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URINARY TRACT INFECTION AMONG INFANTS WITH LETHARGY

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ABSTRACT

Background: Lethargy is characterized by the infant's seeming lack of energy. Infants are more susceptible to urinary tract infections (UTIs) because of their immature immune systems. A significant percentage of infants' UTIs do not manifest with fever or other particular urinary tract symptoms, despite fever being a notable indicator of UTI in neonates. Thus, understanding the vague symptoms and indicators of a newborn UTI is crucial for prompt diagnosis to avoid serious consequences. Objectives: To assess the presence of urinary tract infection among infants with lethargy in Mosul Province-Iraq. Methods: A cross sectional study was conducted including 120 randomly selected cases of lethargic neonates under or equal to 28 days old of both genders who presented to Ibin Al Atheer and Al Salam teaching hospitals in Mosul, Iraq between April 1st, 2024, and April 1st, 2025. The questionnaire includes Three parts; part one for socio-demographic data such as patients' age, weight, gender, residency, home condition, maturity, mode of delivery and history of neonatal care unit admission, maternal ages and parity. Part two for maternal obstetric history including gestational diabetes, pregnancy induced hypertension, urinary tract infection during pregnancy and antenatal care. Part three for urinary culture results. Results: The study includes 120 patients with proven diagnosis of urinary tract infection, the mean age of the study participants is 9.12 ± 6.47 days. Of them 71 (59.1%) were males and 49 (41.9%) were females. 76 (63.3%) patients had proven culture positive. Of them; 37 (48.7%) patients had E.coli, 16 (21.1%) patients had Klebsiella, 11 (14.4%) patients had proteus, 7 (9.3%) patients had S.aureus, 3 (3.9%) had Enterobacter and 2 (2.6%) had Pseudomonas. Patients age more than seven days are shown to be in risky association (odds ratio=4.583) and statistically significant different (P < 0.001), the presence of urinary tract infection during pregnancy are shown to be in risky association (odds ratio=31.528) and statistically significant different (P <0.001). Conclusion: The study concluded that urine culture should be performed on all lethargic neonates. Furthermore; routine UTI screening during pregnancy should occur at the first and subsequent prenatal appointments.

KEYWORDS: Urinary tract infection, Lethargy, Mosul, Iraq.

1- INTRODUCTION

Lethargy is characterized by the infant's seeming lack of energy.^[1] Infants are more susceptible to urinary tract infections (UTIs) because of their immature immune systems.^[2-3] A significant percentage of infants' UTIs do not manifest with fever or other particular urinary tract symptoms, despite fever being a notable indicator of UTI in neonates.^[4-5] Thus, understanding the vague symptoms and indicators of a newborn UTI is crucial for recognizing the right circumstances, which call for prompt diagnosis to avoid serious consequences.^[6]

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Urinary tract infections (UTIs) can affect the upper or lower urinary tract, where they are referred to as "pyelonephritis" or "cystitis," respectively.^[7] Based on clinical symptoms, it may be challenging, if not impossible, to differentiate between pyelonephritis and cystitis, particularly in less than 1-year age group.^[8]

The prevalence of UTIs during the first year of life is around 2.7% in uncircumcised boys and 0.7% in girls.^[9] In the first two months of life, almost 5% of females and 20% of uncircumcised boys who are feverish had UTI.^[10] Moreover; Uncircumcised males have a 10- to 12-fold higher risk of UTIs during the first six months of life.^[11]

Premature infants are more likely to get UTIs during the neonatal period than are full-term infants.^[12] A UTI is more common in girls than in boys after one year of life.^[13]

