

Frequency and Etiology of Urinary Tract Infections in Neonatal Late Onset Sepsis

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ABSTRACT

Objective: To determine the frequency and etiology of urinary tract infections in neonatal late onset sepsis. **Study Design:** Cross-sectional study. **Place and Duration of Study:** The study was carried out in neonatal unit, Shaikh Zayed Hospital, Lahore for six months period from January to June, 2014. **Methodology:** 175 neonates admitted in Neonatal Unit, Shaikh Zayed Hospital, Lahore through emergency, obstetric unit or outpatient department with late onset sepsis were included. Cases were selected by non-probability sampling technique. **Results:** Culture proven urinary tract infection (UTI) was present in 21.6% of late onset sepsis. The most common causative organism was *Escherichia coli* (84.21%) followed by *Klebsiella* (13.6%). No male, female predisposition was found in this study. **Conclusion:** All neonates with late onset sepsis should be investigated for urinary tract infection and most common causative organism is *Escherichia coli*.

Key Words: Urinary tract infections, late onset sepsis, causative organism, urine culture

INTRODUCTION

Urinary tract infection (UTI) in newborns is one of major clinical problem that is frequently associated with bacteremia. Newborns with sepsis show nonspecific symptoms such as poor feeding, irritability, and weight loss. Diagnosis of UTI is very often missed due to minimal and non-specific symptoms; the only presenting clinical feature may be prolonged jaundice^{1,2}.

Other than prolonged jaundice which is presenting feature of UTI in 5.8% of neonates with; 32% present mainly with fever, 30% present mainly with fever, 30% with poor feeding and 22% with irritability^{3,4}. Prevalence of UTI in neonatal sepsis is 14.9%⁵. Generally females are more likely to develop UTI than males except in the neonates, where the trend is reversed. Among neonates with UTI male, female ratio is 6:14⁶ Most common microorganism involved in UTI is *Escherichia coli* (31%); other isolated microorganisms are *Klebsiella* (29%), *Enterobacter cloacae* (18%), *Enterococcus faecalis* (8%), *Proteus mirabilis* (6%), *Acinobacter* (4%) and *Staphylococcus* (4%)⁴.

Diagnosis of UTI is based on symptoms or findings on urine analysis, or both, but a urine culture is necessary for confirmation and appropriate therapy. The correct diagnosis of UTI depends on having the proper sample of urine that can be collected by catheterization, suprapubic aspiration, sterile collection bag or midstream urine sample¹.

UTI in neonates can be associated with systemic infection, anatomic or functional abnormalities of the urinary tract of which vesicoureteric reflux (VUR) is very common. Rate of VUR is lower in very low birth weight premature newborns than that among term newborns who develop UTI^{7,8}.

Early diagnosis and proper treatment along with long term follow up is very important. The developing renal cortex in young children is vulnerable to renal scarring resulting in hypertension and chronic renal failure. Urinary tract infection has been considered an important risk factor for the development of renal insufficiency or end-stage renal disease in children^{1,9}.

Urinary tract infection is frequently

misdiagnosed and if untreated may lead to renal insufficiency or end-stage renal disease in children. If the frequency of UTI in neonatal sepsis will be high, then we should provide a guideline that every neonate with late onset sepsis should be screened for UTI to further avoid renal insufficiency or end stage renal disease. Given the complications associated with undetected UTI every neonate presenting with signs and symptoms suggestive of sepsis should be screened, treated and followed up for urinary tract infection.

PATIENTS AND METHODS

A cross-sectional study was carried out in neonatal unit of Shaikh Zayed Hospital, Lahore for a period of six months, from January to June, 2014. Sample size of 175 was calculated using Non-probability purposive sampling technique, with 95% confidence level and 3% margin of error and taking expected percentage of staphylococcus i.e. 4% in patients of late onset neonatal sepsis with UTI.

The inclusion criteria was both genders of term and preterm with late onset sepsis. Late onset sepsis was defined as any clinical sign of sepsis like fever or hypothermia, tachycardia, tachypnea or hyperventilation and diagnosis was confirmed on abnormal white blood cells or increase in immature forms with an immature:total neutrophil ratio >0.25 at >72 hours of age. The exclusion criteria was neonates with antenatally diagnosed anomalies of urinary tract and severe life threatening malformations like open neural tube defects (encephalocele, myelocele, myelomeningocele etc) or congenital heart diseases which are not compatible with life; diagnosed antenatally or by clinical examination after birth.

The data was collected after filling out a proforma regarding gestational age, gender, address, weight, urine routine examination and culture. Informed consent was taken from parents. Data was recorded and analyzed using Statistical Package for Social Sciences version 12. Quantitative data like age and weight were analyzed by mean and standard deviation, qualitative variables like gender, frequency of UTI and etiologies by frequency and percentage. Data was stratified for weight and gestational age of the neonate.

