

## A PROSPECTIVE STUDY OF URINARY TRACT INFECTIONS IN MALNOURISHED CHILDREN IN A TERTIARY CARE HOSPITAL

Dr.M.Mallikarjuna<sup>1</sup>, Dr.Maddi Prakash Kumar<sup>2</sup>, Dr.Y.Krishna<sup>3</sup>,  
Dr.K. Aruna Jyothi<sup>4\*</sup>

<sup>1</sup>Associate Professor of Pediatrics, Kurnool Medical College, Kurnool 518002.

<sup>2</sup>Associate Professor of Pediatrics, Kurnool Medical College, Kurnool 518002.

<sup>3</sup>Assistant Professor of Pediatrics, Kurnool Medical College, Kurnool 518002.

<sup>4\*</sup>Associate Professor of Paediatrics, Government Medical College, Nandyal 518501.

**Corresponding Author: Dr.K. Aruna Jyothi**

**Associate Professor of Paediatrics, Government Medical College, Nandyal 518501.**

### Abstract

**Introduction:** Urinary tract infection (UTI) remains one of the most common causes of febrile illness in pediatric practice. In developing countries, it ranks next to gastrointestinal and respiratory tract infections as the third most common bacterial infection in children.

**Materials and methods:** A descriptive cross sectional study was conducted at Kurnool Medical College and Hospital Kurnool. All eligible children with diagnosis of severe acute malnutrition as per WHO criteria who were admitted in department of pediatrics during January 2023 to June 2023 were included in the study. All eligible children were consecutively enrolled in the study after taking prior informed consent from the parents. Demographic profile, relevant information of individual patient was collected using well-structured proforma by interviewing the parents/attendant. At the time of enrollment, detailed evaluation and physical examination of each patient was done. Detailed anthropometry measurements were taken with appropriate techniques.

**Results:** We enrolled 130 eligible children detected with severe acute malnutrition in our study. Data was collected for each subject in pre-designed proforma. Out of total 130 children whose urine culture samples were sent, 28 (21.54%) children were positive and urine culture of 102 (78.46%) children was negative. Prevalence of urinary tract infection comes out to be 21.54% in the study.

**Conclusion:** UTI is an important occult infection in malnourished children which delays the recovery and increases the duration of hospital stay. It is often missed as a large number of children are asymptomatic. Given the high prevalence of UTI among children with SAM, it is suggested that urine culture should be performed in all severely acute malnourished children to diagnose UTI and to treat it on basis of antibiotic sensitivity pattern. Thus, it is an important step toward strengthening the therapeutic management in these children.

**Key Words:** Urinary tract infection, SAM, urine culture, malnourished children.

## INTRODUCTION

Urinary tract infection (UTI) remains one of the most common causes of febrile illness in pediatric practice. In developing countries, it ranks next to gastrointestinal and respiratory tract infections as the third most common bacterial infection in children.<sup>1</sup>

A number of host factors predispose children to UTI; these include obstructive uropathy, urolithiasis, incomplete emptying of the bladder with residual urine, noncircumcision in boys, female sex after infancy, and constipation. Nevertheless, there are some host defense mechanisms, namely, the intrinsic defense of the bladder epithelial cells, secretory immunoglobulin A (IgA) in urine, and blood group antigens in secretions, which block bacterial adhesion to the lining of the urinary tract.<sup>2</sup>

UTI is more common in malnourished children than in their well-nourished counterparts, and the risk of UTI increases with the severity of malnutrition. Severe acute malnutrition (SAM) is associated with immune deficiency, which expectedly renders affected children more vulnerable to severe infections.<sup>3</sup> As defined in the joint statement by World Health Organization (WHO) and United Nations Children's Emergency Fund, SAM consists of two entities: severe wasting and nutritional edema. Severe wasting (marasmus) is defined as weight-for-height below  $-3$  standard deviations (or Z-scores) or middle upper arm circumference  $<11.5$  cm. Nutritional edema (kwashiorkor) is defined as bilateral pitting edema independent of weight-for-height.<sup>4,5</sup>

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

A descriptive cross sectional study was conducted at Kurnool Medical College and Hospital Kurnool. All eligible children with diagnosis of severe acute malnutrition as per WHO criteria who were admitted in department of pediatrics during January 2023 to June 2023 were included in the study.

### **Inclusion criteria:**

All children between 6 months to 5 years of age with diagnosis of SAM who were admitted in department of pediatrics. SAM among children 6 months to 5 years of age is defined by any of the following: weight for height below  $-3$  standard deviation of the median, visible severe wasting, presence of bipedal edema, and mid upper arm circumference below 11.5 cm.

**Exclusion criteria**

The following criteria was excluded from the study: children on antibiotic therapy, children who were known case of urinary tract malformation, and children whose parents did not give consent.

All eligible children were consecutively enrolled in the study after taking prior informed consent from the parents. Demographic profile, relevant information of individual patient was collected using well-structured proforma by interviewing the parents/attendant. At the time of enrollment, detailed evaluation and physical examination of each patient was done. Detailed anthropometry measurements were taken with appropriate techniques. Two urine samples were collected, first urine sample was sent for routine microscopy to detect the presence of pus cells. Second sample was sent for urine culture and sensitivity. All isolates were tested for antimicrobial sensitivity and antibiotic therapy was given as per standard protocol/sensitivity pattern.

