

Prevalence of UTI in Febrile Children from 1 Month to 5 Years of Age

Dr. Chandan Barman, Dr. Arati Deka

(Department of Paediatrics, Gauhati Medical College and hospital, Guwahati, India)

Corresponding Author: Dr. Arati Deka

Abstract: Introduction: Fever is a common symptom of UTI in children of less than 5 years age group. It is very much essential to identify UTI in febrile children and to begin prompt treatment to reduce the burden of potential lifelong morbidity. The objective of this study was to elucidate prevalence of UTI in febrile children in the age group of 1 month-5 years and to find out associated factors of UTI.

Aims and Objectives:

1. To elucidate prevalence of UTI in febrile children in the age group of 1 month to 5 years seeking medical attention at GMCH (both in indoor and OPD patients), during this study period
2. To find out associated factors of UTI from 1 month – 5 years of age group.

Methods: Records of 100 children between 1 month-5 years of age with febrile illness were reviewed. Data related to age, gender, various symptoms, urine microscopy culture and radiological findings were analysed.

Results: Out of 100 children presented with fever 29 of them had UTI. Out of 15 children with UTI in the age group of 1 month-1 year, 8(53.33%) were males and 7(46.67%) were females. In the age group of 1 year-5 years, 6/14(42.8%) were males and 8/14(57.2%) were females. Almost 48.27% cases had pus cells <10/HPF and 51.73% had >10/HPF. Majority (68.96%) of UTI caused by E. Coli. 10.34% of the samples had phimosis on clinical examination. 10.34% of the cases had cystitis, 10.34% had PUV and 3.46% had B/L HUN in USG(KUB). 10.34% of the samples had VUR of different grades.

Conclusion: The prevalence of UTI in this study is 29%. In males 14/55(48.2%) and in females 15/45(51.8%) had UTI. It was found that UTI is more prevalent among uncircumcised boys and patient having underlying uro-genital anomalies. So any child with UTI should be screened for underlying uro-genital anomalies by radiological evaluation.

Keywords: UTI(urinary tract infection), HUN(hydronephrosis), HPF(high power field)

Date of Submission: 19-07-2019

Date of acceptance: 05-08-2019

I. Introduction

Fever is a common symptom of urinary tract infection (UTI) in children of less than 5 years age group. Little attention is however paid to UTI as a cause of fever in this age group¹. Again Urinary tract infection is one of the most common causes of fever in children which can result in significant morbidity and mortality if left unrecognized. Hence it is very much essential to identify urinary tract infections in febrile children and to begin prompt treatment to reduce the burden of potential lifelong morbidity. Untreated progressive renal damage from unrecognized pyelonephritis in children may lead to hypertension and chronic renal failure in later part of life increasing the mortality and morbidity². Pediatric urinary tract infections account for 0.7% of physician office visits and 5-14% of emergency department visits by children annually. Accurate diagnosis of UTI has important clinical implications; in most of the febrile infants with UTI, evidences of renal parenchymal involvement(pyelonephritis) is often present. The presenting signs and symptoms of UTI in childhood are most of the times nonspecific and among infants, definitive testing for UTI involves bladder catheterisation. Accordingly, paediatricians frequently face with the question of whether or not to obtain a urine sample for urinalysis and culture.

Most common causative organism for UTI is *Escherichia coli* (*E.coli*), derived from periurethral faecal flora. *Pseudomonas* and *Proteus* are common in presence of obstruction or instrumentation. Other organisms like *Klebsiella*, *Staphylococcus saprophyticus*, *Enterococci* and *Candida albicans* may also be responsible³.

All invasive fungi e.g. *Cryptococcus neoformans*, *Aspergillus* sp, *Mucoraceae* sp, *Histoplasma capsulatum*, *Blastomyces* sp, *Coccidioides immitis* may infect the kidneys as systemic or as a part of disseminated mycotic infection. Their presence alone indicates infection. Lower urinary tract infection with *Candida* usually occurs in patients with urinary catheters, typically following antibiotic therapy, although candidal and bacterial infections may frequently occurs simultaneously⁴.

Cystitis caused by viruses represents another form of non-bacterial UTI affecting children. Viruses like adenovirus types 11 and 21, influenza A, polyomavirus BK, and herpes simplex viruses cause irritative voiding symptoms, hemorrhagic cystitis and even VUR or urinary retention. In non-immunized or immunosuppressed children, herpes zoster cystitis has similar presentation. Fortunately, these forms of cystitis are self-limiting. Immunosuppressed children those who are undergoing kidney or bone marrow transplantation, or those who are receiving chemotherapy are especially at risk of viral cystitis, including those caused by cytomegalovirus and adenoviruses 7, 21, and 35⁵.

