Int. J. Mendel, Vol. 34 (1-2), 27-30, 2017 HUMAN PATHOLOGY ISSN0970-9649

DISTRIBUTION PATTERN OF UTI (URINARY TRACT INFECTION) ISOLATES IN HUMAN POPULATION OF GAYA TOWN

Murli Dhar Mishra*

Key words : Urinary Tract Infection, *E.coli, K.pneumoniae, P. aeruginosa*

Urinary tract infection is one of the most common type of infection reported around the world. It is mainly caused by bacteria such as *Escherichia coli, Pseudomonas aeruginosa* and *Klebsiella pneumoniae*. To our knowledge a comprehensive review of distribution pattern of UTI isolates in human population of Gaya town has not been attempted uptill now; hence this study was undertaken. *E. coli* was found to be the most dominant pathogen in females while *P. aeruginosa* was found to be more frequent in males. The frequency of UTIs in females was higher as compared to that in males. Close proximity of the urethral metus to the anus and shorter urethra in females and bad toilet conditions have been ascribed to the higher frequency of UTIs in them as compared to males.

INTRODUCTION

Urinary tract infections (UTIs) have plagued mankind long before bacteria were recognized as the causative agents of disease and before urology became an established medical speciality. Urinary tract infections have been described since ancient times and the first documented report was traceable in the Ebers papyrus in 1550 BC (Al-Achi Antoine, 2008). It was described by Egyptians as "Sending forth heat from the bladder" (Wilson & Graham, 1990).

This is the most widespread microbial disease in India as per record of WHO. The common pathogenic bacteria causing UTI are *Escherichia coli*, *Klebsiella pneumoniae*, *Haemophilus influenza*, *Streptococcus pneumoniae* and *Proteus vulgaris* (Anita *et al.* 2011). According to different workers, UTIs are more common in females than in males. The clinical manifestations of UTI depend on the portion of the urinary tract involved, the etiological organisms, the severity of the infection and the patient's ability to mount an immune response to it (Foxman and Brown, 2003). Signs and symptoms may include fever, chills, dysuria, urinary urgency, frequency and cloudy or malodorous urine. If bacteria enter the blood stream, they could cause severe complications, including septicaemia, shock and rarely death (Mohsin *et al.* 2010).

MATERIAL AND METHODS

Collection of Urine sample : A total of 200 urine samples were collected from clinically diagnosed patients of different hospitals of Gaya town. Urine samples were collected through a clean-catch method in sterile containers. Containers were finally transported to laboratory in an ice cold condition by adding boric acid at a final bacteriostatic concentration of 1.8% without delay (Porter *et al.* 1969).

Isolation of bacteria causing UTI from urine sample : The media used in the present investigation include Nutrient agar medium, MacConkey agar and Hi-chrome UTI agar.

Identification of Bacteria : After incubation, colonies were selected and characterized on the basis of morphological, cultural and biochemical characteristics.

(a) **Morphological analysis of urine specimen:** Slides were prepared from different colonies observed on the plates and Gram's staining was performed. The growth of the bacterial colony was monitored by microscope after Gram's staining.

(b) **Cultural observation :** Colour, size and colony morphology were observed from the incubated plates.

(c) **Biochemical examination :** Six biochemical tests were performed for each organism; they are lactose fermentation test, citrate utilization test, Indol test, Methyl red test, Voges-proskauer test and catalase activity test.

OBSERVATIONS

A total of 200 urine samples were collected, out of which 41% (n = 82) were males, and 59% (n = 118) were females. It was observed that 61.5% cases are positive and the rest, i.e., 38.5% (n = 77) are not positive (Table-1). All the positive urine samples showed significant bacterial growth in which 36(43.9%) samples from males and 87(73.72%) from females showed the growth (Table-1). These results indicated that the prevalence of UTI was higher in female patients than in males (Table-1).

Further investigation revealed that *Escherichia coli* was found to be the most predominant uropathogen and its

* Department of Biotechnology, Gaya College, Gaya

percentage was 69.91% (n = 86); pathogenecity of *Klebsiella pneumoniae* 19.51% (n = 24) and *Psedumonas aeruginosa* 10.56% (n = 13) were comparatively very less in percentage (Table – 2). In the present investigation all the three isolates were Gram negative and there was complete absence of Gram positive bacteria.

Genderwise analysis of results indicated that *E.coli* was the predominant isolated pathogen from both sexes. It occurred more frequently in women (73.25%) as compared to men (26.74%). The second most prevalent isolate was *k. pneumoniae* with percentage contribution of 79.16% in females and 20.83% in males. The incidence of UTI due to *P. aeruginosa* was higher in men than in women. It was 61.53% in men and 38.46% in women (Table-3). *E. coli* and *K. pneumoniae* were more frequent in females, whereas *P. aeruginosa* showed higher incidence in males.

