

## A Cross Sectional Study of Prevalence of Urinary Tract Infection in Malnourished Children

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### Abstract

**Introduction:** Urinary Tract Infection (UTI) is the most common childhood bacterial infection associated with high morbidity and long-term complications like renal scarring, hypertension, and chronic renal failure.

**Materials and Methods:** This cross-sectional study was conducted at the department of pediatrics, District Hospital, Machilipatnam, from June 2017 to May 2018. 72 children who met the inclusion criteria were included in this study. Written informed consent was taken from parents/guardians for enrolment of their children in the study. Through history, particularly the nutritional history of the subject and other systemic examination was done. Detailed anthropometric measurements were done and grading of malnutrition was done according to WHO classification. Length/ height of child was measured to the nearest millimeter (mm). Weight was recorded to the nearest 100 gm. Mid arm circumference was measured to the nearest millimeter. Body mass index (BMI) in Kg/m<sup>2</sup> was calculated from weight and height using the formula -BMI=Weight (Kg)/(Height/length in m). BSA was measured by the equation of,  $BSA = \sqrt{[Wt (Kg) \times Ht/ length (cm)/3600]}$ .

**Results:** UTI was found in 16.67% cases, mostly in female and more frequently in 6-12 months age group and most common organisms were gram negative bacilli.

**Conclusion:** Among the various risk factors of urinary tract infection, malnutrition especially under-nutrition itself is a risk factor for UTI or sometimes urinary tract infection also can lead to malnutrition. UTI is common in malnourished children and most common causative organisms are gram negative bacilli.

**Key Words:** UTI, hypertension, and chronic renal failure.

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### I. Introduction

Urinary Tract Infection (UTI) is the most common childhood bacterial infection associated with high morbidity and long-term complications like renal scarring, hypertension, and chronic renal failure.<sup>1</sup> To reduce the adulthood complications, early diagnosis, proper investigation, adequate therapy and prolonged follow-up are of outmost importance. The epidemiology of UTI during childhood varies by age, gender, circumcision status and other factors. Boys are more susceptible during the first year of life, mostly the first 3 months; thereafter the incidence is substantially higher in girls. Among boys, uncircumcised infants have an eightfold higher risk. About 5% of girls and 2% of boys experience at least one episode of UTI up to the age of seven years. Clinically, important UTIs usually occur due to bacteria, although viruses, fungi, and parasites can also cause infection. Gram negative enteric bacilli such as *Escherichia coli*, *Klebsiella* spp., *Proteus* spp., *Enterobacter* spp., *Pseudomonas* spp., and *Citrobacter* spp. and Gram-positive organisms, including group B streptococci, *Enterococcus* spp., and *Staphylococcus aureus* are commonly associated with pediatric UTI.<sup>2,3</sup>

Effective management of patients suffering from severe UTI commonly relies on the identification of pathogenic organisms and the selection of an effective antibiotic agent to the organism in question. However, diagnosis of UTI is often delayed due to obscure clinical findings, particularly in infants and children of less than two years. Moreover, it is difficult to collect urine and interpret the results to confirm the diagnosis unequivocally in this age group.<sup>4,5</sup> Hence, empirical antibiotic prescription is often endorsed even without culture and sensitivity. On the other hand, the emergence of antibiotic resistant uropathogens in pediatric urology is increasing worldwide; particularly in developing countries where empirical treatment is the mainstay of treatment in the absence of proper diagnostic modalities and the availability of antibiotics over the counter.<sup>6,7</sup>

### II. Materials And Methods

This cross-sectional study was conducted at the department of pediatrics, District Hospital, Machilipatnam, from June 2017 to May 2018. 72 children who met the inclusion criteria were included in this study. Written informed consent was taken from parents/guardians for enrolment of their children in the study.

Through history, particularly the nutritional history of the subject and other systemic examination was done. Detailed anthropometric measurements were done and grading of malnutrition was done according to WHO classification. Length/ height of child was measured to the nearest millimeter (mm). Weight was recorded to the nearest 100 gm. Mid arm circumference was measured to the nearest millimeter. Body mass index (BMI) in Kg/m<sup>2</sup> was calculated from weight and height using the formula -BMI=Weight (Kg)/ (Height/length in m). BSA was measured by the equation of, BSA = $\sqrt{[Wt (Kg) \times Ht/ length (cm)/3600]}$ . All cases were subjected to routine and microscopic examination of urine and urine for culture and sensitivity test. Early morning urine was collected. In children below 3 years of age urine was collected by catheterization and in toilet trained children (> 3years of age) midstream clean catch urine sample under strict asepsis was collected in a sterile container. After collecting urine sample was sent within one hour to the laboratory. In case if sample could not be sent for culture test within one hour after collection then sample was stored at 4 degree Celsius in refrigerator and after that it was sent to the laboratory as soon as possible during the working hours. Urine sample was sent for microscopic examination, routine examination and culture and sensitivity test. Urine culture was considered significant (positive) if the colony count was 100,000 (10<sup>5</sup>) or more per ml of freshly voided urine. Urinary tract infection was diagnosed in the presence of more than 5 pus cells per high power field in a centrifuged urine sample in a symptomatic patient and/or positive urine culture.

### III. Results

The mean  $\pm$  SD age of malnourished children was 27.96  $\pm$  16.75 months (Range 6-60). Majority of the children had severe malnutrition (68.06%).

