Iranian Journal of Pediatric Society
Volume 2, Number 2, April-June 2010: 75-78

Original Article

Relation between Urinary Tract Infection and Neonatal Icterus

Nasrin Hoseiny Nejad [1], Mitra Hosseininejad [2], Farah Sabooni [1], S. Ahmad Siadati [3]
[1] Milad Hospital, Tehran, Iran, [2] General Physician, [3] Tehran University of Medical Sciences, Tehran, Iran

ABSTRACT

***Background and Aim**: Urinary tract infection is a common clinical problem in children under 8 weeks of ages. Studies in this area indicate that the first sign of bacterial infection in neonates may be icterus. Our goal in this study is to determine the relationship between urinary tract infection and icterus in neonates admitted because of this condition.*

***Materials and Methods**: This is a prospective study conducted on neonates less than 4 weeks of age who were hospitalized because of neonatal icterus in Milad Hospital. Urinary Tract Infection (UTI) is defined as any number of pathogens found to grow on culture medium obtained by suprapubic puncture. Other information including birth weight and laboratory results are recorded on designed question sheets.*

***Results:** Sixteen cases out of 90 cases had urinary tract infection (18%).The prevalence of UTI in neonates with more than 7 days of age (27.2%) was significantly more than its prevalence in neonates within their first week of age (14.2%). Urinalysis (U/A) in 5 cases of urinary tract infection (38%) was abnormal. Meanwhile 73% with urinary tract infection (12 cases) at the time of admission did not show any sign except icterus.*

***Conclusion**: About 18% of the icteric neonates have urinary tract infections. Therefore it is recommended to investigate UTI (as a part of study) in icteric babies, even in the absence of any other marker.*

Iranian J Pediatr Soc 2010; 2(2): 75-78

***Keywords**: Icterus, Neonatal, Urinary tract infection*

***Corresponding author:** Nasrin Hoseiny Nejad, M.D.*
***Address:** Milad Hospital, Crossing of Shaheed Hemmat and Chamran Expressways,Tehran, Iran*
***E-mail:** nasrnejad@yahoo.com*
***Received:** November 2009; **Accepted:** January 2010*

INTRODUCTION

Sixty percent of infants show icterus in their first weeks of life. In order to reach a diagnosis, certain investigations must be performed. The investigation includes certain tests such as blood group and Rh of mother and baby, Coombs test and level of serum bilirubin (1,2). Although some reports say that inexplicable hyperbilirubinemia is in relation with the bacterial infection, there is no clear recommendation for such study, yet.

Urinary tract infection is seen in 5 to 11% of febrile infants under 8 weeks of age (1). Incidence

of bacteriemia and sepsis in children with UTI is reported between 6 and 36% (3-6). Clinical symptoms of UTI in infants are very variable ranging from severe form of the disease to non-specific symptoms such as vomiting and impaired growth, diarrhea, fever and malaise, drowsiness, oliguria, polyuria and icterus (7-16). The purpose of this study is to determine the relationship between hyperbilirubinemia and urinary tract infection in infants.

MATERIALS AND METHODS

This study is a prospective analysis of 90 samples. In this study, neonates (under 4 weeks of age) with icterus who were admitted in Tehran Milad Hospital from October 2002 to September 2003 were studied. The cases included newborns in nursery who had icterus in sclera or skin or neonates that were discharged from hospital, but were re-admitted in the neonatal ward because of icterus. Cases with known causes of icterus such as metabolic disorders, hemolysis or sepsis of newborns were not studied.

Information regarding age, sex, delivery method, birth weight, and the time icterus appeared was noted. The questionnaire sheet was filled by a neonatal physician or a trained nurse.

The lab results were also entered. For urine analysis, urine sample was obtained by suprapubic puncture. Centrifuged samples of urine were stained and then studied with HPF; leukocyte count (none, less than 5, many) and bacterial count (many, moderate, few, none) were reported. All samples were sent for quantitative urine culture; if colony count was more than 1000 unit growth it would considered as positive.

For all cases blood testes including CBC, total and direct serum bilirubin (Bil), maternal and neonatal blood Coombs and reticulocyte count, ESR, CRP and blood culture were done. In case of necessity CSF culture and analysis, serum electrolyte, glucose and calcium level evaluations were performed. In cases where the urine was positive, ultrasound and further studies of urinary tract structure and function were performed.