According to a number of studies, prenatal urinary tract infections and intrapartum fever are important factors that raise the chance that pregnant women may give birth to a child who has early onset neonatal sepsis (EONS). This is the case because EONS is linked to the transfer of germs from the mother during pregnancy and childbirth.^[14-15] Following the rupture of the chorioamnionic layers of the amniotic fluid, the neonate typically experiences initial colonization. During delivery, the microflora of the birth canal typically colonizes the newborn.^[16] However, vaginal bacteria may ascend and in certain cases cause inflammation of the placenta, umbilical cord, and fetal membranes, especially if the rupture of membranes lasts longer than 24 hours.^[17] Aspiration of contaminated amniotic fluid can cause fetal infection, which can end in neonatal sepsis, early delivery, or stillbirth.^[18] Pregnancy-related urinary tract infections may also be linked to a higher risk of newborn death and a cause of Gram-negative septicemia. Thus, early detection and treatment of urinary tract infections during pregnancy is crucial for preventing the aforementioned problems in infants.^[19]

The aim of study is to assess the presence of urinary tract infection among infants with lethargy in Mosul Province-Iraq.

2-Patients and methods

One hundred and twenty randomly selected neonates with lethargy aged under or equal to 28 days old of both

genders who presented to the study setting between April 1st, 2024, and April 1st, 2025 participated in this crosssectional study, which was carried out in the Ibin Al Atheer and Al Salam teaching hospitals in Mosul, Iraq. The parents were briefed on the aim of the study and verbally given their permission.

Data was gathered by using demographic information and a thorough history that included the mother's prenatal, natal, and postnatal medical histories as well as any symptoms that would indicate an infection during pregnancy. Using conventional techniques, urine was always collected in a sterile Technique. In order to prevent traumatic complications, the study used the Foley's catheter with the shortest diameter. Urine culture was immediately conducted. The urine samples were grown using blood agar and MacConkey's media. Inoculation was accomplished using a caliber loop. All sample plates were incubated for 24-48 hours at 37 degrees Celsius. Bacterial identification was accomplished by routine biochemical tests. Gram stain was used to stain the positive cultures, and a standard plate was used to measure the antimicrobial sensitivity.

Statistically analysis done by using SPSS 30.0 software application. To compare the means, the Student's t-test was employed. The p-value was considered statistically significant if it was less than 0.05.

3. RESULTS

The study includes 120 patients with proven diagnosis of urinary tract infection, the mean age of the study participants is 9.12 ± 6.47 days. Of them 71 (59.1%) were males and 49 (41.9%) were females. As shown in figure 3.1.





Table 3.1 shows basic information of neonates, the majority of the neonates are more than seven days of age, from urban districts, lived in crowded conditions,

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delivered at term and by normal vaginal delivery, not admitted to neonatal care unit and weighted less than 2500 gm.

Table 3.1: Basic neonatal information.

Variable	Number=120	Percent	
Age:			
- Less than 7 days	53	44.1 %	
- Seven to less than one month	67	55.9 %	
Residency:			
-Urban	68	56.6 %	
-Rural	52	43.4 %	
House condition:			
Less than 3 per room	49	40.3	
More than 3 per room	71	59.7	
Maturity:			
- Preterm	23	19.1	
- Term	97	79.9	
Mode of delivery:			
- Normal	62	51.6	
- Cesarean section	58	48.4	
Admission to Neonatal care unit:			
- Yes	41	34.1	
- No	79	65.9	
Patient weight:			
- Less than 2500 gm	75	62.5	
- More than 2500 gm	45	37.5	

Table 3.2 shows basic maternal information. It's evident that gestational diabetes are present among 8 (6.6%) mothers, pregnancy induced hypertension are present among 9 (7.5%) mothers, both gestational diabetes and

pregnancy induced hypertension are present among 3 (2.5%) mothers, urinary tract infection are present among 36 (30%) mothers and poor antenatal care 24 (20%) mothers.

Table 3.2: Basic maternal information.

Variable	Number=120	Percent
Gestational diabetes:	8	6.6
Pregnancy induced hypertension:	9	7.5
Gestational diabetes + pregnancy induced hypertension:	3	2.5
Urinary tract infection during pregnancy:	36	30
Poor antenatal care:	24	20

Table 3.3 explores urine culture results, 76 (63.3%) patients had proven culture positive. Of them; 37 (48.7%) patients had *E.coli*, 16 (21.1%) patients had

Klebsiella, 11 (14.4%) patients had *proteus*, 7 (9.3%) patients had *S.aureus*, 3 (3.9%) had *Enterobacter* and 2 (2.6%) had *Pseudomonas*.