S.No	Variables	Mean	$\pm$ SD
1	Weight (Kg)	7.61	2.15
2	Length/height (cm)	78.62	12.08
3	MAC (cm)	12.48	1.15
4	BMI (kg/m <sup>2</sup> )	12.16	1.43
5	BSA (m <sup>2</sup> )	0.41	0.09

**Table I: Anthropometry**

S.No	Symptoms	Number (N=72)	Percentage
1	<b>Cough</b>	26	36.11
2	<b>Poor Feeding</b>	21	29.16
3	<b>Failure to thrive</b>	17	23.61
4	<b>Fever</b>	13	18.05
5	<b>Lethargy</b>	13	18.05
6	<b>Vomiting</b>	12	16.67
7	<b>Abdominal Distension</b>	11	15.28
8	<b>Loose stool</b>	9	12.5
9	<b>Abdominal pain</b>	8	11.11
10	<b>Breathing difficulties</b>	8	11.11
11	<b>Irritability</b>	7	9.72
12	<b>Crying during micturition</b>	4	5.56
13	<b>Frequency of urine</b>	3	4.17
14	<b>Dysuria</b>	1	1.39
15	<b>Hematuria</b>	1	1.39

**Table 2: Symptoms at Admission**

S.No	UTI	Number (N=72)	Percentage
1	<b>Present</b>	12	16.67
2	<b>Absent</b>	60	83.33
3	<b>Total</b>	72	100

**Table 3: Prevalence of UTI**

S.No	UTI	Male		Female		Total		P Value
		N	%	N	%	N	%	
1	<b>Present</b>	4	8.51	8	32	12	16.67	

2	Absent	43	91.49	17	68	60	83.33	0.010
3	Total	47	100	25	100	72	100	

Table 4: Prevalence of UTI Among Males and Females

S.No	UTI	Moderate		Severe		P Value
		N	%	N	%	
1	Present	3	13.04	9	18.37	0.057
2	Absent	20	86.96	40	81.63	
3	Total	23	100	49	100	

Table 5: UTI among Moderate and Severe Malnutrition

The presence of >10 leukocytes per mm<sup>3</sup> in fresh uncentrifuged sample, or >5 leukocytes per high power field is useful for screening dip stick examination, combining leukocyte esterase and nitrite, has moderate sensitivity and specificity for detecting UTI. Following treatment of the first episode of UTI plans are made for evaluation of the urinary tract. The aim of imaging studies is to identify urologic anomalies that predispose to pyelonephritis such as obstruction or vesicoureteric reflux, and detect evidence of renal scarring. All children with UTI are encouraged to take enough fluids and empty the bladder frequently to prevent stasis of urine routine alkalization of the urine is not necessary. With appropriate therapy fever and systemic toxicity reduce and urine culture is sterile within 24-36 hours. Failure to obtain such a result suggest either lack of bacterial sensitivity to the medication or presence of an underlying anomaly of the Urinary tract. A repeat urine culture is not required during or following treatment unless symptoms failed to resolve despite 72 hours of therapy, symptoms recur suggesting recurrent UTI or contamination of the initial urine culture is suspected. Risk factors for urinary tract infection include female gender, uncircumcised male, vesicoureteral reflux, poor toilet training, voiding dysfunction, obstructive uropathy, urethral instrumentation, wiping from back to front in girls, bubble bath, tight clothing (Underwear), pinworm infestation, constipation, sexually activity, neuropathy bladder, anatomic abnormality (Labial adhesion), bacteria with P fimbriae and under nutrition.

#### IV. Discussion

In the present study, conducted between age group 6-60 months with majority (26.39%) of the study population were 13-24 months of age and the mean  $\pm$  SD age of malnourished children was 27.96  $\pm$  16.75 months. In the present study majority of patients was male (65.28 %) rest were female (34.72%).

In the present study majority of [49 (68.06%)] cases was severe malnourished and rest [23 (31.94%)] cases belonged to moderate malnutrition (WHO classification).

The mean  $\pm$  S.D. weight was 7.61  $\pm$  2.20 kg (Range from 3.30 kg to 12.40kg). The mean  $\pm$  S.D. B.M.I. was 12.16  $\pm$  1.43 kg/m<sup>2</sup> (range from 8.4 to 14.72). The mean  $\pm$  S.D. body surface area was 0.41  $\pm$  0.09 m<sup>2</sup> (range from 0.22 to 0.59). The mean  $\pm$  S.D. length was 78.62  $\pm$  12.08 cm (range from 55 to 104 cm). The mean  $\pm$  S.D. of MAC was 12.48  $\pm$  1.15 cm (range from 9 to 14.5cm).<sup>8</sup>

Majority of study population was from rural area (62.5%) rest was from urban (37.5%).<sup>9</sup>

In the present study, majority of cases admitted with symptoms of cough (36.11%). Other symptoms and signs were poor feeding (29.16%), failure to thrive (23.61%), fever (18.05%), lethargy (18.05%), vomiting (16.67%), abdominal distension (15.28%), loose stool (12.5%), breathing difficulties (11.11%), crying during micturition (5.56%), i.e. around 60% patients were admitted with respiratory tract/ gastroenteritis infections. Pallor was present in 38.89% and vitamin deficiency was found in 41.67% cases.<sup>10</sup>

In the present study out of 72 patients, 12 had UTI (16.67%) and all cases of UTI were culture proven. In this study UTI is more common than the same age group of general population.(23) Similar results were obtained in the study conducted by page et al.<sup>11</sup>

#### V. Conclusion

UTI is common in malnourished children and most common causative organisms are gram negative bacilli. There are many problems encountered in malnourished children including tuberculosis infections, vitamin A deficiency, respiratory infections, gastro-intestinal infections, or other nutritional deficiencies. But, urinary tract infection especially cystitis or acute pyelonephritis may be unrecognized if proper attention is not given or urine culture as a routine protocol for investigation is not included.

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