

# FREQUENCY OF BACTERIAL URINARY TRACT INFECTION IN NEONATES WITH JAUNDICE

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## ABSTRACT:

**Objective:** To determine the frequency of bacterial urinary tract infection in neonates with jaundice

**Study design:** Cross sectional study

**Study place and period:** Department of Pediatric Medicine, Sahiwal Teaching Hospital, Sahiwal from June 2025 to September 2025.

**Methodology:** All the neonates were recruited from NICU and urine sample was taken for urine culture. Reports were assessed and if there was  $>10^4$  colonies in catheter sample, then UTI was labeled. All the data was collected in proforma and analyzed in SPSS version 25.

**Results:** In this study, the mean age of neonates was  $14.91 \pm 5.79$  hours. Out of 105, there were more males (59%) than females (41%). Out of 105 neonates, in 34 (32.4%) neonates, UTI was confirmed on urine culture. Age, Apgar score and mode of delivery had insignificant association with UTI ( $p>0.05$ ), while female gender, low birth weight, and preterm birth were significantly associated with UTI in neonates with neonatal jaundice ( $p<0.05$ ).

**Conclusion:** Thus, the risk of UTI is high in neonates with neonatal jaundice and few demographics and clinical parameters are associated with UTI.

**KEYWORDS:** bacterial urinary tract infection, neonatal jaundice, urine culture

## INTRODUCTION:

When bilirubin is deposited into an infant's skin, it causes high total serum bilirubin, which manifests clinically as neonatal jaundice. Neonatal jaundice is characterized by yellowish skin, sclerae, and mucous membranes.<sup>1</sup> With an estimated 50% of cases, physiologic jaundice is the most common cause of clinical jaundice after the first day of life. About 15% of babies who are breastfed may experience physiologic jaundice that lasts longer than three weeks.<sup>1</sup> In 60% of term babies and 80% of preterm babies, the jaundice usually starts 1-3 days after delivery and goes away in 10–14 days, often requiring interventions.<sup>2</sup> One of the most frequent causes of admission to the pediatric medical ward is thought to be neonatal jaundice.<sup>3, 4</sup> Both mature and preterm newborns frequently experience neonatal jaundice. It may be secondary to several underlying diseases or physiologic.<sup>5</sup>

Even if it has several causes, there are situations where it is inexplicable. Jaundice may be a significant indicator of a urinary tract infection (UTI) in newborns, according to earlier research.<sup>6</sup> Testing for UTI in patients who have jaundice within the first two weeks of life is debatable.<sup>7</sup> Higher rates of morbidity and mortality are possible for newborns with UTIs, especially if they exhibit jaundice. It is economical to screen for UTIs in newborns who are jaundiced.<sup>8</sup> Sagheb et al., conducted a study in Iran, and reported that percentage of UTI was 7.3% in neonates with jaundice.<sup>9</sup> But an Indian study, done by Hasan et al., showed UTI in 17.2% neonates with jaundice.<sup>10</sup> Also in a Pakistani study, conducted by Ahmed et al., the frequency of UTI was recorded in 31.5% cases, which was much higher than reported in other countries.<sup>11</sup>

Rationale of this study is to assess the frequency of bacterial urinary tract infection in neonates with jaundice. Literature showed that the chances of UTI are less in neonates with jaundice. But conflicting data has been reported in previous studies, especially in local studies, the extent of problem is high. Therefore, to confirm the precise level of UTI in local population, we conducted this study, whether the extent is such high. This would help us to get evidence for local population and also improve our practice.

### METHODOLOGY:

This cross-sectional study was conducted at Department of Pediatric Medicine, Sahiwal Teaching Hospital, Sahiwal from June 2025 to September 2025. By using WHO calculator, sample size of 105 cases is calculated with 95% confidence level, 5% margin of error and percentage of bacterial UTI i.e. 7.3% in neonates with jaundice. <sup>9</sup> All the neonates after selecting through following criteria were enrolled in the study via Non-probability, consecutive sampling.