II. Aims And Objectives

- ❖ To elucidate prevalence of UTI in febrile children in the age group of 1 month to 5 years of age seeking medical attention at GMCH (both in indoor and OPD patients), during this study period.
- ❖ To find out associated factors of UTI from 1 month – 5 years age group.

III. Materials And Methods

- ❖ **Study type** :- observational study
- ❖ **Study design** :- Cross – sectional hospital based study
- ❖ **Study population** :- All children age group of 1 month to 5 years of age seeking medical attention at GMCH with febrile illness.
- ❖ **Study area** :- Department of paediatrics , GMCH ,Bhangagarh, Guwahati.
- ❖ **Study period** :- 1st july 2017 to 30th june, 2018
- ❖ **Inclusion criteria** :-
 1. Children of 1 month to 5 years of age with febrile illness.
 2. Urinalysis showing micro-organisms in culture and sensitivity reports and colony count >10⁵ CFU/ml
 3. Parents willing to be a part of the study.
- ❖ **Exclusion criteria** :-
 1. Children who had received antibiotic therapy within 48 hours prior to attending hospital.

IV. Methodology

$$n = \frac{4pq}{d^2}$$

Where

n = sample size

p = prevalence = 90%

q = 100-p= 100-90= 10

d = admissible error (10% of p)

d = 10/100x90 = 9

Calculated sample size is 100

- ❖ **Evaluation**:- detailed clinical history and physical examination was done after taking informed consent from parents/guardians.
- ❖ **Investigations** :-
 - Urine R/E , culture and sensitivity
 - Ultrasonography [USG(KUB)] in urine culture positive cases
 - Micturating Cystourethrogram (MCU) and dimercaptosuccinic acid (DMSA) scan in cases where structural abnormality is detected in ultrasonography.
- ❖ **Data analysis** :-
 - I. The data collected was entered in Microsoft excel spread sheet 2007
 - II. Analysis of qualitative data was done using Fisher’s exact test and Chi – square test.
 - III. Level of significance is expressed as p value < 0.05

V. Results And Observations

The results and observations of this study, the prevalence of UTI in febrile children in the age group of 1 months to 5 years seeking medical attention at GMCH are described below.

Table 1: Percentage distribution of Age

Age	Frequency	Percent
1 month – 1 year	15	51.72%
1 year – 2 years	5	17.24%
2 years – 3 years	4	13.79%

3 years – 4 years	2	6.8%
4 years – 5 years	3	10.05%

This table shows the percentage distribution of age. Almost 51.72% of the sample belongs to the age group of 1 month to 1 year and 17.24% belongs to the age group 1 – 2 years. About 13.79% children were distributed in 2 – 3 years. In the age group of 3 – 4 years, about 6.8% of children were enrolled. And 10.05% of samples were distributed in the age group of 4 – 5 years. The mean age of children was 19.08 months with standard deviation 16.43 and median 30 months. The minimum age was 2 months and the maximum was 58 months.

Table 2: Distribution of sex for children with age 1 month to 1 year

Sex	Frequency	Percent
Male	8	53.33%
Female	7	46.67%

This table shows the percentage distribution of sex for the children with age 1 month to 1 year. Out of 15 children with age 1 month to 1 year, almost 53.33% of the samples were boys and 46.67% were girls

Table 3: Distribution of sex for the children with age 1 – 5 years

Sex	Frequency	Percent
Male	6	42.8%
Female	8	57.2%

This table shows the percentage distribution of sex for the children with age 1 – 5 years. Out of 14 children with age 1 – 5 years, almost 42.8% samples were boys and 57.2% were girls.

Table 4: Percentage Distribution of Sex

Sex	Frequency	Percent
Male	14	48.2%
Female	15	51.8%

This table shows the percentage distribution of sex. Out of 29 children with UTI, almost 48.2% samples were boys and 51.8% were girls.

Table 5: Distribution of duration of fever at the time of presentation

Duration of fever	Frequency	Percent
0 – 7 days	2	6.8%
7 – 14 days	26	89.6%
14 – 21 days	1	3.6%

This table shows frequency and percentage distribution of duration of fever at the time of presentation. Out of 29 UTI cases, 6.8% had fever for 0 -7 days, 89.6% had fever for 7 – 14 days and 3.6% had fever for 14 – 21 days.

