Multidisciplinary

Urinary tract infection in lethargic neonates

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Abstract

Background: Urinary tract infection (UTI) in neonates (infants ≤28 days of age) is associated with bacteremia and congenital anomalies of the kidney and urinary tract. Upper tract infections (acute pyelonephritis) may result in renal parenchymal scarring and chronic kidney disease. Neonates with UTI should be evaluated for associated systemic infection, and anatomic or functional abnormalities of the kidneys and urinary tract. The aim of our study is to detect the prevalence of urinary tract infection in lethargic neonates.

Patients and methods: Across sectional study was carried out looked for urinary tract infection among sample of lethargic neonates in Al-Zahraa teaching hospital for maternity and children at Al-Najaf city, Iraq at period from first of February to first of November, 2023.

Information was gathered according to data collecting sheet that included: name, age, (gestational and postnatal), sex, mode of delivery and symptoms like lethargy, poor feeding, fever, shortness of breath and apneic attack, etc. Data have been obtained by standard laboratory procedures including GUE and urine culture.

Result: A total of 70 neonates were enrolled in this study, the mean age of sample is (8.6 days), the minimum is 1 day and the maximum is 28 days,45 were males and 25 were females. The percentage of urinary tract infection among lethargic neonates was (57.1%) with a percentage of (64.29%), (35.71%) in males and females respectively. The current study found that age more than 7 days was significantly risk factor for urinary tract infection in addition to urinary tract infection during pregnancy among mothers both are significant risk factor (P value less than 0.05) from other point of view neonates of male gender, poor antenatal care was more likely to have urinary tract infection, however, the correlation with these possible risk factors did not reach the statistical significance (P value more than 0.05).

It could be concluded from this study that UTI is a significant cause for lethargy. Urine culture may be used as an effective procedure to diagnose UTI, but to validate these finding larger studies are required.

Keywords: urinary tract infection, lethargy, neonate

1. Introduction

Lethargy defined as the baby seems to have little or no energy. Lethargy with refusal to feed has been reported 28% of neonates with proven sepsis. In the first few months of life, infants are at higher risk of developing urinary tract infection (UTI) due to the undeveloped immune system [1, 2]. Although fever is a noteworthy sign of UTI in neonates [1], a large proportion of neonatal UTI does not present with fever or specific urinary tract symptoms. Therefore, the knowledge of non-specific signs and symptoms of neonatal UTI is essential to identify appropriate situations, which require early diagnosis to prevent long-term complications [3].

Various literatures acknowledge the significance of intra-partum fever and antenatal urinary tract infections in increasing the risk of pregnant mothers to have a newborn with clinical EONS [4]. It is so because EONS is associated with the acquisition of microorganisms from the mother during pregnancy and delivery [5]. For example, in America [6], the risk of neonatal sepsis among newborns delivered of mothers with intra-partum fever is 0.24%. Initial colonization of the neonate usually takes place after rupture of the chorio-amnionic layers of the amniotic fluid [7]. In most cases, the infant is colonized with the microflora of the birth canal during delivery.

However, particularly if the rupture of membranes lasts longer than 24 h, vaginal bacteria may ascend and in some cases produce inflammation of the fetal membranes, umbilical cord, and placenta [8]. Fetal infection can result from aspiration of infected amniotic fluid [9], leading to stillbirth, premature delivery, or neonatal sepsis [10]. Besides, women with urinary tract infection during pregnancy are more likely to deliver premature or low birth weight neonates, who have higher risk of developing neonatal sepsis [11].

Urinary tract infection during pregnancy may also be associated with an increase in neonatal mortality and a source for Gram negative septicemia. Therefore, screening of pregnant women is essential to avoid the aforementioned complications through early diagnosis and treatment of urinary tract infection during pregnancy [12].

2. Materials and methods

This was a cross sectional study conducted in AL_Zahraa teaching hospital for maternity and children at Al-Najaf city, Iraq in emergency department, NCU and clinical Lab. 70 cases selected randomly of lethargic neonates below or equal to 28 days old of both genders who were lethargic presented to our hospital between the 1st of February 2023 to the 1st of November 2023. The parents or the health giver were informed about benefits and risks and verbal agreement were taken. Data

was collected using Demographic data and subjected to detailed history taking including prenatal, natal and postnatal history with stress on symptoms suggested infection in the mother during pregnancy. Study protocol approved by the scientific department in the Al-Kuffa medical college. Urine was always obtained under sterile conditions using standard methods. We used the smallest-diameter foley catheter to avoid traumatic complication. Sterile container for specimen collection. We did not use a catheter with a balloon and/or a guidewire, but we used NG tube in some cases for urine collection.

