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PREVALENCE OF NEONATAL JAUNDICE AMONG ADMISSION PATIENTS TO THE NEONATAL WARD AT REFERRAL HOSPITAL

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ABSTRACT

Background: Jaundice is a yellowish coloring of the skin brought on by an accumulation of unconjugated bilirubin in the blood. It may result in neurological aftereffects as well as acute and chronic encephalopathy. Neonatal jaundice affects 481,000 term or near-term babies per year; however, its effects can be greatly mitigated with early detection and treatment. **Aim:** T**o** find the prevalence of neonatal jaundice among the patients who were admitted to the neonatal wards**. Patients and Methods:** A cross-sectional study was conducted at Al-Khansaa Teaching Hospital, involving 294 neonates aged ≤ 1week, with 114 due to jaundice. The neonates examined by researchers and tested for TSB. Diagnosis is typically made through physical examination and laboratory investigation. The study used SPSS to analyze data, with statistical associations assessed using Fisher and Freeman-Halton Exact test and Independent t-test. A p-value of ≤0.05 was considered significant. **Results:** The study involved 114 patients with a mean age of 4.33±1.856 days, with males at 65 and females at 49. The most common age was three days, with males being heavier and females having higher means of TSB and Hb. Neonatal jaundice was prevalent in 38.8% of admitted neonates, with ABO incompatibility and Rh isoimmunization being the most common causes. Age had a strong direct relationship with TSB in males. **Conclusion:** The study reveals that the prevalence of the jaundice was 38.8% among the newborn cases in Mosul City. Blood group incompatibility was the most common cause.

KEYWORDS: Jaundice, Neonates, Prevalence.

INTRODUCTION

A yellowish coloring of the skin and/or conjunctiva, known as jaundice, is caused by an excess of unconjugated bilirubin in the blood.[1] Neonatal jaundice is categorized as either physiological or pathological jaundice[2], depending on the cause of the illness. A more severe type known as pathological jaundice can arise within 24 hours of delivery[1,2] or later depending on the reason.[2-4] Physiological jaundice is a modest, self-limiting adaption process that typically appears 36 hours after birth and dissipates without therapy.

If there is an excess of unconjugated bilirubin, it can breach the blood-brain barrier and cause acute and chronic encephalopathy, as well as long-term neurological sequelae such kernicterus spectrum disease and even infant mortality. If cases are found and treated promptly, morbidity and death can be greatly avoided.[5] When accessible, blue-light phototherapy and, in extreme situations, exchange transfusion, are useful forms of treatment. Preeclampsia, preterm birth (less than 37 weeks gestation), low birth weight (LBW; less than 2,500 grams) or small for gestational age (SGA), maternal-fetal ABO or Rhesus incompatibility, the gender and nutrition of the neonate, and inherited neonatal disorders like glucose-6-phosphate dehydrogenase (G6PD) deficiency and Gilbert's syndrome are known factors associated with an increased risk of neonatal hemorrhage (NH).[5-7]

According to estimates, this illness affects at least 481,000 term or near-term neonates globally each year, resulting in around 63,000 cases of moderate-to-severe impairment and 114,000 fatalities.[5] Early diagnosis and treatment have significantly improved outcomes for at-risk neonates in high-income countries. However,

genuine population-based statistics are hard to come by in low- and middle-income nations, particularly from rural regions, and it's still unknown how hyperbilirubinemia affects infant morbidity and death.[5-8]

Although it remains challenging, early identification is one of the most effective interventions for reducing the extent and impact of neonatal jaundice.[9]

The study aimed to find the prevalence of neonatal jaundice among the patients who were admitted to the neonatal wards.

PATIENTS AND METHODS

Study design, setting, and interval

A hospital-based cross-sectional design was adopted to achieve the study objectives. The study was conducted at Al-Khansaa Teaching Hospital during the period from 1st January to 1st July 2024.