Table-1
Sample collection details and categories based on sex

Total No. of samples	Male samples	Positive cases	Percentage of +ve cases	Female Samples	Positive cases	Percentage of +ve cases
200	82	36	43.90%	118	87	73.72%

Table-2
Distribution of bacterial isolates from urine samples (n = 200)

Types of Bacteria	Types of isolates	No. of each isolates	Percentage of each isolate
Gram's Negative	1. *E. Coli*	86	69.91%
	2. *K. pneumoniae*	24	19.51%
	3. *P. aeruginosa*	13	10.56%
Gram's Positive	Nil	Nil	Nil

Table – 3
Distribution of three frequently isolated Gram negative isolates according to patient's sex

Organisms	Total No. of Isolates	No. of females	Percentage	No. of Males	Percentage
E.Coli	86	63	73.25%	23	26.74%
K.pneumoniae	24	19	79.16%	5	20.83%
P.aeruginosa	13	5	38.46%	8	61.53%

DISCUSSION

The incidence of UTI was found to be 61.50% in the collected samples (n = 200). This rate of prevalence is higher than in other studies which accounts for 38% (Bartan *et al.* 2008). In other studies, the prevalence of UTI accounts for 38.6% (Akinyemi *et al.* 1997) and 36.68% (Mehta *et al.* 2013). Some other studies revealed higher percentage of UTI as reported by Orrett (2001) in South Trinidad and by Morua *et al.* (2009) in the Mexican populations. They reported higher incidence of UTI and it was 49% and 97.3% respectively. In the present investigation, higher incidence of UTIs in females (73.72%) was reported than in males (43.90%). Randrianirina (2007) also reported higher incidence of female urinary tract infection (75%) than in males (25%). It has been calculated after viewing most of the data related to UTI that infections are 14 times more common in females than males (Annonymous, 2001).

In the present study positive causes of UTIs have been found to occur due to bacteria. This was also supported by David *et al.* (2005). In current investigation, *E. coli* has been found as the major agent in causing UTI. This finding is in line with studies done by McNulty, (2004). The prevalence of *K. pneumoniae* in this study (19.15%) is almost the same as the percentage reported by Tenssaie (2001) in his finding in Ethiopia (19-21%). In our study, percentage of *P. aeruginosa* was 10.56%. This finding did not correlate with other reports in which *P. aeruginosa* was reported as the second most common bacterial isolate in UTI studies in India (Tambekar *et al.*, 2006).

Sexwise break up revealed that *E. coli* was common in females (73.25%). Similar observations were made by Obi *et al.* (1996). The prevalence of *K. pneumoniae* in females was 79.16% and 20.83% in males. In this study *K. pneumoniae* has emerged as the second most common cause of UTIs. Current findings correlate with finding of Manjula *et al.* (2013). Most of the studies conducted in Africa and Arab countries showed S. *aureus* as the second most frequently isolated bacterium from female UTI cases.

In the present investigation the highest number of *P. aeruginosa* infected UTI cases were confined to males (61.53%). Other reports showed that the majority of the *P. aeruginosa* related UTI cases occurred in females as compared to males (Najar *et al.* 2009). According to kiffer *et al.* (2007) the incidence of UTI due to *P. aeruginosa* was higher in those males (14.7%) who were more than 60 years old, as compared to females of the same age group. According to literature, *P.aeruginosa* is more frequent in males due to particular characteristics inherent to the patient, including sex, previous interventions in the urinary tract and patients with neurogenic bladder (Tabibian *et al.* 2008).

In this study the majority of isolates as *E. coli* and *K. pneumoniae* belong to the family Enterobacteriaceae. Studies conducted by Quinteros *et al.* (2003) and Hansotia *et al.*(1997) on ESBL production in members of Enterobacteriaceae isolated from clinical specimen showed 9-50% ESBL (Extended spectrum β-Lactamase) producers. β-lactams are the most widely used antibiotics and β-Lactamases are the greatest source of resistance to them. ESBLs are produced by the Enterobacteriaceae family of Gram-negative organisms, particularly *Klebsiella pneumoniae* and *E. coli*. The family Enterobacteriaceae are causing more than 70% of UTIs and among them the most important is *E. coli*, found in 80% of total cases as reported by Uzunovic (2009). In our study also, *E. coli* was found to be the most dominant bacterium causing urinary tract infection.

