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FREQUENCY OF URINARY TRACT INFECTION IN NEONATES WITH JAUNDICE

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Abstract

Background: *Neonates are frequently hospitalized in healthcare facilities across the world due to indirect neonatal hyper bilirubinemia, a common and frequent cause of jaundice. Neonatal jaundice, which can be physiologic or related to several underlying diseases such as urinary tract infections, is frequently observed in both term and preterm newborns.*

Objective: *This study was conducted to find out the incidence of urinary tract infection in neonates with jaundice.*

Materials and Methods: *This cross-sectional study was conducted at the Department of Paediatrics, Lady Reading Hospital Peshawar from July 2024 to December 2024. Total of 150 neonates with jaundice who appear to have yellow skin or eyes participated in this study. Basic demographic information was obtained from the patients, such as age, gender, duration of complaint, and weight as measured on a weighing scale. The data of the laboratory testing that includes blood culture, urine analysis, c-reactive protein (CRP), complete blood count, serum total, direct bilirubin, direct Coombs test and urine culture was gathered. Midstream urine samples were taken aseptically and were analyzed. The statistical software SPSS version 21.0 was used to analyze the data.*

Results: *The study comprised 150 newborns in total. Of them, 95 (63.3%) were male and 55 (36.6%) were female. With a mean age of 22.5 ± 6.5 days, the patients in this study ranged in age from 16 to 29 days. The mean weight was 2.900 ± 0.30 kg, and the mean period of complaint (jaundice) was 19.20 ± 6.055 days. Among 150 neonates with jaundice, 20 (13.3%) neonates were positive for urinary tract infection.*

Conclusion: *Our study indicates that urinary tract infections are present in a considerable proportion of jaundice patients. Therefore, it is possible that urinary tract infections contribute to the development of jaundice in newborns. Neonates with jaundice should therefore be screened for urinary tract infections (UTIs).*

INTRODUCTION

A chemical called bilirubin, which is a byproduct of hemoglobin breakdown, accumulates and deposits on the skin of newborns, causing jaundice, or yellowish coloring of the skin [1]. It may be present in up to 80% of preterm born babies and about 60% of full-term babies. It is crucial to identify neonatal jaundice since it may be the first sign of sepsis [2]. Urinary tract infections (UTIs) account for up to one-third of bacterial infections in neonates, making them a common clinical issue during this time [3]. Approximately 5–10% of neonates needed assistance [4,6]. Neonatal UTIs can be present with a wide range of clinical symptoms, including weight loss, growth retardation, fever or jaundice, severe sepsis, clinical images, and shock [6]. In order to get a diagnosis and avoid problems, it is essential to understand the vague signs and symptoms of newborn UTIs. The physio-pathological causes of neonatal jaundice due to UTIs include fever, malnourishment, liver injury with altered conjugation and bilirubin excretion, and hemolysis [7]. Physiological immaturity causes jaundice, which typically manifests between 24 and 72 hours of age in term infants and by the fifth or seventh day in preterm neonates. It goes away by 10 to 14 days of life. Although most jaundice is harmless, newborns need to be closely watched for signs of severe hyperbilirubinemia and, in rare instances, acute bilirubin encephalopathy or kernicterus due to the possible toxicity of bilirubin to the developing brain [8]. Jaundice is defined as a serum total bilirubin (STB) level of ≥10 mg/dl that lasts for at least 14 days in term neonates and for at least 21 days in preterm neonates. Although breast milk jaundice accounts for a sizable percentage of chronic jaundice, it is an exclusionary diagnosis, meaning that other pathological reasons must be checked out [9]. One of the major reasons why newborns experience jaundice is urinary tract infections. Research on neonates with jaundice has shown that the incidence of UTI varies. Frequencies reported in the literature ranged from 0.3% to 11% [10, 11]. Research from developed nations, particularly on non-breastfed newborns, has indicated that formula-fed infants who experience chronic jaundice should be thoroughly examined [12]. Neonates with jaundice had a 6% risk of urinary tract infections, according to a research by Pashapour et al. [13]. The incidence of urinary tract infections in infants with chronic jaundice was also 8.9%, according to a another study by Harb et al. [14]. In order to properly identify and treat neonatal jaundice, a UTI should be included in the differential diagnosis [15]. High rates of morbidity and mortality are seen in neonates with UTIs, especially when jaundice is present [16]. *Escherichia coli* and *Klebsiella pneumoniae* are the most frequently isolated uropathogens in newborns with jaudice followed by *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Enterobacter* species [17, 18]. This study was conducted to find out the incidence of urinary tract infection in neonates with jaundice.