Table 6: Percentage Distribution of UTI

UTI	Frequency	Percent
Simple	22	75.8%
Complicated	7	24.2%

This table shows the percentage distribution of UTI. Out of 100 children studied, 29 had UTI and almost 75.8% of the sample had simple UTI and 24.2% had complicated UTI.

Table 7: Percentage Distribution of Age with UTI

Age in months	Simple UTI	Complicated UTI
1 – 12	12(54.5%)	3(42.8%)
12 – 60	10(45.5%)	4(57.2%)

This table shows percentage distribution of age with UTI. Out of 22 simple UTI cases, almost 54.5% of the sample belonged to the age group 1 – 12 months and 45.5% belonged to 12 – 60 months. Out of 7 complicated UTI cases, 42.8% of the age group belonged to the age group 1 - 12 months and 57.2% belonged to 12 – 60 months.

Table 8: Percentage Distribution of Sex with UTI

Sex	Simple UTI	Complicated UTI
Male	10 (45.45%)	4 (57.14%)
Female	12 (54.55%)	3 (42.86%)

This table shows the percentage distribution of sex with UTI. Out of 22 simple UTI cases, almost 45.45% of the samples were males and 54.55% were females. Out of 7 complicated UTI cases, around 57.14% of the samples were males and 42.86% were females.

Table 9: Interpretation of Urinalysis

Urine routine	Frequency	Percentage
Pus cells < 10	14	48.27%
Pus cells > 10	15	51.73%
Epithelial cells < 10	23	79.31%
Epithelial cells > 10	6	20.69%
RBC	3	10.34%

This table shows the interpretation of urinalysis. Almost 48.27% cases had pus cells <10/HPF and 51.73% had pus cells >10/HPF. Out of 29 culture positive cases analysed, almost 79.31% had epithelial cells <10/HPF and 20.69% had epithelial cells >10/HPF. 10.34% cases had RBC in urine.

Table 10: Percentage Distribution of Micro-organism

Micro-organism	Frequency	Percentage
<i>E. Coli</i>	20	68.96%
<i>Klebsiella Pneumoniae</i>	3	10.34%
<i>Proteus mirabilis</i>	2	6.8%
<i>Staphylococcus aureus</i>	2	6.8%
<i>Pseudomonas</i>	1	3.4%
<i>Acinetobacter baumannii</i>	1	3.4%

This table shows the percentage distribution of micro-organism. Out of 29 culture positive children from the study, majority (68.96%) of the sample had *E.Coli*. About 10.34% of the children had *Klebsiella pneumoniae*, 6.8% children had *Proteus mirabilis*, 3.4% of children had *Pseudomonas*, another 3.4% had *Acinetobacter baumannii* and the last 6.8% had *Staphylococcus aureus*.

Table 11: Percentage Distribution of Clinical Symptoms

Clinical Symptoms	Frequency	Percent
Fever	29	100%
Increased frequency of micturition	26	89.65%
Difficulty in micturition	10	34.48%
Urgency of micturition	5	17.24%
Crying during micturition	26	89.65%
vomiting	7	24.13%
Convulsions	1	3.4%
Dribbling of urine	3	10.34%
Weak or abnormal urine stream	1	3.4%
Phimosis	3	10.34%
Lower limb neurological deficit	1	3.4%

This table shows the percentage distribution of clinical symptoms in the study group. It is noted that 100% of the study group had fever as the study was done on the febrile children only, but the duration of fever vary with children to children. Almost 89.65% of the UTI cases had increased frequency of micturition, 34.48% had difficulty in micturition, 17.24% had urgency in micturition and 89.65% had crying during micturition. Almost 24.13% of the samples had vomiting. 3.4% of the study group had convulsions. Almost 10.34% had dribbling of urine, 3.4% had weak or abnormal urine stream. 10.34% of the samples had phimosis on clinical examination and 3.4% had lower limb neurological deficit.

Table 12: percentage distribution of USG findings

USG	Frequency	Percent
Normal	22	75.86%
Cystitis	3	10.34%
Posterior urethral valve	3	10.34%
B/L hydronephrosis	1	3.46%

This table shows the percentage distribution of USG findings. Almost 75.86% of cases had normal USG(KUB) findings. 10.34% of the cases had cystitis, 10.34% had posterior urethral valve and 3.46% had B/L hydroureteronephrosis in USG(KUB).

