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PREVALENCE OF URINARY TRACT INFECTION AMONG FEBRILE CHILDREN UNDER TWO YEARS

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ABSTRACT

Background: Urinary tract infection should be considered in any child under 2 years of age or younger who has unexplained fever. **Objectives:** To determine the prevalence of urinary tract infection in febrile children under 2 years old, effect of breast feeding on urinary tract infection and prevalence and the effect of circumcision on Urinary tract infection. **Patients and Methods:** A cross sectional study was done to determine the prevalence of urinary tract infection in febrile children under 2 years old who presented to the emergency department and pediatric wards of Al Salam Teaching Hospital during the period from the first of April 2023 to the first of November 2024, all patients were randomly chosen. After taking good history and examination and send the patients to general urine examination, then those with positive findings in general urine examination (pyuria, bacteriuria or both) were send for urine culture. Children were included in the study if have possible cause of fever such as gastroenteritis or upper respiratory tract infection and were excluded from study if have definite source of fever (such as meningitis, pneumonia and septic arthritis). **Results:** There were 600 patients included in our study 315 (52.5%) girls and 285 (47.5%) boys, with boy to girl ratio was (0.9/1) there were 34 positive results, overall prevalence in our study sample were (5.7%), girls were 21(61.8%) and boys were 13 (38.2%), the overall prevalence were more common in girls (girl to boy ratio was 1.6/1), but it did not reach statistical level of significance. Comparing between circumcised and uncircumcised patients with urinary tract infection 11 patient (84.6%) of boys were uncircumcised (P value =0.05) which is statistically significant**.** The prevalence of urinary tract infection is more common among those with non identified cause of fever (8%) (13/162) as compared with those with possible cause of fever (4.8%) (21/438). The prevalence of urinary tract infection according to type of feeding: bottle feeding (73.5%) (25/34), mixed bottle and breastfeeding (20.6%) (7/34), breastfeeding (5.9%) (2/34), statistically is extremely significant= 0.0001. **Conclusions:** Urinary tract infection Is prevalent in febrile children without a definite source of fever. UTI is more common in boys among febrile children less than 1 year old especially those who are uncircumcised, whereas it is more common in girls who are more than 1 year old. UTI is more prevalent in young children with bottle feeding.

KEYWORDS: Feverish, Pediatrics, Urinary tract infection.

1- INTRODUCTION

Urinary tract infection (UTI) is a frequent childhood illness. Globally; pediatric UTIs account for 0.7% of outpatient department (OPD) visits and 5%-14% of emergency room visits in children each year.[1] UTIs are most common in children in their first two years of life. The prevalence is significantly lower in older children. UTI incidence in newborns and young babies with fever without localized range between 7% and 15%.[2]

Fever may be the sole symptom of a UTI in children under two years old.[3] Infants may exhibit lethargy, frequent vomiting, or poor feeding.[4] Urinary tract infections in older children can cause new onset incontinence. As a result, young children's UTI signs and symptoms are sometimes rather vague. So; pediatricians often face the question of whether to take a urine sample for analysis and culture.[5-6] Furthermore, due to vague presentation and inadequate techniques for getting urine specimens for culture, identifying UTI in young children can be challenging. Aside from the financial burden of exposing children to needless and unpleasant medicines,

various guidelines and reviews have been released in recent years with new updates on how to manage children with UTIs.[7-8]

Urinary tract infection places a burden on children and parents and might result in short-term consequences including urosepsis and acute renal failure and Long-term consequences of complex UTI or pyelonephritis include renal scarring, which can develop to hypertension and end-stage renal disease, necessitating ongoing follow up.[9-10]

The aim of the study is to determine the prevalence of Urinary tract infection in febrile children under 2 years old, effect of breast feeding on urinary tract infection, prevalence and the effect of circumcision on urinary tract infection.

2- PATIENTS AND METHODS

A cross sectional study was done to determine the prevalence of UTI in febrile children under 2 years old who presented to emergency department and pediatric ward of Al Salam Teaching Hospital during the period from the first of April 2023 to the first of November 2024, all patients were randomly chosen. There were 600 patients included in this study, after taking good history and examination and the patients send for GUE, then those with positive findings in GUE (pyuria, bacteriuria or both) additionally sent for urine culture. Children were included in the study if have possible cause of fever such as gastroenteritis or URTI and were excluded from study if have definite source of fever (such as meningitis, pneumonia, aseptic arthritis) then children with proved UTI we sent them for Ultrasonography of the abdomen.