Urine culture was immediately performed. The urine samples were cultured in blood agar and MacConkeys media. Inoculation was done with help of caliber loop. All the sample plates were incubated for 24_48 hrs at 37c. Bacterial identification was done by standard biochemical test. When multiple growths were obtained the culture was repeated again before accepting the results. positive cultures were stained by gram stain and antimicrobial sensitivity was assessed using conventional plate. Timing of the procedure when the infant had not recently voided (1 to 2 hours after the last wet nappy to reduce the chance of an unsuccessful attempt.

3. Results

A total of 70 neonates had been included in the study. The gender distribution of neonates was 45(64.29%) males and 25(35.71%) females as shown in figure 1. The prevalence of neonates with positive growth on culture was 57.1% (40 neonates).

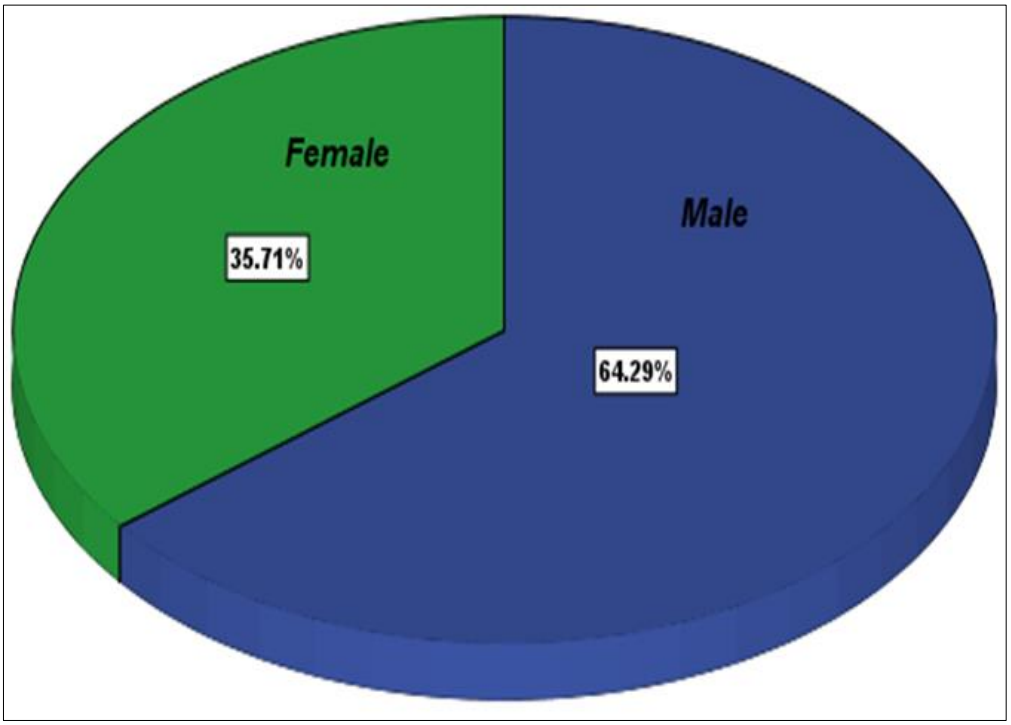

Fig 1: Gender distribution of neonates

Table 1: Frequency and percentage of different variables related to neonates

Characteristics		Number	Percentage
Address	Rural	37	52.9
	Urban	33	47.1
Age	Early neonatal period	30	42.9
	Late neonatal period	40	57.1
Crowdness index	≤3 person/room	31	44.3
	>3 person/room	39	55.7
Time of delivery	Full term	63	90
	Preterm	7	10
Mode of delivery	NVD	36	51.4
	C/S	34	48.6
Admission to NCU	Yes	23	32.9
	No	47	67.1
Weight	≥2500	64	91.4
	<2500	6	8.6

Table 2: Frequency and percentage of different variables related to mothers

	Characteristics	Number	Percentage
Chronic disease	DM	5	7.1
	HT	6	8.6
	DM+HT	1	1.4
	No	58	82.9
Sign of UTI during pregnancy	Yes	28	40
	No	42	60
Antenatal care	Good	21	30
	No or poor	49	70

Table 3: Type of bacteria on culture

	Frequency	Percent
E. coli	18	45
Klebsiela	10	25
Proteus	6	15
S. aureus	4	10
Enterobacter	1	2.5
Pseudomonas	1	2.5
Total	40	100.0

Table 3 shows that the most common type of bacteria causing UTI is *E. coli* followed by Klebsiella. There 30 patients show no growth on culture.