Table 3.3: Urine culture results.

Type of bacteria in culture	Number	Percent
E.coli	37	48.7
Klebsiella	16	21.1
Proteus	11	14.4
S.aureus	7	9.3
Enterobacter	3	3.9
Pseudomonas	2	2.6
Total	76	100

Table 3.4 shows logistic regression of different predictors for development of urinary tract infection (Adjusted odds ratio). Patients age more than seven days are shown to be in risky association (odds ratio=4.583) and statistically significant different (P <0.001), the presence of urinary tract infection during pregnancy are shown to be in risky association (odds ratio=31.528) and

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statistically significant different (P <0.001). Other variable are not associated or statistically significant different.

Variable	Positive culture= 76	Negative culture=44	Odd's ratio (confidence interval)	P-value
Gender:				
-Male	49 (64.4%)	26 (59.1%)	1.251 (0.378-1.789)	0.782
-Female	27 (35.6%)	18 (40.9%)		
Age:				
- Less than 7 days	21 (27.6%)	28 (63.6%)	4.583 (1.312-7.731)	< 0.001
- Seven to less than one month	55 (72.4%)	16 (36.4%)		
Residency:				
-Urban	25 (32.9%)	18 (40.9%)	0.708 (0.329-1.241)	0.348
-Rural	51 (67.1%)	26 (59.1%)		
Home condition:				
- Less than 3 per room	26 (34.2%)	17 (38.6%)	0.826 (0.478-1.398)	0.478
- More than 3 per room	50 (65.8%)	27 (61.4%)		
Mode of delivery:				
Normal	52 (68.4%)	21 (47.7%)	2.373 (0.389-5.367)	0.139
Cesarean section	24 (31.6%)	23 (52.3%)		
Admission to Neonatal care				
unit:	32(42.10%)	20(45,45%)	0 872 (0 652 1 255)	0.871
- Yes	32(42.170) 44(57.004)	20(43.45%)	0.072 (0.052-1.255)	0.071
- No	44 (37.9%)	24 (34.33%)		
Presence of urinary tract	53 (60 7%)	3(6.8%)	31 528 (4 871 52 241)	<0.001
infection during pregnancy:	33 (09.7%)	5 (0.0%)	31,320 (4.0/1-32,241)	<0.001

Table 3.4: Logistic regression of different predictors for development of urinary tract infection (Adjusted odds ratio).

4. DISCUSSION

The management of infant urinary tract infections depends on early diagnosis and appropriate treatment. Furthermore, lethargy may be predisposed to by urinary tract infections.^[20]

The study found that about two thirds of the study participants had positive urine culture for bacterial infection, additionally; *E.coli* was the commonest proven bacteria in the culture, followed by *Klebsiella* and *Proteus*, which is consistent with Zakia Iqbal et al study findings.^[21]

Regarding the significant risk factors; this study found that been more than seven days is risky for urinary tract infection due to the time spend to bacteria to invade and proliferate in the genital tract. This finding runs with Isadora Caixeta da Silveira Ferreira et al study findings.^[22] In same way; maternal urinary tract infection during pregnancy also found to be risky for neonatal urinary tract infection which is goes with Huseyin Bilgin et al study results.^[23]

On the other hand; other factors including gender, residency, Home condition, mode of delivery and admission to neonatal care unit were found to be not significant which is comparable to Batool Mohammed Kadhim et al study results.^[24]

Small sample size and depending on two teaching hospitals setting were the limitation of this study.

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5. CONCLUSION

According to the study findings; E.coli, Klebsiella, and Proteus were the most common forms of bacteria on urine culture of lethargic infants. Neonates aged more than 7 days, as well as mothers' UTI during pregnancy, were significant risk factors for neonatal UTIs. Moreover; the study concluded that urine culture should be performed on all lethargic neonates. Furthermore; routine UTI screening during pregnancy should occur at the first and subsequent prenatal appointments.

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Conflict of intertest

About this study, the authors disclose no conflicts of interest.

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