

# RISK FACTORS IN URINARY TRACT INFECTION

M. Ramzan, S. Bakhsh, <sup>1</sup>A. Salam, G. M. Khan, <sup>2</sup>Ghulam Mustafa

Department of Pharmaceutics, Faculty of Pharmacy, Gomal University, Dera Ismail Khan (NWFP) Pakistan.

<sup>1</sup>Women Medical Abbottabad (NWFP) Pakistan.

<sup>2</sup>Department of Pharm. Chemistry, Faculty of Pharmacy, Gomal University, Dera Ismail Khan (NWFP) Pakistan.

## ABSTRACT

**Background:** There are many intrinsic and extrinsic factors risk factors which are the leading causes of urinary tract infection. To investigate the relationship of various risk factors to urinary tract infection a study was conducted on one hundred patients.

**Materials and Methods:** Detailed history and physical examination was carried out in each patient. Fifty-seven were male while female patients were 43. The age range was 1-70 years.

**Results:** In majority of patients (15%) urolithiasis was associated with urinary tract infection. Benign prostrate hypertrophy was the second (10%) leading risk factor causing urinary tract infection. Catheterization and pregnancy almost equally contributed (4% and 5%) and acted as risk factor. Minor contribution was made by risk factors like tumor in kidney, non-functional kidney, kinking of uterus, kidney transplant, myxoedema, diabetes, etc. In almost sixty percent cases the risk factor cannot be identified and no visible cause was present that resulted in the occurrence of urinary tract infection.

**Conclusion:** The chances of urinary tract infection increases in the presence of risk factors. The hot weather in the study area and dietary habits may also contribute to urinary tract infection in these cases.

**Key words:** Risk factors, CLED Medium, MacConkey Agar, Blood Agar, Biochemical Screening.

## INTRODUCTION

Under normal circumstances, the urine is sterile until it reaches the distal urethra. Various defense mechanisms of the body prevent the infection of urinary tract. One of the most important defense mechanism is the out ward flow of urine that can clear 99% of the organisms experimentally inoculated in the bladder. The acidic pH (5.5) and low osmolarity of urine also discourage the bacterial growth.<sup>1</sup> Similarly there are a number of factors that increase the risk of developing urinary tract infection. Some of these are: sex, age, pregnancy, catheterization, kidney stone, tumors, urethral strictures, neurological diseases, congenital/acquired anomalies of bladder, vesico-ureteric reflex, suppressed immune system, diabetes mellitus, enlarge prostate, ureteric stresses etc.<sup>2</sup>

In infants the incidence of urinary tract infection is more in male than female due to higher incidences of obstructive anomalies of urinary tract in boys than in girls. After one year, the urinary tract infection is more frequent in girls than boys because the female urethra is small and chances of vaginal vestibular contamination with fecal flora are more. In school age, the frequency of bacteriuria is 0.5%, where as in girls it is 2%. After this age, the men have rare urinary tract infection until the age of 40. There is regular increase in the rate of urinary tract infection with age in women. At

the age of seventy, about 10% women have urinary tract infection. In younger women, the incidence of the disease has some correlation with sexual activity.<sup>3</sup> During pregnancy, the tendency of urinary tract infection increases partly due to the pressure of gravid uterus on the ureters causing stasis of urine flow and is also attributed to the humoral and immunological changes during normal pregnancy.<sup>4</sup>

In patients with various diseases, the incidence of urinary tract infection is 20% for diabetes mellitus, 14% for hypertension, 80% for hydronephrosis and nephrolithiasis and greater than 50% for long term indwelling catheters. Twenty five percent of pregnant women with asymptomatic bacteriuria go on to develop acute pyelonephritis<sup>1</sup>