**Inclusion criteria:** Neonates of 6-24 hours of both genders were enrolled who were diagnosed to have neonatal jaundice. Jaundice was defined as presence of yellowish discoloration of the skin, sclera, and mucous membranes, with total bilirubin level >5 mg/dl.

**Exclusion criteria:** Neonates with congenital anomalies of the kidney and urinary tract, known etiology in work-up, including systemic infection with fever >39°C, iso-immunization, erythrocyte enzyme or structural defects, hypothyroidism, metabolic disease, and polycythemia were excluded from the sample.

All the neonates were recruited from neonatal intensive care unit. Informed consent was taken from parents after explaining the purpose of the research. Demographics including age (hours), gender, weight (kg), gestational age at birth, Apgar score at birth, mode of delivery, place of delivery, maternal history of UTI were also obtained. Then urine sample was taken in a sterile container by using urine bag through Nelaton catheter and was sent to the laboratory of the hospital for urine culture. Reports were assessed and if there was >10<sup>4</sup> colonies in catheter sample, then UTI was labeled. Neonates with positive UTI were managed as per standard method. All the data was collected by using a pre-prepared proforma.

Data was collected and analyzed using SPSS version 25. Numeric variables like age, birthweight, gestational age at birth, Apgar score at birth, were presented as mean and standard deviation. Categorical data like gender, mode of delivery, place of delivery, maternal history of UTI were expressed as frequency and percentage. The data was stratified for age, gender, birthweight, gestational age at birth, Apgar score at birth, mode of delivery, place of delivery, maternal history of UTI to control effect modifiers. Post-stratification, stratified groups were compared for UTI by using chi-square test. P-values ≤0.05 was considered as significant.

### RESULTS:

In this study, total 105 neonates with neonatal jaundice were enrolled from NICU with the mean age of 14.91 ± 5.79 hours. Out of 105, 45 (42.9%) presented within 6-12 hours of age while 60 (57.1%) presented during 13-24 hours of age (appearing symptoms). Out of 105, there were more males (59%) than females (41%). The mean birth weight of neonates was 1927.35 ± 262.94 grams and 64 (61%) of them were underweight (≤200 grams). The gestational age at birth was 37.19 ± 2.24 weeks and 39 (37.1%) of them were preterm. The mean Apgar score was 37.19 ± 2.24 and 83 (79%) of them had Apgar 6-8 at 5 minutes of birth. Out of 105 neonates, 51 (48.6%) delivered via cesarean section, 38 (36.2%) delivered spontaneously through vagina and 16 (15.2%) delivered by induction of labor. Maternal UTI was reported in 53 (50.5%) cases. Table-I

Out of 105 neonates, in 34 (32.4%) neonates, UTI was confirmed on urine culture. Figure-1

Data was stratified for age, gender and few clinical parameters of neonates. In neonates presenting within 6-12 hours of life, UTI was confirmed in 13 (28.9%) that was less than neonates presenting during 13-24 hours of life 21 (35.0%). But the difference was insignificant (p>0.05). Among males, UTI was less common than females (14 (22.6%) vs. 20 (46.5%), p<0.05), as well as among neonates with birth weight >2000 grams, UTI was less common (7 (17.1%) vs. 27 (42.2%), P<0.05) as compared to neonates with birth weight ≤2000 grams. UTI was observed to be more common in preterm neonates than term neonates (20 (51.3%) vs. 14 (21.2%), p<0.05) and in neonates with history of maternal UTI (25 (47.2%) vs. 9 (17.3%), p<0.05). But insignificant association was observed with Apgar score (28 (33.7%) vs. 6 (27.3%), p>0.05) and mode of delivery (cesarean: 15 (29.4%), vs. vaginal: 17 (44.7%), vs. induced labor: 2 (12.5%), p>0.05. Table-II

