. They consisted of 55 females & 27 from males with age ranging from 18 to 70 years. All urine sample was- fulfill the criteria for significant bacteriuria ($>10^5$ cfu/ml), sample inoculation, bacterial isolation and identification, was performed by standard methods, using by Vandepitte *et al.* (2003)

Cheesbrough (2002).^{7,4} Identify the bacteria by colony morphology and biochemical test.⁴

RESULTS & DISCUSSION

A total of 82/267 (30.8%) samples 55 from females and 27 from males cases, *Escherichia coli* strain were 50 (60.9%) among all isolated bacteria with UTI during the study period (Table 1). This is followed by *Klebsiella* spp (14.6%) *Staphylococcus* (12.1%), *Pseudomonas* spp (8.5%) and *Proteus* spp (3.6%). Isolated bacterial distribution from females and males cases was, females 33 (66%) and males 17 (34%). (Table 1) It was found of that *E. coli* was the most prevalent in UTI of both male and female patients. It was significantly occurred and more frequently in females (70.9%) than males (40.7%). (Table.1).

The prevalence of UTI was highest within the 28-37 years age group (30.9%), and was least above the 68 years (6.27%) in females but in male highest in above 68 years age group and least within the 18- 27 years age group. (Table 2) .

E. coli often gains entry into the urinary tract via stool. Women are particularly at risk for UTIs because their urethra sits close to the anus, where *E. coli* is present. It’s also shorter than a man’s, giving the bacteria easier access to the bladder, where the majority of UTIs occur, and the rest of the urinary tract. In the very old and the very young females, symptoms may be vague or non-specific.⁸ There was significant increase in UTI with increasing age of male patients due to prostatic hypertrophy causing obstruction to the normal flow of urine leads to high UTI.

In this study evaluation was conducted on bacterial distribution of UTIs isolates. *E. coli* (60.9%) was the prevalent isolate isolated from the urine specimen followed by *Klebsiella*, *Staphylococcus*, *Pseudomonas* and *Proteus* spp. *E. coli* was higher in all isolates, and females are more affected than males. Our result is further supported by different authors .^{9, 10} Similar pattern was seen in study done by other studies. The second most common uropathogen in this study was *Klebsiella*, followed by *Pseudomonas* and *Proteus* spp.¹¹

A similar percentage of *E. coli* has been obtained in Bettiah (Bihar)¹² 59.26%, Rohtas (Bihar)¹³ 64.57%, Nepal (55%),¹⁴. But a different percentage of *E. coli* has been reported in Kathmandu Valley¹⁵ (49%).

Kumari & Kumari-Prevalence of *Escherichia coli* in urinary tract infections in the people of Hajipur (rural area)

There was significant increase in UTI was higher in females than males due to poor hygiene and sanitary conditions in females and also due to the shortness of the female urethra. Malnutrition, poor hygiene, low socio-economic statuses are associated with urinary tract infections and these factors are usually found in rural settings.¹⁶

CONCLUSION

To sum up, *E. coli*s most prevalent uropathogen in the cases of both female and male patients, but it is more prevalent in cases of female due to anatomical structure i.e, the shortness of the female urethra. Hygiene & sanitary condition are also responsible for causing more cases of *E.coli*, so in order to manage these infections the hygiene and sanitary issues should be addressed sincerely. From this, we suggest that Gram stain of centrifuged urine is a very sensitive screening method to detect bacteriuria.

Table 1. Isolated bacterial distribution from UTI among females and males.

| Isolated bacteria | No. of isolates and %age | No. of isolates & % in Female | No. of isolates & % in Male |
|------------------------|--------------------------|-------------------------------|-----------------------------|
| <i>E.coli</i> | 50 (60.9) | 39 (70.9) | 11 (40.7) |
| <i>Klebsiella</i> spp | 12 (14.6) | 8 (14.6) | 4 (14.8) |
| <i>Staphylococcus</i> | 10 (12.19) | 7 (12.7) | 3 (11.1) |
| <i>Pseudomonas</i> spp | 7 (8.5) | 5 (9.09) | 2 (7.4) |
| <i>Proteus</i> spp | 3 (3.6) | 2 (3.6) | 1 (3.7) |

Table-2 Distribution of UTI patients according to age group and gender

| Age groups in year | No. of females infected (%) | No. of males infected (%) |
|--------------------|-----------------------------|---------------------------|
| 18-27 | 9 (16.3%) | 0 |
| 28-37 | 17 (30.9%) | 0 |
| 38-47 | 12 (21.8%) | 2 (7.4%) |
| 48-57 | 7 (12.7%) | 4 (14.8%) |
| 58-67 | 6 (10.9%) | 9 (33.4%) |
| >68 | 4 (7.27%) | 12 (44.5%) |

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