

A Prospective Study of Urinary Tract Infections in Malnourished Children in a Tertiary Care Hospital

Naveen Kumar Reddy A^{1*}, A. Chandrasekhar Reddy²

¹Associate Professor, Department of Paediatrics, Viswabharathi Medical College, Penchikalpadu, Kurnool, Andhra Pradesh, India

²Consultant, GVR Children Hospital, Kurnool, Andhra Pradesh, India

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Abstract

Introduction: Urinary tract infection was reported as the major cause of health-related morbidity among the children in various studies. The most common presenting signs and symptoms are unexplained fever, nausea, vomiting and also diarrhea and failure to thrive among infants.¹ However, among older children, these signs and symptoms are coupled with increased frequency of micturition and sometimes presents with nocturnal enuresis as the associated common presenting signs and symptoms. **Materials and Methods:** This was a descriptive study done on 180 children of age 6 months to 5 years, attending in outpatient department of Viswabharathi Medical College, Kurnool from June 2017 to June 2020. After taking 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. **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. **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.

Keywords: Urinary tract infection, MAM, SAM, WHO.

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Introduction

Urinary tract infection was reported as the major cause of health-related morbidity among the children in various studies. The most common presenting signs and symptoms are unexplained fever, nausea, vomiting and also diarrhea and failure to thrive among infants.[1]

*Correspondence

Dr. Naveen Kumar Reddy A

Associate Professor, Department of Paediatrics,
Viswabharathi Medical College, Penchikalpadu,
Kurnool, Andhra Pradesh, India

E –Mail: pranaveen@rediffmail.com

However, among older children, these signs and symptoms are coupled with increased frequency of micturition and sometimes presents with nocturnal enuresis as the associated common presenting signs and symptoms. However, some studies reported that children are asymptomatic also in their findings.[2] In the context of associated factors, previous studies reported that malnutrition is frequently associated among cases of urinary tract infection and its prevalence is varies from 6% to 37% in their findings. However, these cases of urinary tract infection were asymptomatic and the clinical features of urinary tract infection were masked by clinical features of malnutrition.[3]

Previous studies reported that children diagnosed with malnutrition had impaired immunity status; these children were more vulnerable to various infections. Hence, the prevalence of urinary tract infection was reported to be higher among children with malnutrition. In some studies, it was shown that these trends of association of malnutrition and urinary tract infections were seen vice versa.[4] They reported in their findings that urinary tract infections further increase the severity of malnutrition and leading to secondary complications like failure to thrive, pyelonephritis and chronic kidney disease. Hence, early diagnosis of urinary tract infections is very essential for starting the treatment which is helpful for child's improvement and preventing further complications.[5]

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.

Materials and Methods

This was a descriptive study done on 180 children of age 6 months to 5 years, attending in outpatient department of Viswabharathi Medical College, Kurnool from June 2017 to June 2020. After taking 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.

Statistical Analysis: 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 | Male | 87 | 50 |
| | Female | 87 | 50 |
| | MAM | 94 | 54 |
| | SAM | 80 | 46 |

| Nutritional status | Symptoms | | |
|--------------------|------------------|-----|------|
| | Fever | 50 | 28.7 |
| | Urinary Symptoms | 14 | 8 |
| | Diarrhoea | 10 | 5.7 |
| | Vomiting | 6 | 3.4 |
| Symptoms of UTI | Symptomatic | 55 | 31.6 |
| | Asymptomatic | 119 | 68.4 |