Table-I: Basic information of enrolled neonates presenting with neonatal jaundice (n = 105)

	F (%)
Age, hours	14.91 ± 5.79
Age: 6-12 hours	45 (42.9%)
Age: 13-24 hours	60 (57.1%)
Gender	
Male	62 (59%)

Female	43 (41%)
Birth weight, grams	1927.35 ± 262.94
≤2000 grams	64 (61%)
>2000 grams	41 (39%)
Gestational age at birth, weeks	37.19 ± 2.24
Preterm	39 (37.1%)
Term	66 (62.9%)
Apgar score at birth	37.19 ± 2.24
Apgar score: 6-8	83 (79%)
Apgar score: 9-10	22 (21%)
Mode of delivery	
Cesarean section	51 (48.6%)
Vaginal delivery	38 (36.2%)
Induced labor	16 (15.2%)
History of maternal UTI	53 (50.5%)

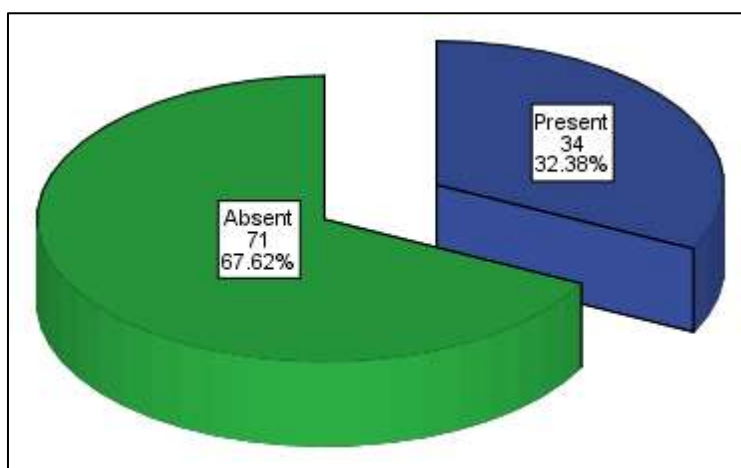


Figure-1: UTI observed in neonates with neonatal jaundice (n = 105)

Table-II: Association of neonatal UTI with age, gender and other demographic and clinical parameters of neonates (n = 105)

		Neonatal UTI		p-value
		Present n = 34	Absent n = 71	
Age	6-12 hours	13 (28.9%)	32 (71.1%)	0.508
	13-24 hours	21 (35.0%)	39 (65.0%)	
Gender	Male	14 (22.6%)	48 (77.4%)	0.010
	Female	20 (46.5%)	23 (53.5%)	
Birthweight	≤2000 gams	27 (42.2%)	37 (57.8%)	0.007
	>2000 grams	7 (17.1%)	34 (82.9%)	
Gestational age at birth	Preterm	20 (51.3%)	19 (48.7%)	0.001
	Term	14 (21.2%)	52 (78.8%)	
Apgar score	6-8	28 (33.7%)	55 (66.3%)	0.565
	9-10	6 (27.3%)	16 (72.7%)	

Maternal UTI	Present	25 (47.2%)	28 (52.8%)	0.001
	Absent	9 (17.3%)	43 (82.7%)	
Delivery via	Cesarean section	15 (29.4%)	36 (70.6%)	0.057
	Vaginal route	17 (44.7%)	21 (55.3%)	
	Induced labour	2 (12.5%)	14 (87.5%)	

### DISCUSSION:

In this study, Out of 105 neonates, in 34 (32.4%) neonates, UTI was confirmed on urine culture. Age, Apgar score and mode of delivery had insignificant association with UTI ( $p > 0.05$ ), while female gender, low birth weight, and preterm birth were significantly associated with UTI in neonates with neonatal jaundice ( $p < 0.05$ ).