Urine specimens were collected by two methods: urine bag and transurethral catheterization. After cleaning the area with plain water or saline adhesive plastic urine bag was applied to the perineum, and urine catheterization was done by the investigator in standard sterile technique (in 474 patients collect urine by urine bag and in 126 patients collect urine by transurethral catheterization). All specimens were examined in laboratory firstly for color, turbidity, reaction (acidic or alkaline) and protein content and the specimens were centrifuged and examined for leukocytes, bacteria, RBC, epithelial cells and casts. The positive findings in GUE means (pyuria, bacteriuria or both), in this study >5 WBC in urine considered pyuria. A loop calibrated to deliver 0.001 ml was used to inoculate blood and MacConkey agar plates, the plates were incubated at 37c and examined after 24 hrs. then inspected for any bacterial growth and the results were reported according to the following scheme:

1. Culture negative-no growth of bacteria.
2. Culture positive- growth of single pathogen.

For specimens obtained by catheterization, single pathogen with colony count more than 10,000 CFUs were considered significant, for specimens obtained by urine bag single pathogen with colony count more than 100,000 were considered significant.

Analysis of data was carried out using the available statistical package of SPSS 30 (Statistical Package for Social Sciences-version 30). Data were presented in simple measures of frequency and percentage. The significance of different percentages (qualitative data) was tested using chi-square test. Statistical significance was considered whenever the P value was less than 0.05.

3- RESULTS

There were 600 patients included in our study 315 (52.5%) of them were girls and 285 (47.5%) of them were boys, with boy to girl ratio was (0.9/1) there were 34 positive results. The overall prevalence in our study sample was 5.7%. As shown in figure 3.1 and 3.2.

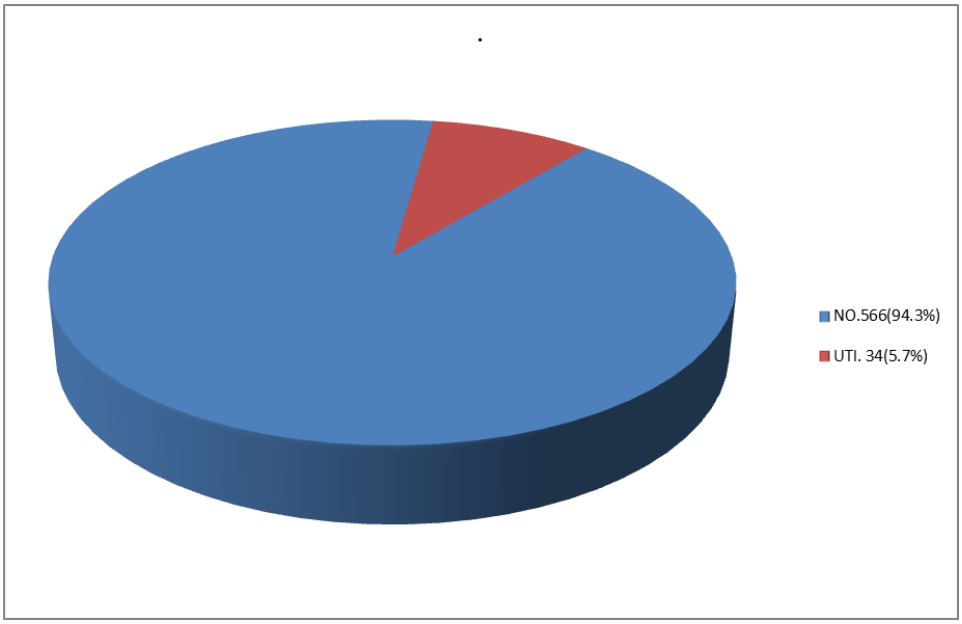

Figure 3.1: The prevalence of UTI in 600 febrile children under 2 years old.

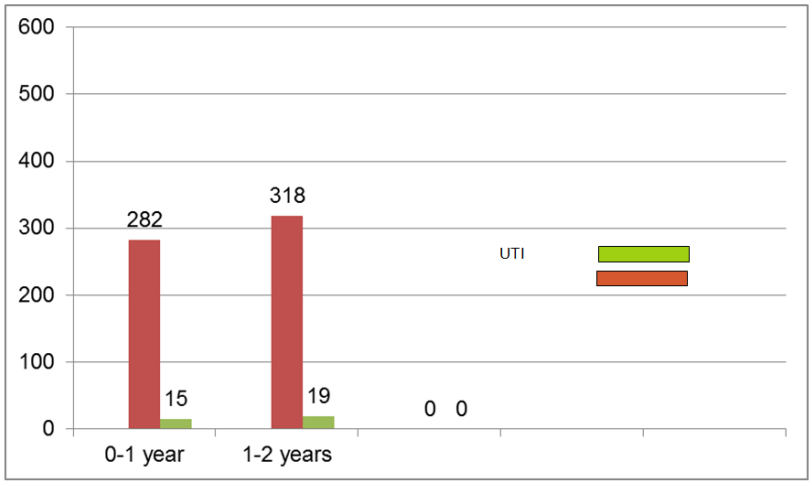

Figure 3.2: The prevalence of UTI in 600 febrile children according to the age group.