Table 4: Logistic regression of different predictors for development of UTI (Adjusted odds ratio)

Variable		Growth (UTI)		*p* value	OR (95%CI)
		Positive (n=40)	Negative (n=30)		
Gender	Male	27(73%)	18(52%)	0.107	3.72(0.75-18.41)
	Female	13(27%)	12(48%)		
Address	Rural	27(73%)	10(33.3%)	0.142	2.99(0.69-13)
	Urban	13(27%)	20(67.7%)		
ANC	Good	10(25%)	11(36.7%)	0.436	0.55(0.12-2.46)
	No or poor	30(75%)	19(63.3%)		
Admission to NCU	Yes	15(37.5%)	8(26.7%)	0.573	1.59(0.31-8.14)
	No	25(62.5%)	22(73.3%)		
MOD	NVD	26(65%)	10(33.3%)	0.523	1.57(0.39-6.31)
	C/S	14(35%)	20(67.7%)		
Age/days	≤7	9(22.5%)	21(70%)	<0.001	0.048(0.009-0.25)
	>7	31(77.5%)	9(30%)		
Crowdness	≤3	13(32.5%)	18(60%)	0.773	0.81(0.20-3.28)
	>3	27(67.5%)	12(40%)		
UTI during pregnancy (mother)	Yes	26(65%)	2(6.7%)	0.001	258(9.4-7059)
	No	14(35%)	28(93.3%)		

In table (4) there is no significant association between different predictors and development of urinary tract infection except for age so those with late neonatal period (>7days) are at higher risk for development of UTI than those with early neonatal period. Also significant for UTI of mother during pregnancy so neonate of mother with UTI during pregnancy more likely to develop UTI.

4. Discussion

Early diagnosis and proper treatment are crucial in the management of neonatal urinary tract infection. Additionally, urinary tract infection could be a predisposing factor for lethargy.

Therefore, the current study tried to assess the prevalence of Urinary tract infection among a group of neonates at AL-Zahraa teaching hospital. The current study found that 40% of mothers of neonates had signs of urinary tract infection during pregnancy this consistent with aprevious study in Iran conducted by [13] who found association between the history of UTI in mother and occurrence of UTI in neonate.

The more frequent types of bacteria in the culture revealed that *E. coli* was the more frequent bacteria followed by Klebsiella, Proteus, *S. aureus* where positive culture among the urine samples in the neonates for these bacteria was 45%, 25%, 15%, 10% respectively. Previous studies and literatures in Prishtine mentioned that *E. coli*, Klebsiella are the more frequent cause of urinary tract infection [14] who found that *E. coli* was the

most common cause of urinary tract infection (57.14%), the second most common was Klebsiella (42.86%).

The current study found that age more than 7days was significantly risk factor for urinary tract infection in addition to urinary tract infection during pregnancy among mothers both are significant risk factor (*p* value less than 0.05) from the other point of view neonates of male gender, rural residence, poor antenatal care and crowded houses were more likely to have urinary tract infection [2], however, the correlation with these possible risk factors did not reach the statistical significance (P value more than 0.05). This insignificance might have attributed to lower sample size. Previous study in America (Zee *et al*, 2016), mention the incidence of UTI in neonatal life in boys exceeds that in girls and this consisted with our study that we found (64.29%) in males and only (35.71%) in females [15].

5. Conclusions and recommendations

It could be concluded from this study that: UTI reported in 40% of lethargic neonates. Lethargy, poor feeding and fever were the more frequent presentation of neonates with UTI. *E. coli*, Klebsiella and Proteus were the more frequent types of bacteria on culture. And neonates aged more than 7 days and UTI during pregnancy of the mothers were significant risk factors for UTI in neonates.

Our study recommended that urine culture should perform for all lethargic neonates. Routine screening for UTI in pregnancy should be performed at the first and subsequent antenatal visits. If the pregnant women had UTI, they should complete course of antibiotics.

A large sample is needed for evaluation of the percentage of UTI in lethargic neonates and to know the exact percentage as compared with that in other parts of the world.

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