Statistical analysis was performed using the statistical packages for social sciences (SPSS) version 20 IBM Corporation. Data was entered into MS Excel software. Statistical analysis of Categorical variables was compared between patients using the chi-square test. Quantitative data was analysed using student T-test. A p value <0.05 is considered to be significant

**RESULTS**

We enrolled 130 eligible children detected with severe acute malnutrition in our study. Data was collected for each subject in pre-designed proforma. Out of total 130 children whose urine culture samples were sent, 28 (21.54%) children were positive and urine culture of 102 (78.46%) children was negative. Prevalence of urinary tract infection comes out to be 21.54% in the study.

<b>Drugs</b>	<b>E.coli (14)%</b>	<b>Klebsiella (8)%</b>	<b>Pseudomonas (4)%</b>	<b>Acinetobacter (2)%</b>	<b>Total (n=56)</b>
<b>Imipenem</b>	14 (100)	8 (100)	4 (100)	2 (100)	28
<b>Nitrofurantoin</b>	14 (100)	8 (100)	-	2 (100)	24
<b>Co-trimoxazole</b>	4 (28.57)	4 (50)	-	2 (100)	10
<b>Co-amoxyclav</b>	2 (14.28)	2 (25)	2 (50)	-	6
<b>Cefixime</b>	8 (57.14)	4 (50)	-	-	12
<b>Ceftriaxone</b>	10 (71.42)	4 (50)	-	-	14
<b>Gentamicin</b>	14 (100)	6 (75)	4 (100)	-	24
<b>Amikacin</b>	14 (100)	8 (100)	4 (100)	-	26

**Table 1: Antibiotic sensitivity pattern in association with organisms.**

Out of the total 28 culture positive samples, E. coli was the most common organism, detected in 14 samples (50%) followed by Klebsiella 8 samples (28.57%), Pseudomonas 4 samples (14.29%) and Acinetobacter in 2 samples (7.14%).

Socio-demographic factors	UTI present	UTI absent	Total
	Number (%)	Number (%)	
<b>Gender</b>			
Male	8 (13.33)	52 (86.67)	60
Female	20 (28.57)	50 (71.43)	35
Total	28	102	130
P value	<0.01		
<b>Age in months</b>			
6-12	10 (26.32)	28 (73.68)	38
13-24	10 (21.74)	36 (78.26)	46
25-36	4 (18.18)	18 (81.81)	22
37-48	2 (14.29)	12 (85.71)	14
49-60	2 (20)	8 (80%)	10
Total	28 (21.54)	102 (78.46)	130
<b>Residence</b>			
Urban	10 (25)	30 (75)	40
Rural	18 (20)	72 (80)	90
Total	28 (21.53)	102 (78.46)	130
P Value	0.7557		
<b>Socioeconomic class</b>			
Upper Middle	0 (0)	8 (100)	8
Middle	4 (15.3)	22 (84.6)	26
Upper lower	18 (24.32)	56 (75.67)	74
Lower	6 (27.27)	16 (72.72)	22
Total	28 (21.53)	102 (78.46)	130

**Table 2: Distribution of socio-demographic factors among children with urinary tract infection in severe acute malnutrition**

Clinico-epidemiological factors	UTI Present	UTI absent	Total
	Number (%)	Number (%)	
<b>Immunization</b>			
Incomplete	16 (21.62)	58 (78.37)	74
Complete	12 (21.42)	44 (78.57)	56
Total	28 (21.53)	102 (78.46)	130
P value	0.9899		
<b>Duration of hospital stay (days)</b>			
<6	6 (10.34)	52 (89.66)	58
≥6	22 (30.55)	50 (69.45)	72
Total	28	102	130

P value	0.0001		
<b>Criteria of SAM in children with UTI</b>			
MAUC <11.5cm	28 (22.58)	96 (77.42)	124
Weight for height <-3SD	22 (18.33)	98 (81.67)	120
Edema positive	0 (0)	8 (100)	8
Visible severe wasting	2 (25)	6 (75)	8
<b>Presenting complaints</b>			
Cough	6 (15.78)	32 (84.22)	38
Fever	6 (13.63)	38 (86.37)	44
Increased frequency of micturition	6 (100)	<b>0</b>	6
Loose stools	4 (18.18)	18 (81.82)	22
Pain in abdomen	2 (16.67)	10 (83.33)	12
Vomiting	0 (0)	0 (0)	14

**Table 3: Distribution of clinico-epidemiological factors among children with urinary tract infection in severe acute malnutrition.**

## DISCUSSION

In the present study, total 130 children with severe acute malnutrition between the age group 6 months to 5 years were enrolled to study the prevalence of urinary tract infection. Urinary tract infection was found in 28 (21.54%) out of total 130 children with SAM enrolled in our study. This was in accordance with the previously done study by Sharma et al in severe acute malnourished children where they found the prevalence of UTI to be 22.4%. Previous studies have reported UTI prevalence ranging from 4% to 32.7%. Prevalence of UTI in our study is slightly higher than that of a similar studies done on severe malnourished children by Page et al and Singh et al where they reported prevalence of UTI to be 16% and 14% respectively.<sup>6</sup>