Table 13: Percentage Distribution of MCU findings

MCU	Frequency	Percentage
Normal study	24	82.75%
Vesicoureteric Reflux	3	10.34%
Posterior urethral valve	2	6.8%

This table shows percentage distribution of MCU findings in the study group. Almost 82.75% of the samples had normal findings in MCU. 10.34% of the samples had VUR of different grades. And 6.8% of the samples had posterior urethral valve.

Table 14: Percentage Distribution of DMSA scan findings

DMSA	Frequency	Percentage
Normal	27	93.10%
Abnormal	2	6.9%

This table shows the percentage distribution of DMSA scan findings in the study group. 93.10% of the total sample had normal DMSA scan findings whereas 6.9% had abnormal DMSA scan finding. The abnormal findings were like cortical thinning of the right and left kidney and another report shows cortical defects of both the kidneys.

Table 15: Association between UTI and age

Age in months	Urine culture positive	Urine culture negative	p - value	Odds ratio
1 – 12	15 (51.72%)	6 (8.4%)	<0.0001	11.60*
12 – 60	14 (48.28%)	65(91.6%)		

*Association is significant

This table shows the association between UTI and age, using Chi – square statistic (with Yates correction). Here the p-value is <0.0001 which is extremely significant; which means that association between UTI and age is very significant. It is noted that proportion of UTI is greater in the age group of 1 – 12 months whereas it is lesser in the age group of 12 – 60 months.

Table 16: Association between UTI and sex

Sex	Urine culture positive	Urine culture negative	p-value	Odds ratio
Male	14 (48.27%)	41 (57.74%)	0.520	0.682*
Female	15 (51.73%)	30 (42.26%)		

*Association is not significant

This table shows the association between UTI and sex, using Chi – square statistic (with Yates correction). Here the p – value is 0.520 which is not significant; which means that association between UTI and sex is not significant. It was noted that the proportion of UTI is less in males and proportion of UTI is more in females.

Table 17: Association between increased frequency of micturition and UTI

Increased frequency of micturition	Urine culture positive	Urine culture negative	p - value	Odds ratio
Present	26(89.65%)	15(21.16%)	<0.0001	32.35*
Absent	3(10.35%)	56(78.84%)		

*Association is extremely significant

This table shows the association of increased frequency of micturition with UTI using Fisher’s exact test. Here the p – value is lesser than the significance level i.e. <0.0001. So, the association between increased frequency of micturition and UTI is extremely significant. It was noted that those who presented with increased frequency of micturition, 89.65% had UTI and 21.16% did not have UTI. And, those who does not had increased frequency of micturition at the time of presentation, out of them 10.35% had UTI and 78.84% did not have UTI.

Table 18: Association between crying during micturition and UTI

Crying during micturition	Urine culture positive	Urine culture negative	p – value	Odds ratio
Yes	26(89.65%)	25(35.22%)	<0.0001	15.94*
No	3(10.35%)	46(64.78%)		

*Association is significant

This table shows the association between crying during micturition and UTI using Fisher’s exact test. Here the p – value is <0.0001. So, the association between crying during micturition and UTI is extremely significant. It was noted that 89.65% cases of UTI had crying during micturition and 35.22% non – UTI feb

Table 19: Association between Uro-genital anomaly with UTI

Urogenital anomaly(PUV)	Urine culture positive	Urine culture negative	p - value	Odds ratio
Present	5(17.24%)	0(0.00%)	0.001	32.10*
Absent	24(82.76%)	71(100%)		

*Association is significant

This table shows the association of uro-genital anomaly with UTI using Fisher’s exact test. Here the p – value is 0.001 ; the association between uro-genital anomaly and UTI is very significant. 17.24% cases of UTI had underlying uro-genital anomaly and there was no underlying uro-genital anomalies found in the culture negative patients.

Table 20: Association between phimosis and UTI

Phimosis	Urine culture positive	Urine culture negative	p - value	Odds ratio
Present	3(21.42%)	1(2.43%)	0.046	10.90*
Absent	11(78.58%)	40(97.57%)		

*Association is significant

This table shows the association of phimosis with UTI in male children in the study group using Fisher’s exact test. Here the p – value is 0.046; So, the association between phimosis in male children with UTI is significant. It is noted that almost 21.42% of UTI cases in male children had phimosis at the time of presentation and 2.43% of culture negative cases had phimosis at the time of presentation.

