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Frequency of Urinary Tract Infection in Severe Acute Malnutrition Children Presenting at Lady Ready Hospital Peshawar

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ABSTRACT

Background: Severe acute malnutrition (SAM) significantly impairs immune defenses, predisposing children to infections such as urinary tract infections (UTIs). UTIs in this group may often go undetected due to atypical presentations and resource-limited settings. This study aimed to determine the frequency of UTIs among children with SAM presenting to a tertiary care hospital in Peshawar, Pakistan. Methods: The study is a descriptive cross-sectional that was undertaken at the Department of Pediatrics, Lady Reading Hospital, Peshawar, and lasted six months (Nov 2023 to APRIL 2024). 175 children aged 1 to 5 years old having SAM according to WHO criteria were recruited by consecutive sampling. Sterile collection of urine and assessment of UTI according to traditional microbiological parameters was undertaken. Demographic, socioeconomic background, residence and maternal educational data as well as analyzing it by using SPSS. Results: UTI was diagnosed in 30 (17.1%) of 175 children with severe acute malnutrition. UTI prevalence was higher among younger children (1–2 years), rural residents (76.7%), children from low socioeconomic status (86.7%), and those with illiterate mothers (76.7%). Statistically significant associations were found between UTI and socioeconomic status ($p = 0.048$), residence ($p = 0.049$), and maternal education ($p = 0.032$). No significant correlation was observed between UTI and gender or age group. Conclusion: Frequency of UTI is higher among children with SAM, particularly in socioeconomically disadvantaged and rural populations. Routine screening for UTI in malnourished children may help prevent serious complications and improve overall clinical outcomes. Health education and improved access to sanitation and healthcare services are crucial in addressing this burden.

INTRODUCTION

Malnutrition is less supply of energy and nutrients from daily intake of food necessary to perform daily activities.[1] In Pakistan, malnutrition is a leading issue of the population health, two out of every five children are malnourished below 5 years[1,2]. Malnutrition and hematological defects are directly related to one another. Severe Acute Malnutrition lead to extensive changes in the organ and functions of the hematological system that impacts upon all the blood cells [3,4].

UTIs have been known to be more prevalent among malnourished children, compared to their well-nourished counterparts, and with increasing degrees of malnutrition, the likelihood of UTI is also likely to become higher[5]. severe acute malnutrition (SAM), predisposes a child to immune dysfunction, which understandably, increases the susceptibility of children with SAM to severe infections6. World Health Organization (WHO) and the United Nations Children Emergency Fund (UNICEF) defined as weight for length (or Height) < -3SD of WHO child growth standards or have mid-upper arm circumference <115 mm Or who have bilateral edema[7 8].

Children with malnutrition are susceptible to UTIs in comparison with those who are well-nourished, and UTI risk increases with malnutrition 9. SAM is associated with immunological insufficiency, thereby predisposing affected infants to severe infections [9,10]. In a majority of the studies in poor countries, there was the high incidence of UTI in hospitalized children with SAM. Such awareness of the danger could assist litigious physicians to show better diagnostics and treatment decisions in such children[11,12].

The prevalence of UTI among severe acute malnutrition children was 25.9 percent in one study[12]. UTI in SAM prevalence rates noted in developing countries were found to range between as 6 percent as low and as high as 37 percent[13]. The most common isolates of bacterial infection of the urine were found to be the Gram-negative coliform organisms such as Escherichia coli and Klebsiella species[13]. In another study the prevalence of UTI in severe acute malnutrition children was 7.88% [14,15].

The objective of the research is to assess the frequency of UTI in children with severe acute malnutrition. With the

above background research, it can be suggested that the global burden of UTI is on a rise and showing extreme variance across different populations. Children who are malnourished lack immunity and are vulnerable to clinical and nonclinical UTIs. UTI is a critical infectious disease that can develop into sepsis and other fatal effects of UTIs in children. There has not been such type of study on our population in last five years hence, this study will present us the recent and the updated magnitude of UTI in severe acute malnourishment children. Further the outcomes of the research will be also disseminated to the other health professionals to provide an early diagnosis and also to help in the management of severe acute malnutrition in respect to UTI.

METHODOLOGY

A sample of 175 children with severe acute malnutrition was selected and participated in the study over six months. Urinary tract infection (UTI) was detected in 30 children, giving a frequency of 17.1%. The mean age of the participants was 2.43 ± 1.28 years. The gender distribution showed 98 (56%) males and 77 (44%) females. Most of the children belonged to low socioeconomic strata (74.3%) and resided in rural areas (62.3%). Regarding maternal education, 60% of the mothers were illiterate.