Tables 3.1, 3.2, 3.3 and 3.4 show basic information of the study participants. It's evident that UTI were prevalent in 21 (61.8%) girl and 13 (38.2%) body. Moreover; 11 (84.6%) patients of boys were uncircumcised, the overall prevalence was more common in girls (girl to boy ratio was 1.6/1), but it did not reach statistical level of significance. Additionally; UTI prevalence was more among girls in the second year of life whereas the prevalence among boys were more than double of that in girls in the first year of life. Furthermore; the prevalence of UTI according to type of feeding higher among bottle feeding (73.5%) (25/34), followed by mixed (bottle and breast) feeding (20.6%) (7/34) and Breastfeeding (5.9%) (2/34).

Table 3.1: The Prevalence of UTI in 600 febrile children under 2 years old (Age, sex and cause) distribution.

Parameter	No.	Patients with UTI	prevalence
Sex Girls	315	21	6.7%
<1 year	140	5	3.5%
>1 year	175	16	9.1%
Boys	285	13	4.6%
<1 year	142	10	7.0%
>1 year	143	3	2.1%

Table 3.2: The prevalence of UTI in 600 febrile children according to the age group.

Age group	Total no.	Patient with UTI	Percentage
0-1 year	282	15	5.3%
1-2 year	318	19	5.9%
Total	600	34	5.7%

Table 3.3: Age and Sex distribution of 34 patients with UTI. and circumcision distribution.

Age group	Patient with UTI	girls	boys	circumcised	uncircumcised
0-1 year	15	5	10	1	9
1-2 year	19	16	3	1	2
Total	34	21	13	2	11
P value	0.001			0.05	

Comparing between circumcised and uncircumcised patients with UTI.
P value =0.05

Table 3.4: Prevalence of urinary tract infection in febrile children according to type of feeding.

No. of patients with UTI	Breast feeding		Bottle feeding		Mixed feeding	
	No.	%	No.	%	No.	%
34	2	5.9	25	73.5	7	20.6

Comparing between breast feed and bottle feeding children with UTI.
P value = 0.0001

Most of the patients had non-specific signs or symptoms such as vomiting (50%) (17/34), diarrhea (44.1%) (15/34), poor feeding (35.2%) (12/34), constipation (8.8%) (3/34) and failure to thrive (5.9%) (2/34). As shown in figure 3.3.

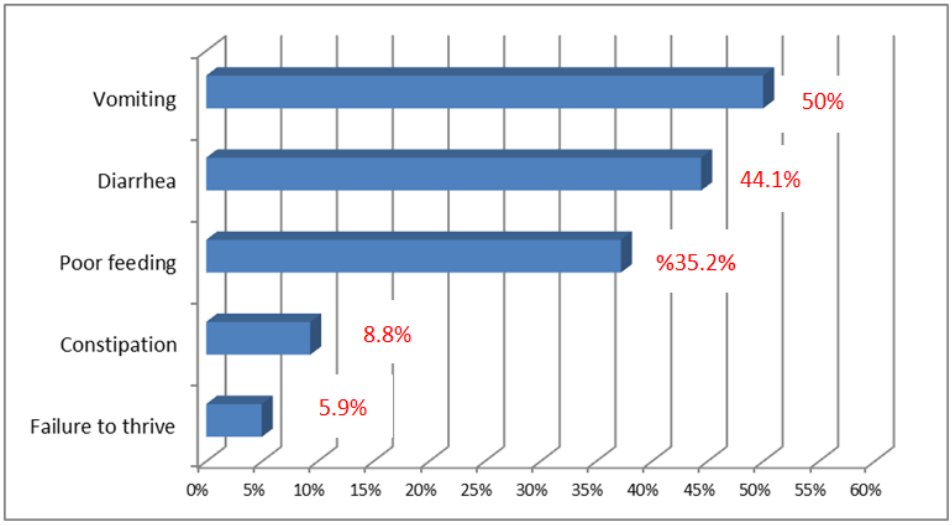

Figure 3.3: The percentage of non-specific sign or symptoms in 34 patients with UTI.