Table 21: Association between Pyuria and UTI

Pus cells per HPF	Urine culture positive	Urine culture negative	p - value	Odds ratio
<10/HPF	14(48.27%)	71(100%)	<0.0001	0.006*
>10/HPF	15(51.73%)	0(0.00%)		

*Association is significant

This table shows association between pyuria and UTI using Fisher’s exact test. Here the p – value is lesser than the significance level; the association between pyuria and UTI is extremely significant. It was noted that out of 29, urine culture positive cases 48.27% has pus cells <10/HPF and 51.73% has pus cells >10/HPF. And out of 71 urine culture negative cases, all have pus cells <10/HPF.

Table 22: Association between degree of illness with UTI

Clinical presentation	Simple UTI	Complicated UTI	p - value	Odds ratio
Ill looking	0(0.00%)	7(100%)	0.0001	-----
Not ill looking	22(100%)	0(0.00%)		

*Association is significant

This table shows the association between degree of illness with UTI using Fisher’s Exact test. Here the p – value is lesser than the significance level; the association between UTI and degree of illness is extremely significant. It was noted that 100% of the cases of complicated UTI were ill looking at the time of presentation and 100% of simple UTI were well at the time of presentation.

VI. Discussion

This study was carried out on observations in children between the age group of 1 month to 5 years with febrile illness seeking medical attention in our tertiary care teaching hospital in Guwahati, Assam. UTI is common clinical presentation seen in children of Assam. Although children many a time present with non-specific signs and symptoms, prompt evaluation and management of UTI helps in preventing long term complications.

Age:

In our study the mean age of children was 19.08 months. The minimum age was 2 months and the maximum age was 58 months. A retrospective study done by Wallaa A.Garout, et al. in 2015 among children less than 5 years age group states that the mean age for UTI was 15 months with standard deviation 19.86⁶.

Another study done by *Ibeneme CA, et al.* in 2014 states that mean age of prevalence of UTI in the same age group is 31.14 ± 17.96 months¹.

Out of 100 children studied, 29 (29%) cases had UTI and out of which 22(75.8%) had simple UTI and 7(24.2%) had complicated UTI. Out of 22 simple UTI cases, 54.5% of the sample belongs to the age group of 1 – 12 months and 45.5% belongs to 12 – 60 months. Out of complicated UTI cases, 42.8% of the sample belongs to the age group 1 – 12 months and 57.2% belongs to the age group of 12 – 60 months. Out of total 29 urine culture positive cases, 51.72% of the sample belongs to the age group of 1 – 12 months and 48.28% of the sample belongs to the age group of 12 – 60 months. And out of 71 urine culture negative cases, 8.4% of the sample belongs to the age group of 1 – 12 months and 91.6% belongs to the age group of 12 – 60 months. Here the p – value is <0.0001 ; lesser than the significance level. Therefore, the association between age and UTI is significant.

Sex:

Out of 100 samples of our study group 45% were females. Out of which 15 i.e. 51.8% of total urine culture positive cases were females and the rest 48.2% were males. A study done by *Ashish Jitendranath, et al.* also showed predominantly females being affected⁷. Another retrospective study done by *Ibeneme CA, et al.* in 2014 states that the prevalence of UTI is significantly higher in females than in males¹. The gender variation with UTI is as follows, 53.33% are males and 46.47% are females in the age group 1 month – 1 year. Whereas 42.8% are males and 57.2% are females in the age group of 1 year – 5 years. On analysing the association between UTI and gender variability, the p – value is 0.52 i.e. greater than the significance level 0.05; the association is not significant.

Type:

Out of 29 Urine culture positive cases, 75.86% had simple UTI and 24.14% had complicated UTI. On further analysis, out of total 22 simple UTI cases 45.55% were males and 54.55% were females. And out of 7 complicated UTI cases, 57.14% were males and 42.86% were females.

Urinalysis:

In the interpretation of urinalysis, out of 29 urine culture positive cases 48.27% cases had pus cells <10 /HPF and 51.73% had pus cells >10 /HPF. Almost 79.31% had epithelial cells <10 /HPF and 20.69% had epithelial cells >10 /HPF. 10.34% cases had RBC in urine among 29 urine culture positive cases. AAP guidelines considers an urinalysis positive for pyuria if there were > 3 WBC/HPF along with bacteria visible in urine specimen or any urine sample with >10 WBC/HPF.