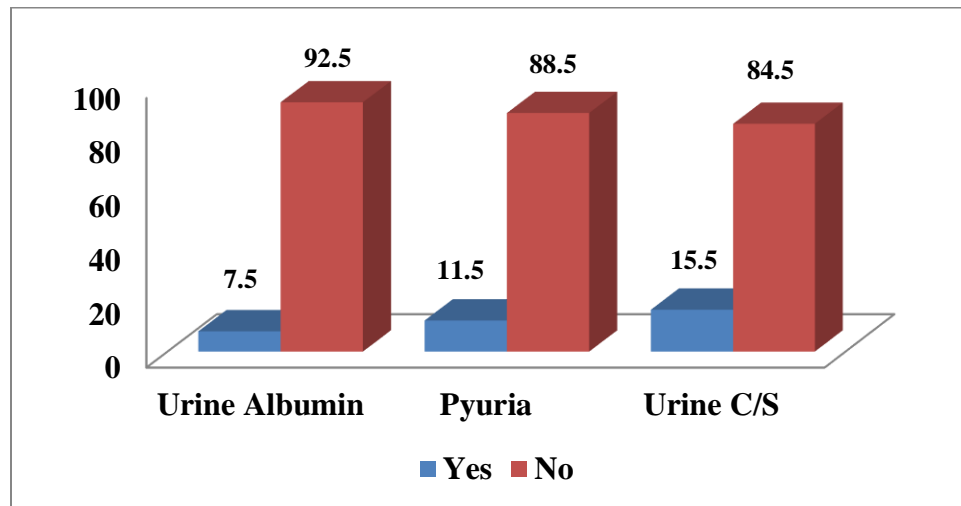


Figure 1: Characteristics of urine examination

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

| S.No | Organisms | Number | Percentage |
|------|----------------------|--------|------------|
| 1 | E.Coli | 16 | 59.2 |
| 2 | <i>Klebsiella</i> | 4 | 14.8 |
| 3 | <i>Proteus</i> | 3 | 11.1 |
| 4 | <i>Pseudomonas</i> | 3 | 11.1 |
| 5 | <i>Acinetobacter</i> | 1 | 3.7 |

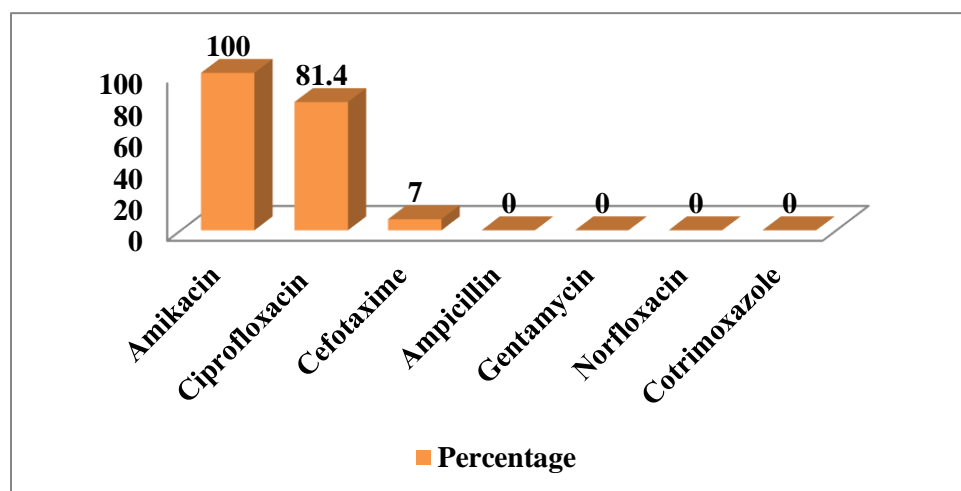


Figure 2: Antimicrobial sensitivity pattern to the organism

Table 3: Blood investigation in malnourished in children

| Blood investigation | Anemia | | CRP | RFT | |
|---------------------|-------------|-------------|-------------|-------------|-------------|
| 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%) |

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.

Discussion

This study was done in Department of Paediatrics, Viswabharathi Medical College, Kurnool. 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.[6]

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%.[3]

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.[6]

In this study there was 17 children were symptomatic (63%) while 10 children were asymptomatic 10(37%) and the difference was statistically significant ($p < 0.01$). 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. 6 Fever was the most common clinical presentation observed in the

study (59.3%). This was similar to the study of Robino et al.[3]

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%.[7,8]

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.[9,10]

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.

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