Sample size, Inclusion, and Data collection

The study included 294 neonates below one week of age who admitted to the NICU for different reasons; 114 of them were because of Jaundice, the neonates were examined by the researchers and the TSB with Hb were tested and the neonates were managed according to the unit protocols based on the guidelines for neonatal jaundice.[10]

A medical practitioner would usually do a physical examination to make the diagnosis, paying particular attention to any yellow discoloration. To confirm the diagnosis, a laboratory study is carried out, usually consisting of measuring the total serum bilirubin levels. Although particular criteria may vary based on the infant's age, gestational age, and other circumstances, a total blood bilirubin level of 5 mg/dL (85 µmol/L) or above is a generally used threshold for diagnosing newborn jaundice.[11-13]

Blood types A or B and blood type O in a mother might result in ABO incompatibility.[14] For there to be ABO incompatibility in this investigation, two or more of the following circumstances have to be true: (1) anemia in different degrees; (2) circulating red blood cells with nuclei; (3) spherocytosis; or (4) polychromasia on a peripheral blood smear.

Statistical analysis

The data was summarized in Excel sheet and analyzed by using SPSS-26. The categorical data was expressed in numbers and percentages while the numerical data expressed in means and standard deviations. Freeman-Halton Exact test and Independent t-test for two means were used to assess the statistical associations for the categorical and numerical data respectively. Person correlation was also used. The p-value ≤0.05 considered significant.

RESULTS

The current study included 114 patients with mean age of 4.33±1.856 days, the males were 65 constituted 57.0% while the females were 49 represented 43.0% as shown in table (1).

Table (1): Socio-demographic characteristics of the studied sample.

	Mean	Standard deviation
Age (days)	4.33	1.856
Sex	No.	%
Males	65	57.0
Females	49	43.0

The comparison of the age in relation to sex was demonstrated in table (2). This table elicited that the most common age among the males was three days in 15(23.1%) while among the females, the age of seven was the commonest in 12(24.5%); the difference was statistically not significant (p=0.306).

Table (2): The comparison of the age in relation to sex.

		Sex		Total	p-value *
		Males	Females		
		No. (%)	No. (%)	No. (%)	
Age	1.00	4(6.2)	1(2.0)	5(4.4)	0.516
	2.00	10(15.4)	5(10.2)	15(13.2)	
	3.00	15(23.1)	11(22.4)	26(22.8)	
	4.00	8(12.3)	8(16.3)	16(14.0)	
	5.00	13(20.0)	6(12.2)	19(16.6)	
	6.00	3(4.6)	6(12.2)	9(7.9)	
	7.00	12(18.5)	12(24.5)	24(21.1)	
Total		65	49	114	
*Freeman-Halton Exact test					

The comparison of the study measurements in relation to sex was demonstrated in tale (3) which revealed that the males were heavier that females while the means of TSB and Hb were higher among the females; the differences between males and females concerning the weight, TSB, and Hb were statistically not significant.

Table (3): The comparison of the study measurements in relation to sex.

	Males	Females	Total	p-value *
	Mean ±SD	Mean ±SD	Mean ±SD	
Weight	3.02±0.531	3.567±3.469	3.06±0.526	0.219
TSB	17.16±4.411	18.45±5.088	17.24±4.840	0.150
HB	15.56±2.007	15.58±2.025	15.59±1.996	0.954
*Independent t-test for two means				

The prevalence of the neonatal jaundice was assessed among the admitted neonates and found that the jaundice was prevailed in 38.8% among the neonates less than 7 days of age as shown in figure (1).