An Indian study done by *Shina Menon* in 2005 showed microscopic leukocyturia had sensitivity of 73% and specificity of 81%, bacteriuria showed sensitivity and specificity of 81% and 83% respectively. In our study, the sensitivity of pyuria is 48%.

Organism:

Out of 29 urine culture positive cases, majority 68.96% had *E.coli*. About 10.34% of the children had *Klebsiella pneumoniae* and 6.8% children had *Proteus mirabilis* and *Staphylococcus aureus* each. About 3.4% children having UTI had *Pseudomonas* and *Acinetobacter baumannii* each. A study done by *Qureshi AM* in 2005 states that *E.coli* was the most common organism, followed by *Klebsiella*, *Proteus*, *Staphylococcus* and *Pseudomonas*⁸. Another study done by *Copp, et al.* in 2011 states that *E. Coli* is by far the most commonly isolated organism in pediatric UTI with prevalence ranging from 80-90%⁹. Another study done by *Dahle et al.* in 2012 states that *E.coli* is the most frequently encountered in pediatric UTI followed by others such as *Pseudomonas aeruginosa*, *Kelbsiella pneumonia*, *Proteus mirabilis* and *Staphylococcus species*¹⁰. In a recent study done by *Ashish Jitendranath, et al.* in 2014, *E.coli* followed by *Klebsiella* was found to be the most common isolates⁷. Our study also had similar findings.

Clinical Symptoms:

It was noted that 100% of the UTI cases had fever as this study was done in febrile children only. Almost 89.65% cases had increased frequency of micturition, 34.48% had difficulty in micturition, 17.24% had urgency of micturition, 89.65% had crying during micturition, 24.13% had vomiting, 3.4% had convulsions, 10.34% had dribbling of urine, 10.34% had phimosis, and 3.45 had weak or abnormal urine stream and lower limb neurological deficit each.

It was noted that 89.65% of UTI cases had increased frequency of micturition and 10.35% cases did not have the symptom at the time of presentation. Here the p – value is <0.0001 and hence the association between increased frequency of micturition and UTI is significant. The association between increased frequency of micturition and UTI is also statistically significant in our study. A study done by *Medina-Bambardo D, et al.*

in 2003 states that 90% of the patients with UTI complains of urinary tract symptoms (increased frequency of micturition, painful micturition and burning micturition), one third or more of the patients with these symptoms do not have bacteriuria¹¹. Our study also had similar results.

It was noted that out of total 29 UTI cases, almost 89.65% had crying during micturition and 10.35% did not have that symptom at the time of presentation. Here the p – value is <0.0001 and hence the association between crying during micturition and UTI is significant.

It was noted that out of total 29 UTI cases, 17.24% had underlying uro – genital anomalies. Out of which 10.34% had VUR. Here the p – value is <0.001 and hence the association between underlying uro - genital anomaly in UTI cases is significant. A study done by *Ali Ahmadzadeh, et al.* in 2003 states that 40% of patients with UTI had VUR and 20% had other associated abnormalities in urinary tract¹².

It was noted that out of 55 male children, 4(7.2%) had phimosis at the time of presentation. Out of all male UTI cases 21.42% had phimosis and 78.58% did not have phimosis at the time of presentation. Here the p – value is less than the significance level 0.05 and hence the association between phimosis and UTI in male children is significant. The reason for encountering this less number of male children with phimosis may be because 40% of males in the study group are Islamic by religion and they do religious circumcision at a very early age. A study done by *Singh Grewal, et al.* in 2005 states that circumcision was associated with significantly reduced risk of UTI¹³ (OR=0.13; 95% CI, 0.08 TO 0.20; P<0.001). Another study done by *Shaikh N, et al.* in 2009 states that among febrile male infants less than 3 months of age, 2.4% (CI: 1.4-3.5) of circumcised males and 20.1% (CI: 16.8-23.4) of uncircumcised males had a UTI¹⁴. In 1985, Wiswell suggested that uncircumcised male infants were 10 to 20 times more likely to develop UTIs than circumcised male infants. In 1993, Wiswell performed a meta-analysis of 9 studies and showed that uncircumcised male infants had a 12-fold increased risk of UTIs compared with circumcised male infants¹⁵.