RESULTS

In this study during one year 105 newborns, who were hospitalized due to icterus were studied. Fifteen cases, due to lack of information or failure to obtain sample (sampling) were excluded. The average age of hospitalization was 4± days. Also, 68 cases were less than one week old and 22 cases were more than a week (Table 1). Eighteen cases (16 newborns) had UTI (p value=0.005, theory of p=0 is rejected by 95%). The average weight of hospitalization was 3200± 600 *gr*. Meanwhile 62% of the cases were born by C/S and 38% by NVD; 61% of the cases were males.

Microbial pathogens detected in urine culture in decreasing order were: 5 cases of *Klebsiella pneumoniae*, 5 cases of *Escherichia coli* (*E.coli*), 3 cases of *Enterobacter aeroginosa*, 2 cases of *Streptococcus pneumoniae* and one case of *Seracia marcensis* (*S. marcensis*) (Table 2).

Among 16 cases with UTI 5 cases had moderate to many bacteriuria, 4 cases had more than 5 WBC in HPF and 2 cases had many WBCs' (positive urinalysis). Ten cases with positive urine culture had negative urinalysis (WBC less than 5 in HPF and few bacteria) (Figure 1).

Among the cases with negative urine culture, there were 6 cases with moderate to many bacteriuria; while among cases with UTI, 10 had less than one week of age (62%), and between cases with negative urine culture, 58 cases were less than one week old (79%).

None of the cases had positive blood culture or CSF analysis and/or culture. In 4 cases with UTI

Table 1. Demographic data of neonates

Sex	No.	Percent	Age	No.	Percent
Female	35	39%	<1 wk	68	75%
Male	55	61%	>1 week	22	25%
Total	90	100%	--	90	100%

Table 2. Microbial sensitivity and resistance to drugs

Type of microorganism	No. of cases	Drug sensitivity	Drug resistance
Klebsiella pneumoniae	5	Aminoglycosides, Gentamycin, Amikacin, Ceftriaxone, Ceftazidime	Cephazoline, Ampicillin
Escherichia coli	5	Amikacine Ceftazidime	Cephazoline, Ampicillin
Enterobacter aeroginosa	3	Ceftriaxone, Gentamycin	Cotrimaxazol Cephazoline
Streptococcus pneumoniae	2	Cotrimaxazole, Vancomycin, Gentamycin	Meticilline, Ampicillin
Seracia marcensis	1	Amikacin, Nalidixic acid	Ampicillin Ceftriaxone Ceftazidine, Cefazoline

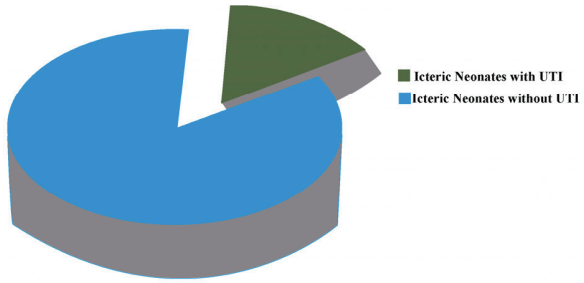

Figure 1. Prevalence of UTI in icteric neonates

G6PD enzyme was deficient, but none of them had abnormal CBC. In 3 patients CRP was positive. In 4 cases with UTI, serum direct bilirubin was more than 1.5 *mg/dl*. In urine culture of these cases, *E. coli* and *S. marcensis* were detected.

In 5 patients with UTI there were abnormalities in kidney ultrasound report; there were 3 cases of hydronephrosis and 2 cases with mild pyelocalis ectasia and bladder thickness. There was no report of stone.

Among 16 cases with UTI in addition to icterus, 4 cases suffered from lethargy, reduced feeding and reduced neonatal reflexes. Twelve patients with UTI were symptom free. Twenty four cases in addition to icterus had other signs. Among them, 4 had positive urine culture. Results of sensitivity and resistance to drugs are recorded in Table 2.

DISCUSSION

According to this study 18% of cases with icterus had UTI. In previous studies it was reported between 5 and 15%. Pashapour et al and Ghaemi et al studies have emphasized on UTI in late and prolonged icterus. In Ghaemi's study 5.8% of late neonatal icters were with UTI and study of urine in these neonates has been recommended (16,17).

