

CLINICO-EPIDEMIOLOGY OF UTI IN UNDER 5 YEARS OF AGE IN CHILDRENSonali Suman¹, Smita Kumari², Ashutosh Kumar Sinha³, Banani Sengupta⁴, Prabhavati Banerjee⁵**HOW TO CITE THIS ARTICLE:**

Sonali Suman, Smita Kumari, Ashutosh Kumar Sinha, Banani Sengupta, Prabhavati Banerjee. "Clinico-Epidemiology of UTI in Under 5 years of Age in Children". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 47, June 11; Page: 8162-8170, DOI: 10.14260/jemds/2015/1182

ABSTRACT: Urinary tract infections (UTIs) are a common, potentially serious, and often occult bacterial infections of childhood. UTI is more frequent in females than males at all ages with the exception of the neonatal period. Urinary tract infections imply invasion of urinary tract by pathogens which may involve the upper or lower urinary tract depending on the infection in kidney, bladder and urethra. **OBJECTIVES:** To determine the incidence of UTI in febrile children below 5years of age and to know the aetiological profile of UTI among the same group of children with fever. **METHODS:** This cross sectional observational study included all febrile children from one month to 5years of age, admitted in Pediatric ward in MGM Medical College, Kishanganj, Bihar. **RESULTS:** Overall incidence rate of UTI in the present study was 6% with maximum incidence in children <2years of age. Among culture positive cases majority (50%) grew E. coli. DMSA revealed renal cortical scarring in 42. 85% cases following UTI. **CONCLUSION:** From the present study it can be concluded that UTI is a common bacterial infection in infant and children. Rapid evaluation and treatment of UTI is important to prevent renal parenchymal damage and renal scarring or renal failure.

KEYWORDS: Urinary tract infections (UTI), Renal scarring, Renal failure.

INTRODUCTION: Urinary Tract Infection (UTI) is one of the most common pediatric infections. UTI are the third most common infection in children in developing countries after those of gastrointestinal and respiratory tract.⁽¹⁾ The prevalence of UTIs varies with age. During the 1st year of life, the male: female is 1:1 in developing countries.^(1,2) Beyond 1-2 year, there is female preponderance, with male: female ratio of 1:10. The risk of developing symptomatic UTI before the age of 14years is 1 to 2% in boys and 3 to 8% in girls. The risk of UTI is higher in children with malnutrition and chronic diarrhea.⁽²⁾

About 90% of first symptomatic UTI and 70% of recurrent infections are due to E. coli.⁽¹⁾ In girls, 75-90% of all infections are caused by Escherichia coli, followed by Klebsiella spp and Proteus spp. Some series report that in boys >1 year of age, Proteus is as common a cause as E. coli i.e, one third of UTI in boys are caused by Proteus spp. Other report a preponderance of gram positive organisms in boys.

The three basic forms of clinical presentation of UTI are pyelonephritis, cystitis and asymptomatic bacteriuria.⁽¹⁾ Clinical pyelonephritis is characterized by any or all of the following: abdominal pain, flank pain, fever, malaise, nausea, vomiting and occasionally diarrhea. Sometimes fever may be the only manifestation. Pyelonephritis is the most common serious bacterial infection in children <24 months of age who have fever without an obvious focus. Involvement of renal parenchyma is termed pyelonephritis, whereas if there is no parenchymal involvement, the condition may be termed pyelitis. Cystitis indicates that there is bladder involvement; symptoms include dysuria, urgency, frequency, supra pubic pain, incontinence and malodorous urine. Asymptomatic bacteriuria refers to a condition in which there is a positive urine culture without any clinical

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manifestation of infection. It is most common in girls. The incidence is <1% in preschool and school age girls and is rare in boys.⁽²⁾ The incidence declines with increasing age. The condition is benign and does not cause any renal injury.

Approximately 10 to 15% of end stage renal disease is thought to be related to UTI in children that was often unrecognized and therefore, undertreated.⁽³⁾ Unlike occult bacteraemia or severe bacterial illness (In infants and children) little attention has been focused on the identification of UTI in febrile children under five years of age, despite recent information that suggests a high prevalence of UTI and significant associated morbidity in these patients. So we proposed to do the present study to estimate the incidence and etiological profile of urinary tract infection in febrile children less than five years of age.

MATERIALS AND METHODS:

Study Area: Pediatric Medicine ward, MGM Medical College and LSK Hospital, Kishanganj.

Study Population: All febrile children from one month to five years of age, admitted in pediatric medicine ward in MGM medical college, Kishanganj.

Study Period: From March 2014 to May 2015.

Sample: 300 febrile children below five years of age, admitted in MGM Medical College and LSK Hospital, Kishanganj.