It was noted that the 3.4% of UTI cases who presented with convulsion, was a case of febrile seizure. A study done by *Aidin Abedi, et al.* in 2017 states that 11.1% of febrile convulsion cases had underlying UTI at the time of presentation¹⁶. And out of 10.34% of UTI cases who had phimosis at the time of presentation; 3.4% had abnormal or weak urine stream. The 3.4% of UTI cases who had lower limb neurological deficit, was a case of cerebral palsy.

USG findings:

Almost 75.86% of the sample had normal USG(KUB) findings and 10.34% had cystitis and posterior urethral valve each. Almost 3.46% urine culture positive child had B/L hydroureteronephrosis. A study done by *Srividhya S, et al.* in 2016 states that 79.7% had normal USG findings and 14.3% had cystitis.

MCU findings:

Out of total 29 UTI cases 17.14% had MCU findings in the form of VUR and PUV. As MCU had only be done in those cases of UTI having USG(KUB) detected anomalies, the sensitivity and specificity could not be calculated. However it is seen that MCU findings have fairly good correlation with prevalence of UTI in febrile children. A study done by *Sunil S Vaidya, et al.* in 2018 states that VUR is common in culture positive UTI, milder grade are more common which are more likely to be missed by renal USG, thus stressing the need of MCU in children of culture positive UTI¹⁷.

DMSA findings:

DMSA had only been done to those cases with positive urine culture study. It was noted that 93.10% had normal DMSA scan findings and 6.9% had abnormal DMSA scan findings in the form of cortical thinning of the kidney and cortical defects in the kidney. Out of 3(10.34%) cases having VUR in MCU study, 2 of them i.e. 66.67% had abnormal DMSA scan findings showing dilating VUR effects. So, the accuracy of DMSA scan in detecting VUR changes is quite higher in our study. A retrospective study done by *Xin Zhang, et al.* in 2011 states that the rate of abnormal results(75.9%) on DMSA for the dilating VUR group was significantly higher than the rates for the non-VUR and low-grade VUR groups (P < .01)¹⁸. Our study also had similar findings.

Finally on discussing the prevalence of UTI in febrile children in the age group of 1 month to 5 years with a sample size of 100, we found that the prevalence is almost 29%. A study done by *Ibeneme CA, et al.* in 2014 states that the prevalence of UTI was 11% in febrile children less than 5 years of age with a sample size of 200¹. Another study done by *Shaik Ateal Saheb, et al.* states that the overall occurrence of UTI in children less than five years was 13%¹⁹.

Hence we conclude that in our study UTI is common in male children in infancy and among females in age group > 1 year. Also simple UTI is found to be the most common type with predominance of *E.Coli* in the culture reports. It has also been found that UTI is common among uncircumcised boys, children with underlying uro – genital anomalies. It is found that increased frequency of micturition and crying during micturition have good association with presence of UTI in children in this age group. Lastly pyuria with UTI in general and toxic

and ill appearing with complicated UTI were found to have fairly good correlation in our study. All these findings are in accordance with many of the studies.

The strength of this study was that it is first study done on UTI in febrile children in the age group of 1 month to 5 years in Gauhati Medical College and Hospital. Most of the results in our study correlate with established data and various previous studies and therefore can be considered reliable. The major limitation of this study was that it consisted of highly selected group of children having fever seeking medical attention in our institute. This study had restricted age range between 1 month to 5 years where neonates and children above 5 years of age were excluded. Moreover, since this is a hospital based study the outcomes may differ from that in a community setting.

VII. Conclusion

We conclude that in our study UTI is more prevalent among male children in infancy, and among females beyond infancy. Simple UTI is found to be the most common type, with predominance of *Escherichia coli (E.coli)* in the culture reports. Majority of the children in our study with UTI had increased frequency of micturition and crying during micturition at the time of presentation. It has also been found that UTI is more prevalent among uncircumcised boys and patient having underlying uro – genital anomalies. Majority of the children in our study who were toxic and ill appearing had complicated UTI and pyuria is invariably present with patients with culture positive UTI. All these findings are in accordance with many previous studies and hence reliable.