## MATERIAL & METHODS

A total 100 patients (both males and females), belonging to Dera Ismail Khan (NWFP) and Bhakkar (Punjab) with urinary tract infection and thirty normal controls were included in this study. All the patients were provided with wide mouthed, tightly closed sterilized bottles. The bottles were sterilized in hot air oven by dry heat at 160 C° for one hour. The patients were advised to collect clean catch, mid stream early morning specimen of urine. The patients were instructed to hand over the specimen to

the laboratory within half an hour of the collection of specimen. In any case when it was not possible to reach the laboratory in time, they were asked to put the specimen in the refrigerator. The patients were asked to wash the hands thoroughly with antiseptic (detol) soap, then to clean the urethral meatus in male and to wash the vulva with detol water in female. They were asked to destroy the first part of the urine and to collect the mid stream in the sterilized bottle. With the help of one millimeter sterilized nicrome wire loop, the samples were obtained from uncentrifuged urine specimen and were streaked on Blood agar, MacConkey agar and CLED medium at one and same time according to standard procedure. After streaking the plates were kept in the in-

cubator at 35 – 37 C° for 18 – 24 hours. When the growth was obtained either on Blood agar, MacConkey agar or on CLED medium, the identification of the responsible pathogen was confirmed by the observation of colony characteristics, Gram staining and biochemical screening using different tests.

## RESULTS

The present study was undertaken on one hundred patients of urinary tract infection of either sex (both male and female) and twenty normal males and ten normal female controls. The detail results are given in the proceeding tables.

**Table 1: Distribution of Patients according to Age**

AGE (in years)	No. of patients	Male	%age	Female	%age
1 — 15	6	2	33.33	4	66.67
16 — 40	61	31	50.82	30	49.18
41 — above	33	24	72.73	9	27.27
Total	100	57	57	43	43

**Table 2: Distribution of Urinary Tract Pathogens with Sex of the Patients**

S. No.	Organism Isolated	Total	Male	%age	Female	%age
1	Staph. saprophyticas	43	24	55.81	19	44.19
2	Staph. Aureus	19	10	52.63	9	47.63
3	Micrococcus	4	3	75.00	1	25.00
4	Streptococci	5	2	40.00	3	60.00
5	E. coli	11	7	63.64	4	36.36
6	Serratia spp.	9	6	66.67	3	33.33
6	Enterobacter spp.	4	4	100	—	—
7	Klebsiella spp.	2	—	—	2	100
8	Proteus mirabilis	1	—	—	1	100
9	Pseudomonas aeruginosa	1	—	—	1	100
10	Candida spp.	1	1	100	—	—
	Total	100	57		43	

**Table 3: Showing the Frequency of Risk Factors in Urinary Tract Infection**

S. No.	Name of the Risk Factor	Total cases	%age
1	Stone	15	15
2	Enlarge Prostrate	10	10
3	Catheterization	4	4
4	Pregnancy	5	5
5	Tumor in Kidney	1	1
6	Non Functional Kidney	2	2
7	Kinking of Uterus	1	1
8	Kidney Transplant	1	1
9	Myxoedema	1	1
10	Diabetic	1	1
11	Unknown	59	59
	Total	100	100

## DISCUSSION

Urinary tract infection is one of the most common types of infectious diseases encountered in the practice of medicine today. Intensive investigations of these infections has been carried out during the past three decades in an attempt to define more accurately the epidemiology, pathogenesis, natural history, treatment and prevention of these infection.<sup>1</sup> There are many intrinsic (such as urinary obstruction and pregnancy) and extrinsic risk factors (such as catheterization and other invasive procedures), which are the leading causes of urinary tract infection.<sup>2</sup> It has been shown that a single transient catheterization of bladder induces bacteriuria approximately in 1% of ambulatory and 10% of bed ridden patients.<sup>5</sup> Therefore, the best way of preventing the catheter associated urinary tract infection is to avoid the unnecessary use of catheter and their prompt removal when they are no longer needed.<sup>6</sup> In our study 4% of patients were catheterized.

The hormonal changes in pregnancy leads to decreased bladder tone, diminished peristalsis and dilatation of renal pelvis and ureter<sup>2,5</sup> It has been claimed that pregnancy produces physical obstruction in the female urinary tract and obstruction is one of the important risk factor for the development of the infection.<sup>4,7</sup> Pregnant women have recurrent

urinary tract infection with common urinary tract pathogens.<sup>3</sup> It has been shown that 25% of pregnant women with asymptomatic bacteriuria go on to develop an acute pyelonephritis<sup>1</sup>. Epidemiological data from western Australia regarding the *Staphylococcus saprophyticus* as urinary tract pathogen has been reported and found that in pregnant females the proportion of *Staphylococcus saprophyticus* was 6.5%.<sup>8</sup> In our study 5% pregnant patients developed urinary tract infection. The decreased incidence in our study may be due to the better toilet hygiene in our patients due to religious regions.