In our study, total number of males was 60 (46.15%) and females were 70 (53.85%). There was female predominance in our study. Difference in distribution among both genders was statistically not significant (p value >0.05). It was different from the studies done by Girish and Page et al in which male children were more than female children.<sup>20,22</sup> While in the study done by Kumar et al and by Muhsin et al in which female children were more than male children. In our study 8 male children (13.33%) and 20 female children (28.57%) had UTI. It was similar with the study done by Ibrahim et al and Muhsin et al where they found UTI predominance in females than males.<sup>7</sup> In our study, maximum number of children were in the age group between 13-24 months (35.38%), followed by 6-12 months (29.23%). The mean age of children was 26.61±14.96 months as compared to 27.04 months found in study of Sharma et al in which majority of cases were in age group 13-36 months. Similar facts were observed by Kumar et al in which majority of cases were in age group between 13-24 months. Dangi et al also observed that majority of cases (35%) were in the age group between 1-2 years. UTI in SAM children was observed to be higher among the age group of 6-12 months (26.32%) and 13-24 months

(21.74%). So, in our study more number of children with UTI was seen in less than 2 years of age. Similar results were seen in study done by Ibrahimet alin which maximum number of the cases of UTI occurred in the age group of less than 2 years.<sup>8</sup>

In current study, out of 130 children, 90 (69.23%) belonged to rural area and 40 (30.77%) belonged to urban area. These results were similar to studies done by Nagar et al and Prasad et al where mostly children belonged to rural area. Out of 40 children belonging to urban area, UTI was present in 10 (25%) children and out of 90 children belonging to rural area, UTI was present in 18 (20%) children. Although more children which belong to urban area had UTI but this difference is statistically not significant. So area of residence does not affect the incidence of UTI among children with SAM.<sup>9</sup>

In our study, maximum number of children 74 (56.92%) belonged to upper lower class. Results were comparable in study done by Kumar et al and in study done by Kumar et al where 94.7% and 67% of the study group belong to lower socio-economic class respectively.

Out of total 74 children which belonged to upper lower class, 18 (24.32%) had UTI. In lower class 6 (27.27%) had UTI, in middle class 4 (15.3%) had UTI. No UTI was seen among upper middle class. This shows that UTI was more common in lower and upper lower socioeconomic classes in our study which might attribute to poor hygienic conditions among these groups.<sup>10</sup>

## CONCLUSION

UTI is an important occult infection in malnourished children which delays the recovery and increases the duration of hospital stay. It is often missed as a large number of children are asymptomatic. Given the high prevalence of UTI among children with SAM, it is suggested that urine culture should be performed in all severely acute malnourished children to diagnose UTI and to treat it on basis of antibiotic sensitivity pattern. Thus, it is an important step toward strengthening the therapeutic management in these children.

## REFERENCES

1. Arya AK, Lal P, Kumar P. Co-morbidities in Children with Severe Acute Malnutrition -A Tertiary Care Centre Experience. *Int J Contemp Med Res.* 2017;4(5):1086-8.
2. Garg M, Devpura K, Saini SK, Kumara S. A hospital based Study on Co-morbidities in children with severe acute malnutrition. *J Pediatr Res.* 2017;4(1):82-8.
3. Page AL, de Rekeneire N, Sayadi S, Aberrane S, Janssens AC, Rieux C, et al. Infections in children admitted with complicated severe acute malnutrition in Niger. *PLoS One.* 2013;8(7):68699.
4. Singh JK, Bajaj N, Pattnaik D, Singh J. Antibiotic susceptibility of bacterial agents in children with SAM: A single centre cross-sectional study. *Int J Pediatr Res.* 2016;3(9):672-7.

5. Gopal G, Premalatha R. Effect of malnutrition on kidney size and incidence of urinary tract infection in malnourished children. *Int J Pharm Biomed Res.* 2014;5(1):29-35.
6. Muhsin M, Ashoor R, Sarhat, Abdul Ghani F. Urinary tract infection and malnutrition. *Indian J Public Health Res Develop.* 2019;10(1).
7. Ibrahim UA, Aikhionbare HA, Aliyu I. Urinary tract infection in children with protein-energy malnutrition in Aminu Kano Teaching Hospital Kano, Northwest Nigeria. *Niger J Basic Clin Sci.* 2019;16:64-9.
8. 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.
9. Choudhary M, Sharma D, Nagar RP, Gupta BD, Nagar T, Pandita A. Clinical Profile of Severe Acute Malnutrition in Western Rajasthan: A Prospective Observational Study from India. *J Pediatr Neonatal Care.* 2015;2(1):57.
10. Ahmed M, Moremi N, Mirambo MM, Hokororo A, Mushi MF, Seni J, et al. Multi-resistant gram negative enteric bacteria causing urinary tract infection among malnourished underfives admitted at a tertiary hospital, northwestern, Tanzania. *Ital J Pediatr.* 2015;41:44.