ASSOCIATION OF URINARY TRACT INFECTION WITH PROTEIN CALORIE MALNUTRITION IN PAEDIATRIC POPULATION PRESENTED TO KHYBER TEACHING HOSPITAL

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ABSTRACT

Background: UTI is a common cause of acute illness in young children and is more frequent among malnourished children due to their lowered immunity.
Objective: To determine the association of urinary tract infection (UTI) in children having Protein Calorie malnutrition in the age range of six months to five years in the department of child health at Khyber teaching hospital
Methods: This cross-sectional research was performed at the Department of Child Health, Khyber Teaching Hospital Peshawar, Pakistan from June 2020 to June 2022.The sample proportion contained 218 children. 218 urine samples were taken andsent for routine examination and cultures.Nonprobability consecutive samplingtechnique was used for sample collection. Data was entered and analysed using SPSS version21.0. Percentages were calculated for categorical variables. Chi square test was applied whereneeded to measure the association. P value<0.05 was taken as significant. Incidence wascalculated in percentages for different categories. PCM was graded on the basis of z-score. Those with z-score below -3SD was graded as severe or grade 3 PCM.
Results: Total 218 patients were included in the study. Age were between 6 months to 5 years. There were total 118(54.1%) male and 100 (45.87%) female. Urine culture test was positive in 44% of females and 25.4% of males. Urine culture was positive in 42% of grade 3 Protein calorie malnutrition (PCM), 27.5% of grade 2 PCM and 17% of grade 1 PCM. The overall prevalence of UTI was 33.9% in PCM.
Conclusion: UTI is more prevalent in malnourished children. The study showed that UTI is 33.9% prevalent in PCM children. So adequate treatment should be started in time, to prevent further compromise on the child's nutritional status and to avert further complications of malnutrition and UTI it-self.
Keywords: Protein calorie malnutrition, Urinary tract infection, children

INTRODUCTION

Malnutrition is one of the major causes of morbidity and mortality all around the world. [1] Childs malnutrition is more prevalent in Pakistan, as opposed to other developing countries. [2] According to National nutritional survey 33% of all children were under weight, nearly 44% were stunted, 15% were wasted and 50% were anaemic.[3]

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Protein calorie malnutrition (PCM)is a state in which a child has insufficient protein and calorie intake. Prolonged malnutrition leads to serious derangements in organ function and growth, the child is usually growth retarded, oedematous and wasted. Malnutrition leads to weakened immunity and inability to fight infections. Children are exposed to infections like diarrhoea, pneumonia, UTI, vitamins and minerals deficiencies. [4, 5]

PCM can be classified into moderate and severe according to Z score.[6] Those with a Z score below -3 is classified as severe PCM and those below -2 is moderate PCM . Grade 3 PCM are more susceptible to acquire infection. In another classification PCMcan be classified as kwashiorkor, marasmus and marasmic kwashiorkor. Marasmus is a state of chronic malnutrition due to severe calorie deficiency leading to muscle wasting whereas kwashiorkor is acute state and is due to protein deficiency leading to fluid retention. Marasmic kwashiorkor is the one with features of both .Malnutrition can be primary or secondary .Primary malnutrition is due to inadequate nutrition intake where as secondary is due to some underlying disease.

Whatever may be the cause and whatever the type, malnutrition is a state of emergency and needs to be managed aggressively and in time before it deteriorates your immune system to the extent that your body is unable to fight infections.

Among febrile illness in paediatric patientsUrinary tract infection (UTI) remains one of the most common cause.[7,8,9,10] In developing countries, it is the third most common bacterial infection in children.[11]UTI can be defined as: In a supra pubic or catheter sample, if the culture shows > 50,000 colonies of a single pathogen or if there are 10,000 colonies and the child is symptomatic the child is counted to have a UTI.[12] In sample of bag if the urinalysis result is positive, the patient is symptomatic and there is a single organism cultured with a colony count > 100,000 there is presumed UTI.UTI can be divided into two categories (i) Pyelonephritis (ii) Cystitis. It affects both the sexes but the incidence is greater in females. It prevails both in healthy and malnourished children, but malnourished seems to be affected more since the infection further deteriorates the nutritionalstatus and a vicious cycle continues.

Since UTI is more prevalent in malnourished it is therefore important to rule out UTI by means of urine culture in every malnourished child, so adequate treatment is started in time and to prevent further compromise on the child's nutritional status.