Urinary tract obstruction is one of the main causes of urinary tract infection, which produces the favourable environment for the growth of urinary tract pathogens. The presence of stone is one of the main causes of urinary tract infection.<sup>2</sup> The work done by Naqvi and his associates show that among 180 children with bladder stone diseases when cultured, 22.2% were having positive urine cultures.<sup>8</sup> In our study 15% of patients with urinary tract infection had stone in kidney or in bladder. In all these cases significant growth ( $>10^5$  CFU/ml) was obtained when the early morning clean catch uncentrifuged urine specimen was cultured. This gives a strong support to the studies undertaken by Anwar Naqvi et al (1984).

The presence simple bacteriuria particularly in females should not be neglected. It may act as a risk factor for urinary tract infection.<sup>3</sup> The prevalence of bacteriuria in female population increases gradually with time reaching 5% in women of child bearing age and 10-20% in post menopausal women. These infections may morbid or asymptomatic, acute or chronic, singular or recurrent. Some time they can produce permanent damage to kidney. In our study 15 out of 43 female patients (35%) showed significant bacteriuria.

The presence of pus cells in urine (pyuria) is an indication of the urinary tract infection. Plorade et al. (1984) reported that approximately 75% of the patients with urinary tract infection have pyuria.<sup>5</sup> In our study pyuria was present in 77% cases, which is in close conformity with that of Plorade study.

Diabetics are at higher risk of urinary tract infection due to the unfavorable metabolic changes such as elevated blood sugar levels, which suppress the immune system.<sup>2</sup> In our study there is one diabetic case, which support this idea. In 60% cases no visible risk factor was identified. The existence of clear hot weather called stone season in which this study was carried out may be responsible for the occurrence of urinary tract infection. The resulting dehydration and secondly dietary habits in this geographical area may lead to the occurrence crystaluria and urinary tract infection.

Concludingly it is states that the chances of urinary tract infection increase in the presence of risk factors. It is suggested that the patients with risk factors should be regularly checked and examined by the visiting clinicians. They should be promptly treated after the proper investigation and the risk factors be avoided to prevent the development of recurrent urinary tract infection.

## REFERENCES

1. Linda L H, and J W Freston, 1980, Diseases: Manifestations and Pathophysiology. IN: Remington Pharmaceutical Sciences. 16<sup>th</sup> ed. Mack Publishing Company. Pennsylvania. pp: 615
2. www.Remedy-bladder-infection.com Call: 1. 877. 786. 8458
3. Steven A. S., "Genitourinary tract" IN: Current Medical Diagnosis and Treatment (1989). pp 595. ELSEVIER New York. Amsterdam. Oxford.
4. Jabbar, H. A., R. A Moumena, H. A Mosli, A. S. Khan, A. Warda. 1991. Urinary tract infection in pregnancy. *Annal of Saudi Medicine* 11(3): 322-24
5. Plorade J. J., J. C. Sherris, K. J. Ryan and C. Georgeray., 1984. Urinary tract infection. IN: *MEDICAL MICROBIOLOGY* 1<sup>ST</sup> ed . Elsevier NEW YORK \* AMSTERDAM \* OXFORD ELBS. TROPICAL HEALTH TECHNOLOGY / BUTTERWORTH. pp 601-7, 247-8
6. Vincet T and Andriol. 1987. Urinary tract infection: Recent developments. *The J. of Infectious Diseases.* 156(6): 865-8.
7. Schneider P. F., Riley T. V., 1996. *Staphylococcus saprophyticus* urinary tract infections. *Eur. J. Epidemiol.* 12(1): 51-4
8. Naqvi, A., S. A. H. Rizvi and S. Shajahan, 1984. "The role of infection in bladder stone in children. *J. P. M. A.,* 34(5):132-7.