

## Original Research Article

# Prevalence of urinary tract infection in malnourished children aged 6 months to 5 years attending tertiary care centre

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**Received:** 10 June 2019

**Accepted:** 01 July 2019

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## ABSTRACT

**Background:** Infections are more common in malnourished children, as result of impaired immunity. Unexplained fever and failure to thrive are the common presenting features of urinary tract infection (UTI) in children. In malnourished children, UTI is mostly asymptomatic and is leading to pyelonephritis and renal scarring. The study was done with the aim to evaluate and find out the prevalence of urinary tract infection in malnourished children between 6 months to 5 year and to find out the causative organism and antibiotic sensitivity pattern.

**Methods:** A total of 180 cases of malnourished children were enrolled and clean catch midstream urine sample was collected for urine culture, according to WHO criteria of malnutrition. Children with urinary tract abnormality were excluded from the study. Renal USG was done in all urine culture positive cases.

**Results:** Total of 174 cases was present after exclusion. Of 174 children, 27 (15.5%) children were having UTI. In this study, 37% of children are asymptomatic. *E. coli* is the commonest organism causing UTI 16 (59%). Other organism are *Klebsiella pneumonia* 4 (14.9%), *Proteus mirabilis* 3 (11.1%), and *Pseudomonas* 3 (11.1%). The order of antimicrobial sensitivity pattern was amikacin (100%)> ciprofloxacin (81.4%)> cefotaxime (7%). Other common drugs have developed resistance to these organisms.

**Conclusions:** Our observations conclude that malnourished children with fever of unknown origin are at risk of UTI. Hence, urine analysis and culture tests are to be done to all malnutrition cases for assisting to diagnose the bacterial infection and providing the appropriate treatment.

**Keywords:** Antibiotic spectrum, Malnutrition, Urinary tract infection

## INTRODUCTION

Urinary tract infection is the major cause of morbidity among the children.<sup>1,2</sup> Unexplained fever and failure to thrive are the common presenting features in infants besides nausea, vomiting and diarrhea also. In older children, increased frequency of micturition and nocturnal enuresis can be other associated manifestations. Sometimes children are asymptomatic also. In malnutrition, urinary tract infection is very common which is 6% to 37% in literature reviews. UTI is

asymptomatic and the clinical features will be masked in malnutrition.<sup>3</sup>

In malnutrition, because of impaired immunity, children are more vulnerable to infections. Malnutrition leads the chances of urinary tract infection and vice versa.<sup>4</sup> UTI is further aggravating the severity of malnutrition and leading to failure to thrive. Urinary tract infection can be leading to pyelonephritis and chronic kidney disease. Early diagnosis of UTI is very helpful for starting early treatment and also helpful for child's improvement.

The present aims to evaluate and find out the prevalence of urinary tract infection in malnourished children between 6 months to 5 year and to find out the causative organism and its related antibiotic sensitivity pattern.

**METHODS**

This was a descriptive study done on 180 children of age 6 months to 5 years, attending in outpatient department of Institute Child Health, Egmore, Chennai. After getting approval from Institutional ethics committee and informed consent from the parents, children were enrolled in the study according to the anthropometric measurements, nutritional status and the inclusion criteria.

Inclusion criteria were children of both moderate acute malnutrition (MAM) and severe acute malnutrition (SAM), according to WHO criteria and were included both symptomatic and asymptomatic cases also. Children with congenital anomalies in genitourinary tract, obstructive uropathy, renal problems, patients on steroids, immunodeficiency disorder, and HIV infection were excluded. Baseline demographic data format and clinical history were noted. General examination and systemic examination were done in detail in all children.

In both MAM and SAM, urine sample were collected irrespective of symptoms whether symptomatic or asymptomatic. Before collection of urine, all the information and the methods about collection of urine were informed to the parents. In the study, mid-stream urine was collected in the age group of children 6 month to 5 years. In children who are not toilet trained, finger tap collection of midstream urine method is used whereas in toilet trained children, midstream urine collection method was used for urinary sample collection. Collected urine samples had been sent for rapid test and urine culture and sensitivity.

Data was entered in excel sheet. Statistical analysis was done using statistical software SPSS. Qualitative variables were expressed as proportion and quantitative variables. Outcomes were expressed in proportions.