Materials and Methods

This cross-sectional study was conducted at the Department of Paediatrics, Lady Reading Hospital Peshawar from July 2024 to December 2024. Total of 150 neonates with jaundice who appear to have yellow skin or eyes participated in this study. The inclusion criteria include neonates born at 36 weeks gestation or later and those younger than 28 days. The parents of the newborns provided written informed consent, and the study design was approved by Ethical committee of the hospital. Preterm neonates, those who have had jaundice treatment in the past, Infants with respiratory distress syndrome, intrauterine growth retardation, or numerous abnormalities (dysmorphic, cardiac, gastrointestinal, and trisomy) were not included. Basic demographic information was obtained from the patients, such as age, gender, duration of complaint, and weight as measured on a weighing scale. Records of the patients' hospital stays and phototherapy histories were kept. The data of the laboratory testing that includes blood culture, urine analysis, c-reactive protein (CRP), complete blood count, serum total, direct bilirubin, direct Coombs test and urine culture was gathered. Midstream urine samples were taken from neonates and sent to the hospital laboratory to test for urinary tract infection. Most neonates with UTIs had urinalysis and culture using sterile techniques, which included either suprapubic puncture (SPP) or bladder catheterization, and urine collected by bag was used primarily in cases of negative urine analysis as screening for UTI.

The statistical software SPSS version 21.0 was used to analyze the data.

Results

The study comprised 150 newborns in total. Of them, 95 (63.3%) were male and 55 (36.6%) were female. With a mean age of 22.5 ± 6.5 days, the patients in this study ranged in age from 16 to 29 days (Table1). The mean weight was 2.900 ± 0.30 kg, and the mean period of complaint (jaundice) was 19.20 ± 6.055 days. Out of 150 newborns, 15 (10%) were preterm and 135 (86.6%) were term. A history of phototherapy was determined in 48(32%) neonates of the total. Urine culture was done for all the enrolled patients. Furthermore 15 (10.3%) neonates had Leukocyturia (≥5 cells/area). 2 (1.3%) newborns with Nitruria were identified in this study shown in (Table 2). Among 150 neonates with jaundice, 20 (13.3%) neonates were positive for urinary tract infection. Among them 14 (70%) were male and 6 (30%) were female. Five patients (25%) were preterm, and fifteen patients (75%) were term with UTI. Among the neonates with UTIs, 7 (35%) had a history of phototherapy. Patients with UTIs had negative results from every direct Coombs test. Additionally 6 (30%) and 11 (55%) of the infants with UTI had Leukocyturia and Nitrituria, respectively. (Table 3) Urinary ultrasonography revealed that 2 (10%) of 20 neonates with UTIs had pelvical ectasia. Not a single neonate with a UTI had elevated CRP levels (>1 mg/dL). None of the UTI patients showed signs of blood culture growth. 1 patient received Meropenem, 2 received Ampicillin-cefotaxime, 5 received Ampicillin-amikacin, and 12 received Ampicillin-gentamicin (Table 4). The following pathogens were found in urine cultures: *Escherichia coli* n = 11 (55%) *Klebsiella* spp. n = 6 (30%) group *B Streptococcus* n = 2 (10%), *Enterococcus* spp n = 1 (5%) shown in figure 1.

Table 1: Mean± SD of Patients by Weight, Age, and Length of Complaint (n = 150)

Demographics	Mean ± SD
Weight (kg)	2.900 ± 0.30 Kg,
Age (days)	22.5 ± 6.5
Compliant (days)	19.20 ± 6.005

Table 2; Characteristics of the Study and Initial Lab Results (n=150)

Characteristics	Results	Number (n)	Frequency (%)
Phototherapy History	Yes	48	(32%)
	No	102	(68%)
Gender	Female	55	(36.6%)
	Male	95	(63.3%)
Gestational age	Term	150	(100%)
	Preterm	15	(10%)
Direct Combos	Positive	14	(9.3%)
	Negative	136	(90.6%)
Leukocyturia (≥5 cells/area)	Yes	15	(10.3%)
	No	130	(89.6%)
Nitrituria	Yes	02	(1.3%)
	No	143	(95.3%)

Table 3; Study Features and Lab results are Compared between the UTI and non-UTI groups.

Variables	Out comes	UTI Positive Group n = (20) (%)	UTI Negative Group n = (130) (%)	p-value
Gender	Male	14 (70%)	81 (62.3%)	
	Female	6 (30%)	49(37.6%)	0.3
irect Combos	Positive	0(0%)	14(9.3%)	
	Negative	20(100%)	116 (89.2%)	0.10
Gestational age	Term	14 (70%)	121(93.07%)	
	Preterm	4(20%)	11(8.46%)	0.6
Phototherapy History	Yes	7(35%)	33(25.3%)	
	No	136 (5%)	97(74.6%)	0.009
Nitrituria	Yes	9(45%)	121(93.0%)	
	No	11(55%)	9(6.9%)	0.003
Leukocyturia (≥5 cells/area)	Yes	6 (30%)	9(6.9%)	
	No	14(70%)	121(93.0%)	0.003
Total bilirubin		11.9(12.1-18.5)	13.6(15.0-22.8)	0.4
Hemoglobin, g/dl, median (Min-Max)		16.5 (12.6-19.4)	15.7(11.6-21.3)	0.2
White blood cell, count/microL, median (Min-Max		12.200(8.700-16,100)	9.500(4.800-18.600)	0.004
Thrombocyte, count/microL, median (Min (Max)		447.005 (259.00-580.00)	278.000(160.000-740.000)	0.007

Table 4; Ultrasound Findings, Some Laboratory Values, and Treatments (n=20).