Study Design: Cross sectional observational study.

Study Technique: Febrile children less than five years of age, admitted in pediatrics medicine ward were included in the study after taking valid informed consent from their parents or relatives. Data related to age, sex, nutritional status, socio economic status, bowel habits etc. were noted. A complete history related to onset, duration of fever and associated symptoms were obtained. A thorough physical examination with relevant investigations were carried out. Routine blood counts, urine analysis, urine culture and sensitivity were done. In children below two years of age either supra pubic or catheterization was done after proper aseptic measures for obtaining urine sample. Those samples showing pus cells >5cells per HPF in centrifuged urine sample and or positive culture were investigated further. USG examination was done in every case diagnosed as UTI. MCU, IVP, and CT scan of KUB was done when necessary.

RESULTS AND ANALYSIS: In the present study of 300 cases 171(57%) were males, 129(43%) were females. 82(27.33%) cases were <1year. Maximum cases were in age group <2years. In the present study 41 children (13.66%) showed pyuria in centrifuged urine sample of which 21(51.21%) were males and 20(48.79%) were females. Majority were <2years children (58.53%). Majority of children belonged to class II (54.66%) and class III (46.34%) according to modified Prasad's classification. Nutritional status of majority of children was normal (56.09%). 21.95% were in Grade I PEM, 23.80% were in Grade II PEM, 4.87% belongs to Grade III PEM and Grade IV PEM each. In our study among 300 children 41(13.66%) showed significant pus cells in urine, 65.85% of children with pyuria showed more than 5pus cells/HPF and 19.51% showed more than 10 pus cells /HPF. Only 14.63% showed numerous pus cells/ HPF.

In our study growth of single organism >100000 CFU/ml of urine was considered significant growth. 56.09% of pyuric children showed no growth on urine culture. Among positive cultures 50% showed E. coli. The other 50% showed Acinetobacter, Enterococcus, Pseudomonas, Staphylococcus and Klebsiella sp.

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Abdominal ultrasound with special reference to KUB was done in all culture positive cases. 5 out of 8 boys and 1 out of 10 girls having culture positive UTI showed various renal system abnormality. Rest showed either normal findings or manifestation associated with some other systemic diseases apart from renal system. DMSA scan was done in 7 out of 18 culture positive UTI cases. Among them 3 cases (42.85%) showed renal cortical scarring. MCU and DTPA scan was possible to perform in 4 out of 6 cases with abnormal ultrasound and it confirmed the specific abnormality of renal system revealed earlier by ultrasonography.

DISCUSSION: Present study has been carried out in the department of Pediatrics, MGM Medical College, Kishanganj. Incidence of febrile UTI in infants in our study (9.75%) is higher than the study by Dharni Dharaka et al,⁽⁴⁾ (1993) who reported a incidence of 5.4% in febrile infants, Hoberman et al,⁽⁵⁾ (1993) who reported incidence of 5.3% in infants. Overall incidence of UTI in febrile children in our study was 6% and 9.75% in children <5years and infants respectively which is nearly similar to study conducted by R. K Kaushal et al,⁽⁶⁾ (2003) who reported higher incidence of 8.4% and 12.3%.

According to Elder Jack S,⁽²⁾ in girls, 75- 90% of all infections are caused by *Escherichia coli*, followed by *Klebsiella spp* and *Proteus spp*.⁽²⁾ Our study also showed that the main causative agent is *E. coli* but the incidence is little less than shown in above literature.

Bryan C. S et al,⁽⁷⁾ (1984) reported *E. coli* as the common urinary pathogen in 85% of cases. According to Aravind Bagga et al,⁽⁸⁾ (2000) 90% of 1st symptomatic UTI and 70% of recurrent infections were due to *E. coli*. These are more than our study i.e., 50%.

All infants with UTI must be screened by ultrasonography, followed by MCU (Micturating cystourethrogram) and DMSA (Dimercaptosuccinic acid) scan.⁽⁹⁾ On abdominal USG, 5 out of 8 boys and 1 out of 10 girls showed renal system abnormalities in our study. Rest either had normal findings or manifestations associated with other systemic disease.

A voiding cystourethrogram (VCUG) is indicated in all children younger than 1year with UTI, school aged girls who have had two or more UTI and any male with UTI.^(10,11) Most common findings is vesicoureteral reflux which is identified in 40% of patients.^(12,13) When the diagnosis of acute pyelonephritis is uncertain, renal scanning with technetium labelled Dimercaptosuccinic acid scan (DMSA) is useful.⁽¹⁴⁾ DMSA scan shows filling defect in 50% of children with febrile UTI irrespective of age.^(10,14) In our study the DMSA Scan was done in 7 out of 18 culture positive UTI cases. Among them 3case (42.85%) showed renal scarring. The result would have been more significant if DMSA scan was done in all culture positive UTI cases but this was not possible due to financial constraints. So structural abnormalities of renal system is far more predominant in males compared to female febrile patients under 5years of age having culture positive UTI.