One of the most prevalent issues during the neonatal stage is jaundice. Jaundice affects about 60% of full-term and 80% of preterm babies. Numerous physiological and pathological situations are linked to unconjugated hyperbilirubinemia, which is a prevalent condition. Excessive bilirubin production and the newborn liver's inability to remove bilirubin from the blood quickly enough are the causes of this.<sup>12, 13</sup> Although neonatal jaundice is a frequent physiological sign in newborns, UTI can occasionally occur in these babies and can either be asymptomatic or cause consequences. Neonatal jaundice can be caused by a number of reasons, although prior research has not given much attention to UTIs.<sup>14</sup>

According to a study done in Iran by Sagheb et al., 7.3% of newborns with jaundice had a UTI.<sup>9</sup> However, a research conducted in India by Hasan et al. revealed that 17.2% of newborns with jaundice had a UTI.<sup>10</sup> Additionally, a Pakistani study by Ahmed et al. found that 31.5% of cases had a UTI, which is significantly greater than what has been documented in other nations.<sup>11</sup> According to Aygun et al., 11% of jaundiced infants had a UTI overall.<sup>15</sup>

Conversely, a study conducted by Omar et al., UTI was confirmed in 21% neonates who initially had neonatal jaundice (indirect hyperbilirubinemia).<sup>16</sup> The aforementioned findings show a high correlation between indirect hyperbilirubinemia and UTI. Furthermore, in our study, 46.5% of females were impacted. In contrast, a research by Rashed et al., shown that male infants are frequently impacted.<sup>17</sup>

Sagheb et al., reported that the prevalence of UTI in male icteric neonates (53.1%) was more than females.<sup>9</sup> Few other studies (3,6,7,12-15,18) also reported nearly similar prevalence,<sup>18-21</sup> but in the study of Shahian *et al* and a study conducted by Özcan *et al*, the prevalence in males was significantly higher (87 and 88.5%, respectively).<sup>22, 23</sup> In the Sagheb et al., study, 90.6% of icteric neonates with UTI had a birth weight in normal range (2500-4000) and 100% of them were full-term neonates. None of icteric neonates with UTI had positive blood culture. These findings were in line with previous studies.<sup>18-21</sup> In our study, we observed that among neonates with birth weight  $> 2000$  grams, UTI was less common (7 (17.1%) vs. 27 (42.2%),  $P < 0.05$ ) as compared to neonates with birth weight  $\leq 2000$  grams.

In a different study, Bilgen et al., noted that 8% of 102 asymptomatic unexplained hyperbilirubinemia had UTI, highlighting the significance that UTI can occur in asymptomatic jaundiced neonates even in the first week of life and that urine culture should be part of the workup of neonatal jaundice.<sup>24</sup> According to Jafarzaden et al., the mean age of presentation was 8.9 days, and 8.2% of babies with asymptomatic, unexplained afebrile jaundice had a UTI. To the best of our knowledge, these are the first instances of indirect hyperbilirubinemia in neonates that have been documented as a result of UTIs. None of them had a previous history of jaundice, and the majority of them appeared in the second week of life.<sup>25</sup>

Neonatal jaundice and some bacterial illnesses, such as UTIs, have been found to be causally related. It has been proposed that certain Gram-negative bacteria can release toxins known as hemolysins, which can damage a newborn's red blood cells and cause unconjugated hyperbilirubinemia. One of the most prevalent and early signs of a UTI is jaundice, which has been linked to unexplained hyperbilirubinemia in newborns in 3 to 21% of cases. In order to properly diagnose and treat infant jaundice, UTI should be included in the differential diagnosis.<sup>26, 27</sup>

### CONCLUSION:

Thus, the risk of UTI is high in neonates with neonatal jaundice and few demographics and clinical parameters are associated with UTI. Therefore, in future, we will implement the strategy that neonates with or at risk of neonatal jaundice should be screened for UTI to prevent or timely diagnose and manage neonates from UTI.

**CONFLICT OF INTEREST:** None.

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**AUTHORS' CONTRIBUTION:**

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