Characteristics	Status	Frequency (%) UTI
High c-reactive protein (CRP) value (>1 mg/dL)	Yes	0(100%)
	No	20 (100%)
Blood culture growth	Yes	0(100%)
	No	20 (100%)
Ultrasound findings	Normal	18 (90%)
	Pelvicalyseal ectasia	02 (10%)
Treatment	Antibiotics (%)	
	Meropenem	1(5%)
	Ampicillin-gentamicin	12 (60%
	Ampicillin-amikacin	5(25%)
	Ampicillin-cefotaxime	2(10%)

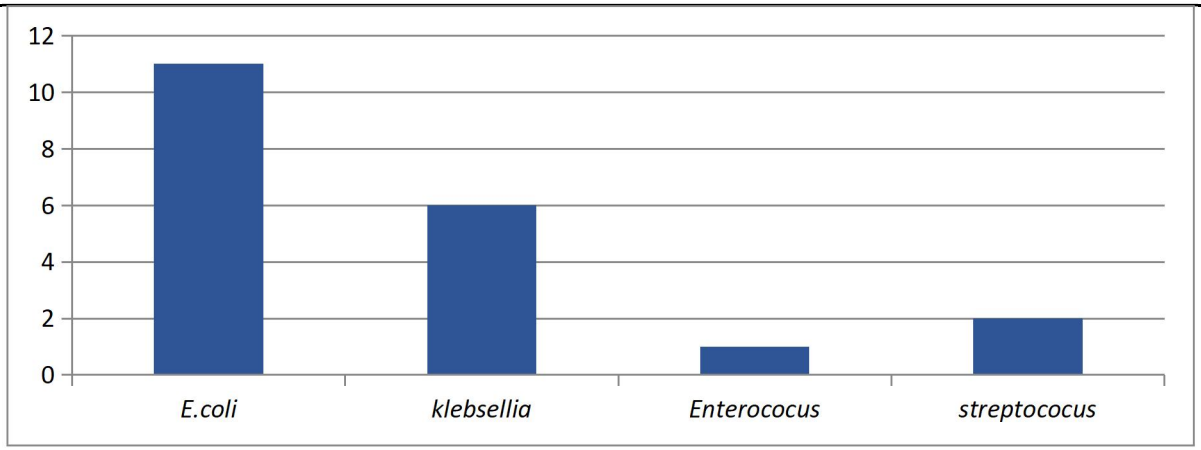

Figure 1: Frequency of Pathogens associated with UTI

Discussion

Jaundice is a common condition in neonates, affecting about 60% of full term newborns [19]. UTI investigations have been included in the standard diagnostic evaluation of jaundice, although there has been controversy regarding the investigation of UTIs in neonates with large-scale, unexplained indirect hyperbilirubinemia [20]. Our study found that 13.3% of the infants with jaundice in our study had UTIs. In neonates with jaundice, the incidence rate of urinary tract infections (UTIs) ranges from 5.8% to 21%, according to earlier study [21]. Urinary tract infections (UTIs) were shown to occur in 25.7% of neonates with jaundice in a prospective study by Shaimaa S. Abdelrheem et al. [22]. Deger I et al.'s study found that a significant percentage of newborns admitted with indirect hyperbilirubinemia had a lower but significant incidence of urinary tract infection (UTI) of 8% in a single center study [23]. A research by Özcan et al. indicated that 16.7% of people had a urinary tract infection (UTI) [21]. According to Tawfeek et al.'s research, among infants who experienced chronic jaundice, UTIs were the third most frequent cause of jaundice [23]. In 2020, a study carried out in Turkey found that 8% of the newborns with persistent jaundice had a UTI [24]. Among 150 neonates with jaundice, 20 (13.3%) neonates were positive for urinary tract infection in our study. This notable variation in UTI rates was probably caused by the way jaundice was defined (STB levels ≥10 mg/dl in our research vs. 5 mg/dl in those studies). Mild jaundice (STB levels between 5 and 10 mg/dl) as opposed to more severe jaundice (≥10 mg/dl) may be caused by a UTI. Like a study conducted by Tola et al [25], our investigation found a greater incidence of UTI in male neonates with jaundice, however this difference was not statistically significant. Just one infant got a UTI verified by recurring culture out of 319 newborns with persistent jaundice an investigation by Chowdhury T. et al [26]. Urine pads, rather than urethral catheterization, were used to collect urine samples for this study [26]. Our study suggests that this discrepancy could be the result of racial differences or changes in how the urine sample was collected. Jaundiced newborns with UTIs are more likely to have a history of prior phototherapy. [27] 155 neonates who got phototherapy for jaundice within their first ten days of life have been assessed for UTIs in a research conducted in Turkey by Ozcan et al [27] 16.7% of newborns those underwent phototherapy for jaundice within the first ten days of their lives had UTIs, according to one study [27]. 51% of children with chronic jaundice had previously received phototherapy, according to a different study by Bilgin et al. in Turkey [28]. In our study, 32% neonates with jaundice had previously received phototherapy. There was a statistically significant difference (p=0.009) between the UTI and no-UTI groups' proportions of phototherapy history. In our study, we found that among individuals with a history of both phototherapy and a UTI, UTI was the unexplained cause of phototherapy. [27], considering that a study by Ozcan et al. found that neonates who exhibit jaundice within the first ten days of life are at a greater risk of UTI. Weng et al. conducted a study in Taiwan in 2018 and discovered that 42% of people without jaundice and 67% of