Our study includes early and late jaundice. In Zafarzadeh et al study both early and late jaundice has been studied and an incidence of UTI in these neonates was reported as 8.2% (3). This incidence was 6.5% in Xinias et al study (18). In our study, cases with physiologic jaundice were not included; this may explain the difference between our study and the others.

In this research the severity of hyper-bilirubinemia has not been considered and more study in this field is necessary. Another considerable point is that in 73% of the cases, icterus is the only sign of UTI in neonates. So constitutional problems and loss of neonatal reflexes are not reliable signs for diagnosis of neonatal UTI.

CONCLUSION

As the result of this study we can recommend to perform urine analysis and urine culture as a routine workup in each case of non physiologic neonatal icterus.

REFERENCES

1. Garcia FJ, Nager AL. Jaundice as an early diagnostic sign of urinary tract infection in infancy. ***Pediatrics*** 2002; 109(5): 846-851.

2. American Academy of Pediatrics, provisional committee for Quality improvement and subcommittee on Hyperbilirubinemia, parachute parameter: management of hyperbilirubinemia in the healthy term newborn pediatrics: 1994: 94: 558-565.
3. Zafarzadeh M, Mohammadzadeh A. Should urine culture be considered in the hyperbilirubinemia workup of neonates? ***J Chinese Clin Med*** 2009; 4(3): 136-138.
4. Krober MS, Bass YW, Powell JM, Smith FR, Seto DS. Bacterial and viral pathogens causing fever in infants less than 3 months old. ***Am J Dis Child*** 1985; 139(9): 889-892.
5. Little Wood JM. Sixty six infants with urinary tract infection in first month of life. ***Arch Dis Child*** 1972; 47: 218-226.
6. Bernstein J, Brown AK. Sepsis and jaundice in early infancy. ***Pediatrics*** 1962; 29(6): 873-882.
7. Ng SH, Rawstron JR. Urinary tract infections presenting with jaundice. ***Arch Dis Child*** 1971; 46: 173-176.
8. Seeler RA, Hahn K. Jaundice in urinary tract infection in infancy. ***Am J Dis child*** 1969; 118(4): 553-558.
9. Seeler RA. Urosepsis with jaundice due to hemolytic E. coli. ***Am J Dis child*** 1973; 126(3): 414.
10. Seeler RA. Hemolysis due to gram negative urinary tract infection. ***Birth Defect Orig Artic Ser*** 1977; 13(5): 425-431.
11. Hamilton JR, Sass Kortsak A. Jaundice associated with severe bacterial infection in young infants. ***J Pediatr*** 1963; 63(1): 121-132.
12. Reelofsen H, Van Der veere C, Ottenhoff R , Schoemaker B, Jansen P, Oude Elferind R. Decreased bilirubin transport in the perfused liver of endotoxemic rats. ***Gastroenterology*** 1994; 107(4): 1075-1084.
13. Roelofsen H, Shoemaker B, Bakker C, Ottenhoff R, Jansen P, Oude Elferink R. Impaired hepatocanalicular organic anion transport in endotoxemic rats. ***Am J Physiol*** 1995; 269(3): 427-434.
14. Abbott GD. Neonatal bacteriuria, a prospective study of 1460 infants. ***Br Med J*** 1972: 1(5795): 267-269.
15. Hoberman A, Wald ER, Reynolds EA, Penchansky L, Charron M. Is urine culture necessary to rule out urinary tract infection in young febrile children? ***Pediatr Infect Dis J*** 1996; 15(4): 304-309.
    Landau D , Turner ME, Brennan J , Majd M . The value of urinalysis in differentiating acute pyelonephritis from lower urinary tract infection in febrile infants. ***Pediatr Infect Dis J*** 1994; 13(9): 777-781.
16. Pashapour N, Nikibakhsh AA, Golmohammadlou S. Urinary tract infection in term neonates with prolonged jaundice. ***Urol J*** 2007; 4(2): 91-94.
17. Ghaemi S, Fesharaki RJ, Kelishadi R. Late onset jaundice and urinary tract infection in neonates. ***Indian J Pediatr*** 2007; 74(2): 139-141.
18. Xinias I, Demertzidou V, Mavroudi A, Kollios K, Kardaras P, Papachristou F, et al. Bilirubin levels predict renal cortical changes in jaundiced neonates with urinary tract infection. ***World J Pediatr*** 2009; 5(1): 42-45.