CONCLUSION: From the present study, it can be concluded that overall incidence rate of UTI is 6% with maximum incidence in children <2 years of age. Among culture positive cases, most common organism was *E. coli* (50%). DMSA scan revealed renal cortical scarring in about 42. 85% cases following febrile UTI. So structural abnormalities of renal system is more predominant in males compared to female febrile patients under five years of age.

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Age	Male	Female	Total
<1 year	49(28.65)	33(25.58)	82(27.33)
1- 2 years	57(33.33)	56(43.42)	113(37.66)
>2 years	65(38.02)	40(31.00)	105(35.00)
TOTAL	171(100.0)	129(100.0)	300(100.0)

Table 1: Age and sex distribution of total no. of febrile patients below 5 years of age

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Age	Male	Female	Total
< 1Year	5(23.80)	9(45.00)	14(34.14%)
1-2 Years	7(33.33)	4(20.00)	11(26.82%)
2-3 Years	3(14.28)	1(5.00)	4(9.75%)
3-4 Years	4(19.04)	3(15.00)	7(17.13%)
4-less than 5Years	2(9.52)	3(15.00)	5(12.19%)
Total	21(100%)	20(100%)	41(100%)

Table 2: Age and Sex distribution of subjects having pyuria.

SES	Male	Female	Total
Class II	12(57.14%)	10(50.00%)	22(54.66%)
Class III	9(42.86%)	10(50.00%)	19(46.34%)
Total	21(100%)	20(100%)	41(100%)

Table 3: Distribution of socio economic status of subjects having pyuria.

Nutritional status	Male	Female	Total
Normal	15(71.42%)	8(40.00%)	23(56.09%)
Grade I	2(9.52%)	7(35.00%)	9(21.95%)
Grade II	2(9.52%)	3(15.00%)	5(23.80%)
Grade III	1(4.76%)	1(5.00%)	2(4.87%)
Grade IV	1(4.76%)	1(5.00%)	2(4.87%)
Total	21(100%)	20(100%)	41(100%)

Table 4: Distribution of subjects based on Nutritional status (IAP classification) in pyuric children showing >5pus cells/HPF.

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No. of pus cells in urine/HPF	Male	Female	Total
>5	14(66.66%)	13(65.00%)	27(65.85%)
>10	3(14.28%)	5(25.00%)	8(19.51%)
Numerous	4(19.04%)	2(10.00%)	6(14.63%)
Total	21(100%)	20(100%)	41(100%)

Table 5: Distribution of pus cells in urine

Urine culture report	Male	Female	Total
No growth	11(52.38%)	12(60%)	23(56.09%)
E. Coli	5(23.80%)	4(20%)	9(21.95%)
Acentobactor sp	-	1(5%)	1(2.43%)
Enterococcus sp	2(9.52%)	1(5%)	3(7.31%)
Psuedomonus sp	2(9.52%)	-	2(4.86%)
Staphylococcus sp	1(4.76%)	1(5%)	2(4.86%)
Klebsiella sp	-	1(5%)	1(2.43%)
Total	21(100%)	20(100%)	41(100%)

Table 6: Distribution of Organisms on Urine culture.

Abdominal USG findings	Male	Female	Total
Normal	2	3	5
Bilateral moderate pleural effusion <u>with ascites</u>	-	1	1
Crossed fused ectopic LT kidney, mild hepatomegaly	1	-	1
Dilated non peristaltic bowel loops (<u>paralytic ileus.intestinal obstruction</u>)	-	1	1
Evidence of large bladder calculi	-	1	1
Features suggestive of <u>bilat.moderate hydronephrosis with cystitis</u>	1	-	1

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Bilateral hydronephrosis with thickened bladder wall with cystitis	1	-	1
Gross ascites with punctate discrete spots in lung parenchyma seen	-	1	1
LT sided minimal pleural effusion with free fluid in abdominal cavity	-	1	1
Massive hydronephrosis (lt side)	1	-	1
Mild hepatomegaly	1	2	3
RT sided hydronephrosis with PUJ obstruction	1	-	1
Total	8	10	18

Table 7: Abdominal Ultra sound scan findings in Culture Positive Children.