Specific signs or symptoms related to UTI such as: crying on micturition (11.8%) (4/34), frequency (5.9) (2/34), suprapubic tenderness on examination (8.8%) (3/34), and red color urine (2.9%) (1/34). As shown in figure 3.4.

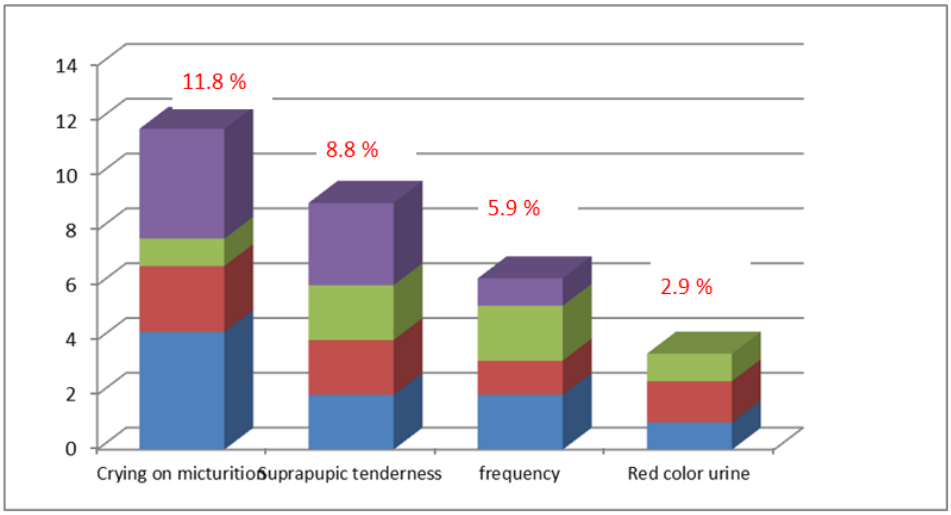

Figure 3.4: The percentage of specific sign or symptoms related to UTI in 34 patients with UTI.

The result of urine analysis was shown in table 3.5; pyuria (94.1%) (32/34), bacteriuria (70.6) (24/34), RBC in urine (26.5%) (9/34), reaction**:** acidic; (91.2%) (31/34), alkaline (8.8%) (3/34), and proteinuria (5.9%) (2/34).

Table 3.5: Urine analysis results of the study participants.

Urine finding	No. of patients	Percentage
Pyuria	32	94.1%
Bacteriuria	24	70.6%
RBC.	9	26.5%
Reaction: Acidic Alkaline	 31 3	 91.2 8.8%
Proteinuria	2	5.9%

The results of urine culture reveal that the predominant pathogen was E. coli (67.7%) (23/34), followed in frequency by Klebsiella species (14.7%) (5/34), proteus (8.8%) (3/34), Enterococcus species (5.9%) (2/34), Citrobacter species (2.9%) (1/34). As shown in figure 3.5.

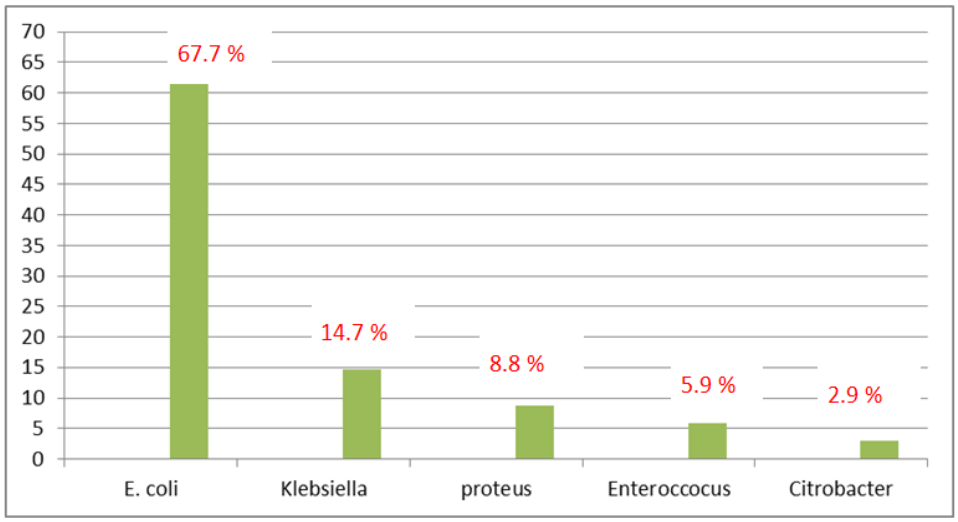

Figure 3.5: The percentage of pathogens isolated.