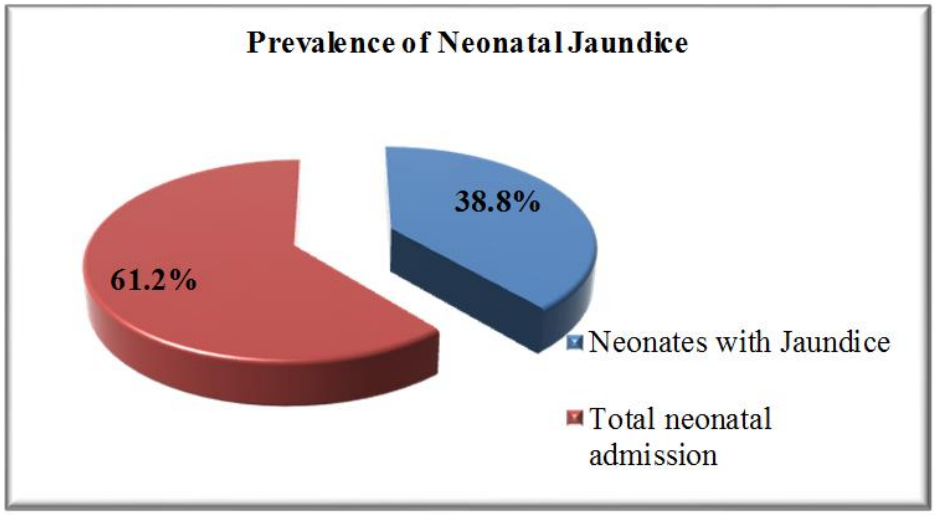

Figure (1): The prevalence of the neonatal jaundice.

Types of treatment in relation to sex were illustrated in figure (2) which demonstrated that among the males, seven patients were treated by blood exchange while nine females were treated by blood exchange.

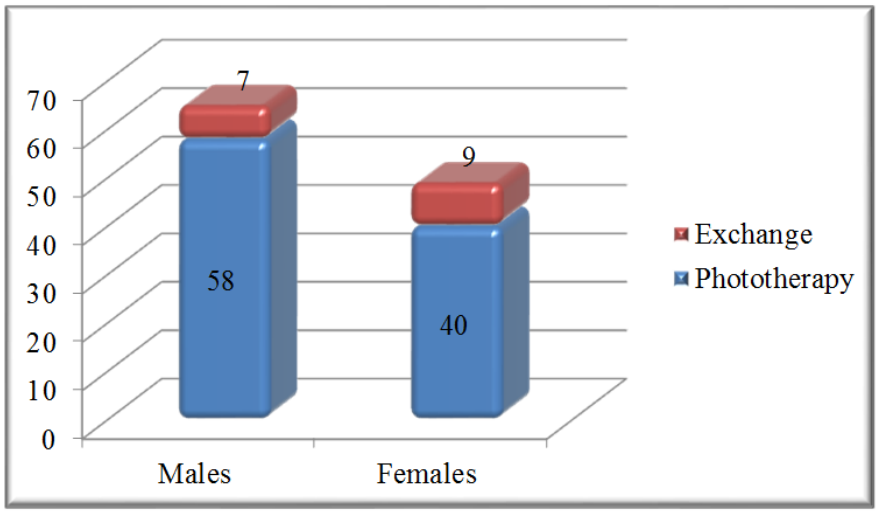

Figure (1): Types of treatment in relation to sex.

The mean level of the TSB according to age per day was demonstrated in table (4) which showed that the lower mean level was in age 1 day while the highest level was found at age of 7 days.

Table (4): The mean level of the TSB according to age per day.

Age	TSB level
	Mean ± SD
1.00	10.18±3.266
2.00	15.74±3.423
3.00	18.20±4.869
4.00	17.77±3.288
5.00	18.45±4.103
6.00	18.55±3.516
7.00	19.04±5.761

The most common cause for the jaundice among the current studied sample was ABO incompatibility which found among 35 neonates followed by the Rh incompatibility in 16 neonates, other causes of jaundice found in 63 neonates as shown in table (5).

Table (5): Causes of jaundice.

Causes of jaundice	Total patients	Phototherapy	Exchange transfusion
ABO incompatibility	35	29(82.9)	6(17.1)
Rh incompatibility	16	11(68.7)	5(31.3)
Other causes of jaundice	63	58(92.1)	5(7.9)

Correlation of age with TSB in each sex showed that there was strong direct relation (r=0.508) between age and TSB among the males in a statistically significant association (p=0.000), while among the female, the association was statistically not significant as shown in table (6).