MATERIAL AND METHODS

After obtaining IREB approval from research cell Khyber Medical College this cross-sectional descriptive questionnaire based study was carried out at the Department of Child Health, Khyber Teaching Hospital Peshawar Pakistan from June 2020 to June 2022.The sample size contained 218 children. The sample size was calculated using open epi calculator and taking the anticipated frequency as 17% from a study done previously.All malnourished patients presenting to OPD were admitted in our nutritional rehabilitation unit. Irrespective of being symptomatic or asymptomatic and using aseptic measures, urine specimens for culture and routine exam were collected by different methods depending upon the patients age i.e. Urine collection bags, mid-stream clean catch or supra pubic aspiration. All paediatric patients who fit in the category of PCM were included in the study. While Cases that are not malnourished,those with Vesico-ureteric reflux, obstructive uropathy, voiding dysfunction, posterior urethral valves or any other anatomic abnormality like labial adhesions,Uncircumscribed males,those with constipation or pinworm infestation,and Cases who are immune-compromised due to diseases like Leukemia or are using steroids were excluded from the study. The questionnaire designed contained the following parameters: name, age, sex, weight, height, z score, symptoms, urine re and culture.Nonprobability consecutive samplingtechnique was used for sample collection. Data was entered and analysed using SPSS version21.0. Percentages were calculated for categorical variable. Chi square test was applied whereneeded to measure the association. P value<0.05 was taken as significant. Incidence wascalculated in percentages for different categories.

Since UTI is more prevalent in malnourished children this study is therefore conducted to rule out UTI by means of urine culture in every malnourished child, so adequate treatment is started in time, to prevent further compromise on the child's nutritional status and to avert further complications of malnutrition and UTI it-self.

RESULTS

Total 218 patients were included in the study. Age ranged between 6 months to 5 years. There were total 118(54.1%) male and 100(45.87%) female. Urine Culture test was positive in 44% of females and 25.4% of males. Age distribution was analysed as 92(42.2%) were infants, 104(47.7%) were toddlers and 22(10.09%) were preschoolchildren. Urine culture test was positive in 31.5% of infants, 38.5% of toddlers and 22.7% of preschool children. (table1)

Type of PCM was analysed as 131 (60.1%) were grade 3 PCM, 40 (11.0%) were grade 2 PCM and 47 (13.0%) were grade 1 PCM. Urine culture was positive in 42% of grade 3 PCM, 27.5% of grade 2 PCM and 17% of grade 1 PCM. The overall prevalence of UTI was 33.9% in PCM.70.1% of patients with a positive urine culture were symptomatic while 14.2 % of children with a positive urine culture were asymptomatic. (Table 2)

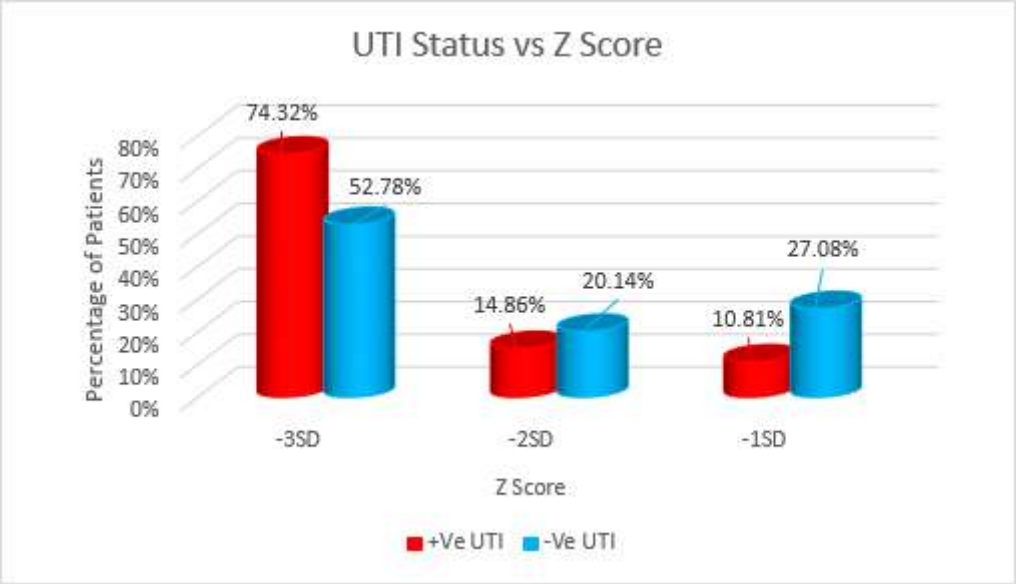
Graph 1 shows UTI status (positive culture / negative culture) in each grade of PCM.