RESULTS

Out of 175 neonates with late onset sepsis 38 (21.6%) were found to have culture positive urinary tract infection (Table 1). Majority of cases 139 (77.7%) were term and 36 (22.3%) were preterm. Term to preterm ratio was 3.86:1 (Table 2). Among 38 culture positive cases 30 (79%) were term and 08 (21%) were preterm. Term to preterm ratio (3.75:1) among urine culture positive cases was almost similar to that of total cases (Table 3).

Table 1: Distribution of cases by UTI (n=175).

UTI	Frequency	Percentage
Present	38	21.6
Absent	137	77.8
Total	175	100

Table 2: Distribution of cases by gestational age (n=175)

Gestational age	Frequency	Percentage
Preterm	36	22.3
Term	139	77.7
Total	175	100

Table 3: Distribution of culture positive cases by gestational age (n=38).

Gestational age	Frequency	Percentage
Preterm	08	21
Term	30	79
Total	38	100

In current study, males were 97 (55.4%) and females were 78 (44.6%) with male to female ratio of 1.24:1 (Table 4). Out of 38 urine culture positive cases, males and females numbered 19 each with ratio of 1:1 (Table 5).

In current study regarding weight distribution out of 175 cases 101 (57.7%) were of 2.5 kg or less and 74 (42.3%) were > 2.5kg on weight, with mean weight of 2.33±1.22 (Table 6). Out of 38 culture positive cases, 19 (50%) were of low birth weight (2.5 kg or less) and 19 (50%) were > 2.5 kg with ratio of 1:1 (Table 7).

The most common organism isolated in urine

culture were *Escherichia coli* 32 (84.21%) followed by *Klebsiella* in 05 (13.16%) and *Enterococcus cloacae* 01 (02.63%).

Table 4: Distribution of urine culture positive cases by sex (n=38).

Sex	Number	Percentage
Male	19	50.0
Female	19	50.0
Total	38	100.0

Table 5: Distribution of cases by weight (n=175)

Weight (kg)	Frequency	Percentage
< or 2.5	101	57.7
>2.5	74	42.3
Total	175	100.0
Mean ± SD		2.33± 1.22

Table 6: Distribution of urine culture positive cases by weight (n=38).

Weight (kg)	Frequency	Percentage
< or 2.5	19	50.0
>2.5	19	50.0
Total	38	100.0
Mean± SD		2.33±1.22

Table 7: Causative organisms found on urine culture (n=38)

Organism	Frequency	Percentage
<i>Escherichia coli</i>	32	84.21
<i>Klebsiella</i>	05	13.16
<i>Enterococcus cloacae</i>	01	02.63
<i>Proteus mirabilis</i>	Nil	Nil
<i>Acinobacter</i>	Nil	Nil
<i>Staphylococcus</i>	Nil	Nil

DISCUSSION

Many studies have been done internationally to see frequency of urinary of urinary tract infection (UTI) in neonatal sepsis and a wide range of variability is found in their studies.

Some studies have shown incidence of UTI as low as less than 2%.^{10, 11,12} In others it was 5-11%. Prevalence of UTI was 13% in a study by Lin DS et

al.¹³ Barton M et al. found high frequency of UTI (38%) among neonates with serious bacterial infections.⁴ In current study, frequency of UTI was 21.6% in cases presenting as late onset sepsis . This emphasis the importance of including urine examination and culture as part of septic screening for late onset sepsis.

In this study out of 38 cases of culture proven UTI, 21% (08) were preterm and 79% (30) were full-term. In a study by Bauer S et al. prevalence of UTI in preterm neonates ranges between 4-25%, a figure similar to that in current study.¹¹ In an international study, there was no difference in frequency of UTI regarding gestational age.^{16,17} Certain other studies report higher incidence of UTI among preterm neonates as compared to full-term.^{11,14}

In the present study, 50% (19) cases of culture proven UTI were male and other 50% were female. This ratio is similar to another study conducted in Ali Asghar Hospital in Zahedan.¹⁵

However majority of international studies, reported UTI to be more common amongst males in neonatal age group. In different studies on neonatal age group ratio of UTI among male and female is reported to vary between 1:1 to 6:1.^{4,6,12,15,16,17}

In this study, 50% (19) cases of culture proven UTI were low birth weight (2.5kg and less) and same 50% (19) were > 2.5 kg. That was same figures as seen in study by Falcao MC et al.¹⁰

An international retrospective study, carried over 30 culture proven UTI cases, only 27% (08) cases were reported to be low birth weight.^{16,17} .On the other hand a study done over African neonates reported low birth weight babies to be significantly more often effected than those of normal weight.^{16,17}

E. coli was found to be most common causative organism in 84.21% subjects in this study. This was in accordance with almost all international and national studies on neonatal population.^{4,16,17,18,19}

CONCLUSIONS

It is concluded from this study that a high index of suspicion for urinary tract infection should be present in every case of late onset neonatal sepsis as specific sign and symptoms are rarely found in neonates. Most common causative organism for

urinary tract infection in neonatal age group is *Escherichia coli*.

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