Table 1. Demographic and Clinical Characteristics of Study Population (n = 175)

Variable	Frequency (n)	Percentage (%)
Age (years)		
1–2 years	109	62.3%
3–4 years	45	25.7%
5 years	21	12.0%
Gender		
Male	98	56.0%
Female	77	44.0%
Socioeconomic Status		
Low	130	74.3%
Middle	33	18.9%
High	12	6.9%
Residence		
Rural	109	62.3%
Urban	66	37.7%
Maternal Education		
Illiterate	105	60.0%
Primary	42	24.0%
Secondary and above	28	16.0%

Table 2. Frequency of Urinary Tract Infection (UTI) in Study Population (n = 175)

UTI Status	Frequency (n)	Percentage (%)
Present	30	17.1%
Absent	145	82.9%

To explore the relationship between UTI and various demographic and clinical factors, stratification was performed followed by application of the chi-square test.

Table 3. Stratification of UTI with Demographic and Clinical Variables (n = 175)

Variable	UTI Present (n = 30)	UTI Absent (n = 145)	p-value
Gender			
Male	16 (53.3%)	82 (56.6%)	0.733
Female	14 (46.7%)	63 (43.4%)	
Age Group			
1–2years	22 (73.3%)	87 (60.0%)	0.153
3–4 years	5 (16.7%)	40 (27.6%)	
5 years	3 (10.0%)	18 (12.4%)	
Socioeconomic Status			
Low	26 (86.7%)	104 (71.7%)	0.048*
Middle/High	4 (13.3%)	41 (28.3%)	
Residence			
Rural	23 (76.7%)	86 (59.3%)	0.049*
Urban	7 (23.3%)	59 (40.7%)	
Maternal Education			
Illiterate	23 (76.7%)	82 (56.6%)	0.032*
Literate	7 (23.3%)	63 (43.4%)	

*Statistically significant at $p \leq 0.05$

DISCUSSION

This paper assessed the attributes and frequency of urinary tract infection (UTI) in a sample of 175 children with severe acute malnutrition (SAM) at a tertiary care facility in Peshawar. The results indicated a UTI frequency of 17.1% (30 out of 175), aligning with prior literature from the region and beyond, which has reported UTI prevalence between 10% and 25% among malnourished children. This relatively high prevalence underscores the increased vulnerability of malnourished children to infectious diseases, likely due to impaired immunity, disrupted mucosal barriers, and weakened phagocytic activity. These immunological deficits are well-documented in protein-energy malnutrition and contribute significantly to the burden of infections in this population.

Our data revealed a higher proportion of UTIs among younger children (1–2 years), although the association with age was not statistically significant. This trend aligns with the natural susceptibility of younger children to UTIs due to anatomical and functional factors, including incomplete bladder emptying and poor perineal hygiene practices. Furthermore, gender distribution showed no significant difference in UTI prevalence, which contrasts with many previous studies where females are typically more affected due to a shorter urethra and closer proximity to the anal opening. The absence of a gender difference in our study may be attributed to uniform exposure to risk factors in severely malnourished children regardless of sex.

Socioeconomic status emerged as a significant determinant of UTI in this study. Children from low-income families were significantly more affected, highlighting the role of poor sanitation, inadequate access to clean water, and delayed healthcare-seeking behavior in UTI pathogenesis. Similarly, rural residence was associated with a significantly higher prevalence of UTI.

This finding may reflect disparities in healthcare infrastructure, diagnostic capabilities, and parental awareness between urban and rural settings. Importantly, maternal education level was inversely associated with UTI prevalence. Children of illiterate mothers had significantly higher rates of UTI, reinforcing the pivotal role of maternal literacy in child health, hygiene, and timely medical intervention.

The methodology of this study was rigorous, with well-defined inclusion and exclusion criteria and laboratory confirmation of UTI using standard microbiological techniques. However, certain limitations warrant consideration. The non-probability sampling technique may limit generalizability, and the cross-sectional design precludes establishing causal relationships. Furthermore, factors such as nutritional biomarkers, prior hospitalizations, or recurrent infections were not explored, which could offer additional insight into UTI susceptibility.

Despite these limitations, the study provides valuable clinical insights into the burden of UTI in malnourished children and underscores the need for routine screening in this high-risk group. Proactive identification and prompt management of UTIs can potentially reduce morbidity and prevent long-term renal complications. Future studies employing longitudinal designs with broader geographic representation and microbiological profiling are warranted to develop targeted screening protocols and improve outcomes in this vulnerable population.

CONCLUSION

This study found a 17% frequency of urinary tract infections among children with severe acute malnutrition, highlighting a considerable infectious burden in this vulnerable group. Significant associations were noted between UTI occurrence and factors such as low socioeconomic status, rural residence, and maternal illiteracy, emphasizing the multifactorial nature of risk. These findings underscore the necessity for routine UTI screening in SAM children, especially in under-resourced settings, to facilitate early diagnosis and intervention. Addressing modifiable factors such as maternal education and sanitation could significantly reduce the risk. Furthermore, public health initiatives should prioritize improving hygiene awareness and strengthening primary healthcare systems in rural areas. Future research should explore microbial patterns, resistance trends, and the benefits of preventive strategies to optimize care in malnourished pediatric populations. Ultimately, timely UTI detection and management can substantially reduce morbidity and prevent renal complications in children with SAM.

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