Table 1: Demographic Statistics

Variable	Sub Group	UTI Status on Culture		Statistics		
		POSITIVE	NEGATIVE			
		n (%)	n (%)	Chi Square (df)	P-value	Phi
Age Group	Infants	29 (31.5)	63 (68.5)	2.4 (2)	0.298	0.105
	Toddlers	40 (38.5)	64 (61.5)			
	Pre School	5 (22.7)	17 (77.3)			
Gender	Male	30 (25.4)	88 (74.6)	8.3 (1)	0.004	0.195
	Female	44 (44.0)	56 (56.0)			

Table 2: Grades of PCM along with Urine culture status and symptoms of UTI

Variable	Sub Group	UTI Status on Culture	
		POSITIVE	NEGATIVE
		n (%)	n (%)
Z Score	-3SD	55 (42.0)	76 (58)
	-2SD	11 (27.5)	29 (72.5)
	-1SD	8 (17.0)	39 (83.0)
Symptoms	Present	54 (70.1)	23 (29.9)
	Absent	20 (14.2)	121 (85.8)
Urine RE	PUS CELLS PRESENT	63 (64.3)	35 (35.7)
	PUS CELLS NOT PRESENT	11 (9.2)	109 (90.8)



Graph 1: UTI status in each grade of malnutrition (Z score)

DISCUSSION

Protein-energy malnutrition (PEM) in children poses a worldwide health challenge in underdeveloped countries of sub-Saharan Africa and southern Asia.[13] Children with PEM have immunological impairment and are thus prone to common childhood infections such as infectious diarrhoea, pneumonia and bacteraemia that, in turn, create a vicious cycle with malnutrition.[14,15] Similarly, as the infection

risk may also raise with the severity of malnutrition these children are also thought to have a predisposition to urinary tract infection (UTI).[16]Literature reviews shows that UTI is about 6-37% in malnourished children.[17]

In our study 218 patients were enrolled. The prevalence of UTI was 33.9 %in PCM.Urine culture was positive in 42% of grade 3 PCM, 27.5% of grade 2 PCM and 17% of grade 1 PCM. Urine Culture was positive in 44% of females and 25.4% of males.In another study in India UTI was 23.57 % prevalent.The study was conducted on 76 females (54.29%) and 64 males (45.71%). 90.7% patients had weight for height less than -3 standard deviation i.e were grade 3 PCM. The majority (76.43%) of patients had negative urine culture. 23.37% of urine cultureswere positive.UTI was more common in females, present in 28.95%.[18]Some studies from Africa report it to be 9-11.4% .[19,20] Few other studies from India found it to be 15.2-22.3%. [21,22,23,24,25,26,27]In a prospective study by Horta BL who reported a UTI prevalence of 31% in children admitted to the hospital who were malnourished.[28] These rates are comparable to our study.In another study conducted by Di Giovanni et al, stated that the predominance of UTI was found to be 16%.[29]

A study was conducted in the paediatric department of Gajju khan medical college, Swabi from July 2019 till January 2020. 241 patients were enrolled in the study .7.88% patients had UTI.[30] In a systematic review and meta – analysis review published in 2019, 17% was the pooled prevalence of UTI in 3294 malnourished children .[31]

A cross sectional hospital based study was done on children under age of 5 years old admitted to paediatric department in Salah Al Deen General Hospital Iraq to evaluate the prevalence of UTI in malnourished children.This study revealed that the incidence of UTI was significantly increased in malnourished children (27%), who commonly come from rural areas and of age group 1-3 years. The most common microorganism isolated was gram –ve coliform organism such as E. coli and klebsiella species.[32] The high incidence of urinary tract infection in PEM could be due to a defect in the local antibody response including locally synthesized IgG and secretory Ig A that are normally present in urine and whose competences inhibit bacterial adhesion to the epithelial surface.[33,34,35]

CONCLUSIONS

From this study we concluded that UTI is more prevalent in malnourished children. It is therefore necessary to rule out UTI by means of urine culture in every malnourished child, so adequate treatment is started in time, to prevent further compromise on the child's nutritional status and to avert further complications of malnutrition and UTI it-self.

AUTHORS' CONTRIBUTIONS

Syed Kaleem Ur Rahman: Conceived and designed the analysis and wrote the paper.

Sana Pervez: Conceived and designed the analysis and wrote the paper.

Husna Khan: Contributed data and analysis tools.

Rifaq Zeb: Data collection

Bibi Sadiqa: Data collection

Jan Muhammad Afridi: Data collection

CONFLICTS OF INTERESTS

Nil

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