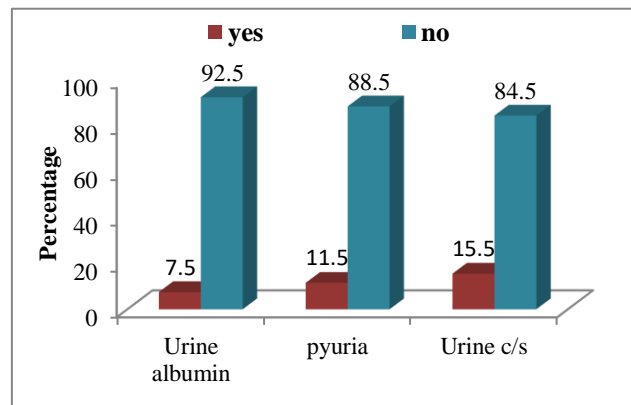
**RESULTS**

A total of 180 children were included in the study based on inclusion criteria. Of them 6 children were found to be urinary tract abnormality cases. Hence, they were excluded from the study. Demographic and clinical data of the total 174 children was shown in Table 1. In this study, more children (64) were in the age group of 13-24 months. Both the sexes were equally distributed (87). In this study 54% MAM and 46% were SAM. The common urinary symptom observed was fever in 50% of children. Out of total 174 children, 55(31.6%) were symptomatic and 119(68.6%) children were asymptomatic.

In this study, urine examinations shows urine albumin positive 13(7.5%), pyuria 20(11.4%) and positive urine culture in 27(15.5%) children (Figure 1). Out of 174 children, 27 children were having urine culture growth positive. The results show *E. coli*(16), *Klebsiella*(4), *Proteus*(3), *Pseudomonas*(3) and *Acinetobacter*(1) (Table 2).

**Table 1: Demographic and clinical characteristics of study participants (n=174).**

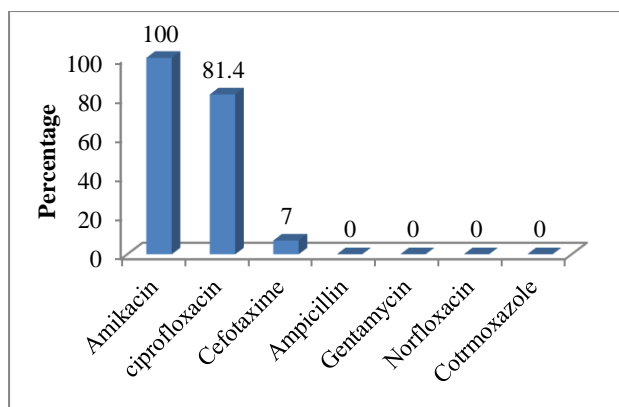
Characteristics	Number (N)	Percentage (%)	
Age in months	6-12	39	22.4
	13-24	64	36.8
	25-36	37	21.3
	37-48	24	13.8
	49-60	10	5.7
Sex	Boys	87	50
	Girls	87	50
Nutritional status	MAM	94	54.0
	SAM	80	46
	Symptoms		
	Fever	50	28.7
	Urinary symptoms	14	8
	Diarrhoea	10	5.7
Symptoms of UTI	Vomiting	6	3.4
	Symptomatic	55	31.6
	Asymptomatic	119	68.4



**Figure 1: Characteristics of urine examination.**

**Table 2: Frequency of organism in urine culture positive children (n=27).**

Organisms	Number (N)	Percentage (%)
<i>E. coli</i>	16	59.2
<i>Klebsiella</i>	4	14.8
<i>Proteus</i>	3	11.1
<i>Pseudomonas</i>	3	11.1
<i>Acinetobacter</i>	1	3.7



**Figure 2: Antimicrobial sensitivity pattern to the organism.**

Renal USG was done in all urine culture positive cases only (15.5%). Out of 27 cases, 17 children showed normal USG and 10 cases showed features of UTI. Antimicrobial sensitivity was done in all urine culture positive (27) cases. Only 3 drugs showed sensitivity (Amikacin-100%, ciprofloxacin-81.4% and cefotaxime-7%), (Figure 2).