References

- [1]. Ibeneme CA, Oguonu T, Okafor HU, Ikefuna AN, Ozumba UC. Urinary tract infection in febrile under five children in Enugu, South Eastern Nigeria. *Nigerian journal of clinical practice*. 2014;17(5):624-8.
- [2]. Sunita V1 , Siva Sankara Murty YV, Sai Sunil Kishore M, Tarakeswara Rao P, Madhusudhan Rao K, Pundarikaksha V. Prevalence of Urinary Tract Infection in Febrile children . *INTERNATIONAL JOURNAL OF HEALTH RESEARCH IN MODERN INTEGRATED MEDICAL SCIENCES*, ISSN 2394-8612 (P), ISSN 2394-8620 (O), Vol-2, Issue-2, Apr-Jun 2015
- [3]. Srivastava RN, Bagga A. Urinary tract infection .In: pediatric nephrology, 6th edition,new delhi, jaypee brothers ,2016.page 273
- [4]. Talha H. Imam . Fungal Urinary Tract Infections (UTIs). *MSD MANUAL PROFESSIONAL VERSION* revision. June 2018 available at <https://www.msmanuals.com/professional/genitourinary-disorders/urinary-tract-infections-utis/fungal-urinary-tract-infections-utis>
- [5]. Kibar Y. Current Management of Urinary Tract Infection in Children. In *Urinary Tract Infections 2011*. InTech.
- [6]. Garout WA, Kurdi HS, Shilli AH, Kari JA. Urinary tract infection in children younger than 5 years: etiology and associated urological anomalies. *Saudi Medical Journal*. 2015;36(4):497
- [7]. Ashish Jitendranath, Radhika R, Bhargavi L, Geeta Bhai and Ramla Beevi. Microbiological Profile of Urinary Tract Infection in Pediatric Population from a Tertiary Care Hospital in South Kerala. *Research Article June 15, 2015. Department of Microbiology, Sree Gokulam Medical College, India*
- [8]. Qureshi AM. Organisms causing urinary tract infection in pediatric patients at Ayub Teaching Hospital Abbottabad. *J Ayub Med Coll Abbottabad*. 2005;17(1):72-4
- [9]. Copp HL, Sharpiro D, Hersh AL. National Ambulatory Antibiotic Prescribing Patterns for Pediatric Urinary Tract Infection. *Pediatrics*. June 2011. 172:6
- [10]. Dahle KW, Korgenski EK, Hersh AL, Srivastava R, Gesteland PH. Clinical Value of an Ambulatory-Based Antibiogram for Uropathogens in Children. *Journal of the Pediatric Infectious Diseases Society*. 2012. 1(4):333-336.
- [11]. Medina-Bombardo D, Segui-Diaz M, Roca-Fusalba C, Llobera J. What is the predictive value of urinary symptoms for diagnosing urinary tract infection in women? *Family Practice*. 2003 Apr 1;20(2):103-7.
- [12]. Ahmadzadeh A, Askarpour S. Association of urinary tract abnormalities in children with first urinary tract infection. *Pakistan Journal of Medical Sciences*. 2007 Jan 1;23(1):88.
- [13]. Singh – Grewal D, Macclessi j, Craig J. Circumcision for the prevention of urinary tract infection in boys: a systematic review of randomized trials and observational studies. *Arch Dis Child* 2005; 90: 853-858
- [14]. Shaikh N, Morone NE, Bost JE, Farrell MH. Prevalence of urinary tract infection in childhood: a meta-analysis. *The Pediatric infectious disease journal*. 2008 Apr 1;27(4):302-8
- [15]. Shapiro E. American academy of pediatrics policy statements on circumcision and urinary tract infection. *Reviews in urology*. 1999;1(3):154.
- [16]. Aidin Abedi, Mastaneh Moghtaderi and Mahmood Reza Ashra .Prevalence of Urinary Tract Infection among Children with Febrile Convulsion. *International Journal of Nephrology and Kidney Failure*. 10.16966/2380-5498.14 Volume: 3.1
- [17]. Vaidya SS, Gaikwad SY. Study of clinical etiological and radiological profile of UTI cases. *International Journal of Contemporary Pediatrics*. 2018 Jun 1.
- [18]. Zhang X, Xu H, Zhou L, Cao Q, Shen Q, Sun L, Fang X, Guo W, Zhai Y, Rao J, Pa M. Accuracy of early DMSA scan for VUR in young children with febrile UTI. *Pediatrics*. 2013 Dec 1;ped-2012.
- [19]. Saheb SA. Prevalence of urinary tract infections in febrile children less than five years of age: a chart review. *International Journal of Contemporary Pediatrics*. 2018 Feb 22;5(2):359-62.

Chandan Barman. “Prevalence of UTI in Febrile Children from 1 Month to 5 Years of Age.” *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, vol. 18, no. 8, 2019, pp 59-67.