Ultrasonography examination was done for all patients proved having UTI by urine culture, 34 patients send for ultrasonography, the results was normal among (50%) (17/34), pyelonephritis (32.4%) (11/34), hydronephrosis (8.8%) (3/34), stone (5.9%) (2/34), ectopic kidney (2.9%) (1/34). As shown in table 3.6.

Table 3.6: Ultrasound findings of 34 patients with UTI.

Ultrasound findings	No. of patients	percentage
Normal	17	50%
Pyelonephritis	11	32.4%
Hydronephrosis	3	8.8%
Stone	2	5.9%
Ectopic kidney	1	2.9%
Total	34	100%

4-DISCUSSION

Urinary tract infection is one of the acute illnesses that presents with fever in children. In this study the overall prevalence of UTI in febrile children under 2 years old without clear source of fever was (5.7%). This finding is consistent with other study that had identified UTIs as a significant cause of fever in young children, especially those with no apparent source for their fever.[11]

In this study, the prevalence of urinary tract infection during the first year of life was found to be (5.3%) which is similar to that obtained by Oana Falup-Pecurariu.[12] Moreover; the study found that the overall prevalence of urinary tract infection was more common in girls (girls to boy ratio 1.6/1). This difference is primarily attributed to the shorter length of the female urethra, making it easier for bacteria to enter the urinary tract. This finding is comparable to Indra et al study finding.[13]

The study found that febrile children with specific signs and symptoms (without apparent source of fever) were more likely (8%) (13/162) to have UTI compared with those with possible cause of fever (4.8%) (21/438) and this result is similar to some extent to the results obtained by Shaikh N.[14] Furthermore; the prevalence of UTI in uncircumcised febrile boys under 2 years of age was (84.6%) (11/13) which is consistent with that obtained by Sindhu Barola et al.[11] Additionally; the prevalence of urinary tract infection was found in this study to be higher among uncircumcised boys than girls in the first year of life or circumcised boys. This is because the foreskin can harbor bacteria, increasing the likelihood of infection, which consistent with results of the studies obtained by Abbas Mohammed Hussein AL-Shebani[15] and Sindhu Barola et al.[11]

Regarding feeding pattern, the study found that the prevalence of urinary tract infections in febrile children under 2 years old is generally higher in bottle-fed infants compared to those who are exclusively breastfed. This is meant that breastfeeding has been shown to have a protective effect against UTIs in infants, while formula feeding is associated with an increased risk. From the other hand; mixed feeding (a combination of breast milk and formula) also presented with a higher prevalence than exclusive breastfeeding but less than exclusive formula feeding. These results are runs with study obtained by Tala N Mawad et al[16] and also runs with Rositsa Chamova et al.[17]

The study found that the prevalence of urinary tract infection among patient presented with non specific signs or symptoms such as vomiting, diarrhea, poor feeding and failure to thrive was higher than for patients with specific signs or symptoms such as crying on micturition, frequency, suprapubic tenderness and red color urine. This means that UTI should be considered in infants and young children who present with vague symptoms, as these could be the only indicators of infection. This is in agreement with Basim S Alsaywid et al study findings.[7]

The study found that pyuria was present in (94.1%) which indicate it is not necessarily present on initial urinalysis even with documented cases of UTI. This highlights the importance of considering other clinical

signs and symptoms along with urinalysis results, when diagnosing and managing UTIs. Michael J. Bono and Stephen W. Leslie had comparable findings.[18]

In this study, E. coli was identified as the most prevalent pathogen, accounting for 67.7% of cases. Following E. coli, other significant pathogens included Klebsiella at 14.7%, Proteus at 8.8%, Enterococcus spp. at 5.9%, and Citrobacter spp. at 2.9%. These findings indicate that E. coli is the dominant cause of the infections studied, with other bacteria also playing a notable role, which is consistent with Vered Shkalim Zemer et al study findings.[19]

The study found that ultrasonography of the abdomen for patient with urinary tract infection showed normal findings in (50%), pyelonephritis (32.4%), hydronephrosis (8.8%), stone (5.9%), ectopic kidney (2.9%). This indicates that for half of the patients, the ultrasound examination did not reveal any abnormalities related to their urinary tract infection. However; no published study showed comparable results.

5- CONCLUSIONS

1. Urinary tract infection is prevalent in febrile children without a definite source of fever.
2. Urinary tract infection is more common in boys among febrile children less than 1 year old especially those who are uncircumcised, whereas it is more common in girls who are more than 1 year old.
3. UTI is more prevalent in young children with bottle feeding.
4. Urine analysis must be done for every child under 2 years of age who complain of febrile illness.

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