people with jaundice had a history of phototherapy [29]. Newborns with and without UTI may have different amounts of thrombocyte numbers, hemoglobin levels, total serum bilirubin, white blood cell counts, [30]. In our study white blood cell counts in the UTI and non-UTI groups differed statistically significantly (12.200 vs. 9.500 count/microL, p=0.004), however there was no discernible difference in the median Serum Total Bilirubin levels between the UTI and non-UTI groups. In contrast to that in 2015 study by Nickavar et al., mean levels of STB (mg/dl) were found to differ significantly of those who had and did not have urine culture growth [30]. There was no discernible change in the median in our analysis in hemoglobin levels between those with and without UTI. People with and without UTIs had significantly varied white blood cell levels. in the Nickavar et al. study (10.970 vs. 9.292 count/microL, p=0.014) [30]. The thrombocyte counts of those with and without UTI did not differ significantly (333.215 vs. 298.580 count/microL, p=0.2) in the Nickavar et al. study [30]. We discovered a statistically significant variation in the number of thrombocytes. There was no discernible difference in thrombocyte counts between individuals with and without UTIs in the Nickavar et al. trial (447.005 vs. 278.000 count/microL,p=0.007). In a different study, Kahraman et al. found that patients with a positive urine culture had significantly higher platelet and white blood cell counts (p=0.015 and p=0.004, respectively) [31]. Although the study by Nickavar et al. [30] reported no culture growth and a high CRP value in 17% of infants with UTI. In our study, none of the neonates exhibited elevated blood or CRP or culture growth. The severity of the clinical illness or when the sample was taken (early versus late in the course of the disease) may be connected to this variation in the proportions of elevated CRP. Leukocyturia was found to be positive in 75% of pediatric UTI patients and nitrite in 30% of them, according to Ünsal et al.'s study. Six (30%) and eleven (55%) of the infants with UTIs in our study had leukocyturia and nitrituria, respectively. When comparing the existence of growth in the urine culture to the presence of leukocyturia or nitrituria in the whole urine assay, each group's differences were statistically significant (p<0.003 and p<0.003, respectively). Nitrituria or leukocyturia may be important signs of a urinary tract infection. A UTI may be exacerbated by abnormal findings in the urinary system. All jaundiced neonates with UTIs were evaluated by urinary ultrasonography in the study by Bahat Özdoğan et al.; abnormal results, including pelvicalyceal ectasia and increased echogenicity in the renal parenchyma, were noted in 28.1% of the children 13 out of the 20 infants in our study who had jaundice with a UTI, 2 (10%) had pelvicalyceal ectasia on urinary ultrasonography. Finding a UTI over an extended period of time could be a chance to find congenital urinary abnormalities. We documented 150 neonates with jaundice in the current study. 13.3% of cases had a UTI identified as the likely cause of their jaundice. Although not statistically significant, the percentage of UTIs in males and preterm neonates was greater, probably due to the limited sample size. UTI was identified in 13.3% of cases as a probable cause of jaundice. Leukocyturia or Nitrituria, history of phototherapy, white blood cell count, and thrombocyte count were all noticeably higher in the UTI group. UTI should be considered a possibly curable cause in newborns with jaundice, even though we reported a low frequency of UTI in these patients.

Conclusion

Our study indicates that urinary tract infections are present in a considerable proportion of jaundice patients. Therefore, it is possible that urinary tract infections contribute to the development of jaundice in newborns. Neonates with jaundice should therefore be screened for urinary tract infections (UTIs).

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