Chart 1: Pie graph showing sex distribution of total number of patients

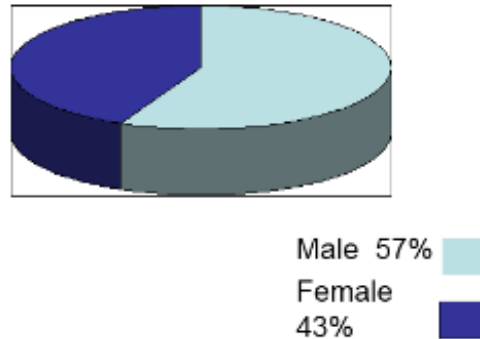
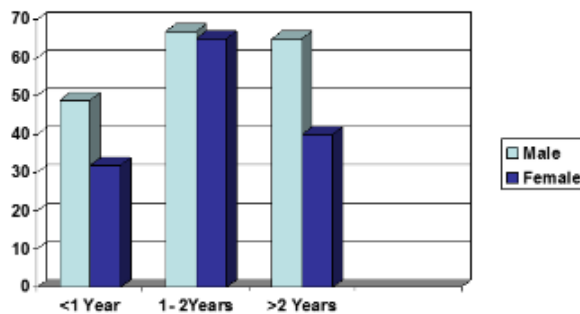


Chart 2: Bar graph showing sex distribution of total patients according to different age group



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Chart 3: Bar graph showing distribution of socio economic status of male and female subjects having pyuria.

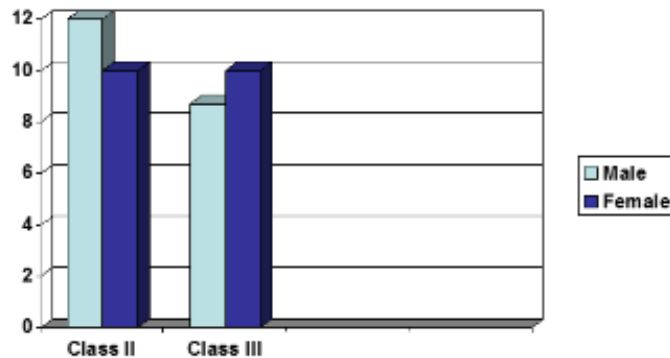


Chart 4: Bar graph showing sex distribution according to the nutritional status of children having positive urine analysis (5 pus cells/HPF).

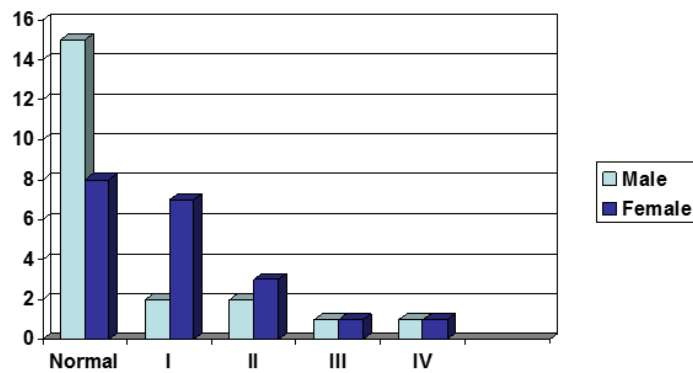
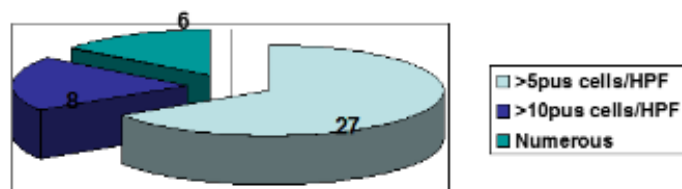
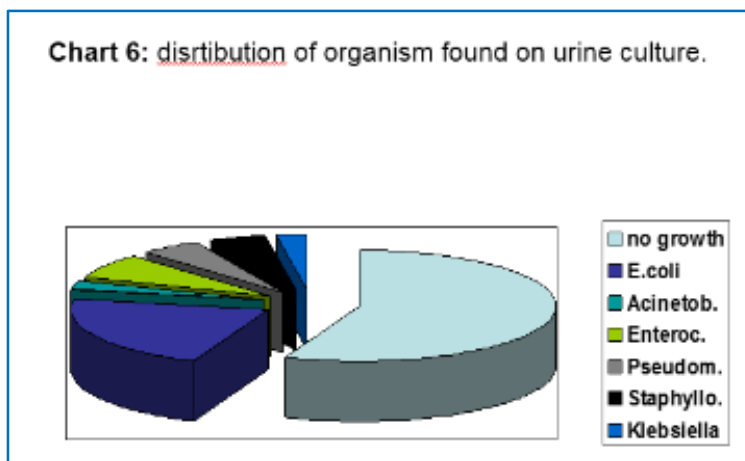


Chart 5: Pie Chart showing distribution of number of pus cells/HPF in urine.



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