References

Al-Achi, Antoine (2008). An introduction to botanical medicines : history, science, uses and dangers. Westport, Conn : praeger publishers. P. 126.

Anita, P., Anthoni Samy, A and Raj J. S., (2011). *In Vitro* Antibacterial activity of *Aegiceras corniculatum* and *Burguiera cylindrica* Against Isolated Bacterial Urinary Tract Infections : IJPRD, 3(11) : 120-125.

Annonymous, (2001) An epidemic of urinary tract infection. Eng. N. Med. J., 345 : 1085-1057.

Barton M, Belly, Thame M, Nicholsan A, Trotman H (2008). Urinary tract infection in neonates with serious bacterial infections admitted to the university hospital of the West Indies. West Indian Med J. 57 (2) : 101.

David, R. D., P. M. De Blieux and R. Press, 2005. Rational antibiotic treatment of outpatient genitourinary infection in a changing environment. Am. J. Med.,118 (7A) : 75-135. Foxman B, Brown P., (2003). Epidemiology of Urinary tract infections : transmission and risk factors, incidence and costs. Infec. Dis. Clin Norta AM. 2003 Jun; 17(2) 227-41.

Hansotia J. B., V. Agrawal, A. A. Pathak and A. M. Saoji, (1997). Extended spectrum beta lactamases mediated resistance to third generation cephalosporins in *Klebsiella pneumoniae* in Nagpur, Central India. Ind. J. Med Res., 105 : 156-161.

Kiffer, C. R. C Mandes, C. P. Oplustil and J. L. Sampaio, 2007. Antibiotic resistance and trend of urinary pathogens in general out patients from a major urban city. Int. Braz. J. Urol., 33(1) : 42-49.

K. O. Akinyemi, S. A. Alabi, M. A.Taiwo, and E. A. Omonigbehin (1997). Antimicrobial susceptibility pattern and plasmid profile of pathogenic bacteria isolated from subjects with urinary tract infections in Lagos,Nigeria," Nigerian Quarterly Journal of Hospital Medicine, Vol. 1. 7-11.

Manjula, N. G. Girish, C. Math., Shripad. A Patil; Subhaschandra M. Gaddad., Channapa. T. Shivannavar (2013), Incidence of Urinary Tract Infections and its Ateiological Agents among pregnant woman in Karnataka Region. Advance in Microbiology, 3, 473-478.

M. Mehta, S. Bhardwaj, and J. Sharma (2013). "Screening of urinary isolates for the prevalence antimicrobial susceptibility of Enterobacteria other than *Escherichia coli*", International Journal of Life Science and Pharma Research, Vol. 3, no. 1, 100-104.

Mohsin R, Siddiqui KM Recurrent urinary tract infections in females. J. Pak Med Assoc. 2010; 60; 55-9.

Najar MS, Saldanha CL, Banday KA (2009). Approach to urinary tract infections. Indian J. Nephrol 19 (4) : 129-139.

Obi cl, Tarapiwa A, Simango C (1996). Scope of urinary pathogens isolated the public heath bacteriology laboratory Harare antibiotic sensitivity patterns of isolates Cent.Aft. J. Med; 8244-8249.

Porter, A. and Brodie, J. (1969). Boric acid preservation of urine samples. British Medical Journal 2 : 353-355.

Quinteros, M. M. Radice, N. Gardella, M.M Rodriguez, N. Costa, D. E. Korbenfeld G. Counto, Gutkind and the Microbiology study Group, (2003). Extended spectrum beta lactamases in Enterobacteriaceae in Buenos Aieres, Argentina, Public Hospitals. Antimicrob Agents Chemother., 47 (9) : 2864-2867.

Randrianirina F., J. L. Soares, J.F. Carod, E. Ratsima, V. Thonnier, P. combe, P. Grosjean and A. Talarmin, (2007). Antimicrobial resistance among uropathogens that cause community acquired urinary tract infections in Antananarivo. Madagascar J. Antimicrob, Chemother., 59 (2) : 309-312.

Tabibian JH, Gornbein J, Heidari A, Dien SL, Lau VH, Chahal P, Churchill BM, Haeke DA (2008) : Uropathogens and host characteristics. J clin. Microbiol. 2008, 46 : 3980-3986

Uzunovic – kamberovic S. Medicinska microbiologija. I etal Zenica (2009) : Stamparija Fujnica; 2009 : pp 367-75.

Wilson – general ed; Graham(1990) Topley and Wilson's principles bacteriology, virology and immunity : in 4 volumes (8 ed.). London : Arnold P. 198. ISBNO-7131-4291-9.