Blood investigations were done in all the children. Out of 174 children, presence of anemia was noticed in 71 children, leucocytosis in 55 children, elevated renal function results in 4 children and blood culture positive in 10 children.

**Table 3: Blood investigation in malnourished in children.**

Blood investigation	Anemia	Leukocytosis	CRP	RFT	Blood c/s
Yes	71 (40.8%)	55 (31.6%)	46 (26.4%)	4 (2.3%)	10 (5.7%)
No	103 (59.2%)	119 (68.4%)	128 (73.6%)	170 (97.7%)	164 (94.3%)

**DISCUSSION**

This study was done in Institute of child health, Egmore, Chennai. This study investigated 180 malnourished children in the age group of 6 months to 60 months. 6 children were excluded from the study because of abnormal renal USG features.

In total of 174 malnourished children, majority of the children were <2 years. Out of this, 13-24 months of the age children were common. In the study, male and female were present equally about 50% each. There is no gender preponderance.

In this study, prevalence of the bacterial infection was 15.5%. The prevalence was almost similar to study by Rabasa et al, which is about 11.3%. While other studies showed varying prevalence about 8% to 37%.<sup>3</sup>

This study observed that severe acute malnutrition had more number of UTI (23.5%) as compared to the moderate acute nutrition (22.8%). In previous study, Bagga et al, observed that UTI was increasing depending upon the severity of the malnutrition.<sup>4</sup>

In this study there was 17 children were symptomatic (63%) while 10 children were asymptomatic 10(37%) and the difference was statistically significant (p<00.1). This explains that malnourished children with UTI may be asymptomatic also. Previous studies were not clearly mentioning about prevalence of UTI in asymptomatic malnourished children.<sup>6</sup> Fever was the most common clinical presentation observed in the study (59.3%). This was similar to the study of Robino et al.<sup>7</sup>

Pyuria was present in 20 children, out of 174. Of 20 cases, 18 children were having bacteriuria. In 27 UTI children, 18(67%) children were having pyuria and remaining children were not having bacteriuria 9(33%). This explains that malnourished children may not have pyuria in addition to the symptoms. In previous studies, pyuria was about 38.8%.<sup>8</sup>

As per the guidelines National Institute for Health and Care Excellence (NICE) management of UTI in MAM and SAM depends on the laboratory investigations of urine culture. 85.2% of children were having leucocytosis and 81.5% of the children were showing CRP positive indicating the presence of UTI. In this study, the urine samples of 27 children were found to have bacterial infection.<sup>9</sup>

The commonest organism causing UTI in malnourished children was *E. coli* in about 16(59.2%) cases. Similar reports were evidenced in previous studies.<sup>10,11</sup> Rare organism like *Acinetobacter* 1(3.7%) was also reported in this studies. Similar reports were also noted in the study by Caksen et al, and Thuo et al.<sup>8,12</sup>

As reported by Rabasa et al, antibiotic sensitivity patterns vary from one study to another.<sup>5</sup> In this study, microorganisms showed antibiotic sensitivity pattern in the following order: Amikacin (100%)> ciprofloxacin (81.4%)> cefotaxime (7%). Other commonest drugs like ampicillin, norfloxacin, cotrimoxazole were showing resistance to this organism. As per the recommendations by Robinson et al, blood cultures should be done, in case of unclear diagnosis. In this study, 4 cases showed blood culture growth. This is emphasizing that septicemia is one of the complication of UTI.<sup>1</sup>

In this study, we did not have controls. So, we are not able to match and compare the parameters. In this study, we are not evaluated the risk factors causing UTI in malnourished children. In this study, we have done only clean midstream urine collection method. But the gold standard is supra pubic aspiration. So, there are possibility contaminations.

## CONCLUSION

The findings of the study conclude that the prevalence rate of UTI is higher in malnutrition children. The most common bacterial isolate from urine culture was *E.coli*. The most sensitive antimicrobial agents to these organisms are amikacin, ciprofloxacin. These observations have formed the basis for the current diagnostic and therapeutic guidelines for clinicians who are managing children with complicated MAM and SAM.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Kumar SA, Gowrinathan TG. Prevalence of urinary tract infection in malnourished children aged 6 months to 5 years attending tertiary care centre. Int J Contemp Pediatr 2019;6:1814-7.