Table (6): Pearson's Correlation of age with TSB in each sex.

Sex	Value	Asymp. Std. Error[a]	Approx. T[b]	p-value
Females (n=49)	-0.002	0.152	-0.017	0.987[c]
Males (n=65)	0.508	0.105	4.680	**0.000**[c]
Females (n=49)	0.350	0.089	3.961	**0.000**[c]

Comparison between birth weight and types of treatment was demonstrated in table (7). It elicited that 17.6% and 13.4% of low and normal birth weight neonates respectively were treated by exchange; the difference was statistically not significant.

Table (7): Comparison between birth weight and types of treatment.

Types of treatment	Birth weight		Total	p-value *
	Low (n=17)	Normal (n=97)		
	No. (%)	No. (%)	No. (%)	
Exchange	3(17.6)	13(13.4)	16	0.705
Phototherapy	14(83.4)	84(86.6)	98	
*Fisher Exact test				

DISCUSSION

Neonatal jaundice frequently results in hospital admissions to neonatal intensive care units as it is a major cause of sickness and mortality in babies.

The current study included 294 neonates admitted to the hospital; 114 neonates of them had Jaundice. Their mean age was 4.33±1.856 days. More than the half were males. The males had the Jaundice earlier than the females. This finding is consistent with studies conducted by Ayalew *et al.*,[15] in which the male neonates were more likely to develop jaundice than females. Similarly, other studies in different regionsthe Amhara region by Bizuneh *et al.*,[16], Mekele by Awang *et al.*,[17], Malaysia by Lake *et al.*,[18], Nepal by Scrafford *et al.*,[19], Iran by Najib *et al.*,[7], and Sweden by Norman *et al.*,[20] This may be explained by the fact that male newborns are more sensitive to some causes of neonatal jaundice due to a hereditary relationship with the X chromosome.

When the prevalence of newborn jaundice was evaluated in the neonates hospitalized, it was shown that 38.8% of the neonates under 7 days of age had jaundice. Based on the provided search results, the prevalence of neonatal jaundice within less than one week appears to vary across different regions and studies. According to a 2018 study conducted by Adoba *et al.*,[21], majority (54%) of neonates developed jaundice within 1–3 days of birth.

Also Brits *et al.*,[22] study in 2018, reported a prevalence of 55.2%, however, only 10% of black babies who were diagnosed with jaundice appeared clinically jaundiced. Approximately 45.4% of neonates developed neonatal jaundice between 1 to 7 days of age, as mentioned in Tessema *et al.*,[23] study published in 2024. Another 2024 study[15] reported a prevalence of 37.3% for neonatal jaundice.

In a study conducted by Belaya *et al.*,[24] and published in 2023, the prevalence of neonatal jaundice was 20.5%. in a study conducted in Tikrit by Al-Jiboury *et al.*,[25], the prevalence of neonatal jaundice is (9.2%). The most frequent cases was having total serum bilirubin(TSB) level ≤18 milligram/dc liter(mg\dl) (84.8%). It's essential to note that these are a collection of findings from various studies on neonatal jaundice, and the prevalence may vary depending on factors such as the setting, the population, and the methodology used in each study. To gain a more precise understanding of the prevalence of neonatal jaundice within one week across a broader range of research, further exploration of the wider literature would be needed.

Treatment modalities according to sex were shown to include blood exchange for nine female patients and blood exchange for seven male patients and constituted 14.0% for both sex while the phototherapy was the most common representing 86.0%. similar findings were reported by Marzoog *et al.*,[26] in which phototherapy was the most common kind of treatment in 95.5% while only 4.5% of cases were treated with exchange transfusion. Furthermore, only 10 (15.6%) of the babies treated by Ayalew *et al.*[15] had double exchange transfusion treatment. Because the blood bilirubin level had reached the phototherapy range according to the butane curve, the left 54 (84.4%) patients received phototherapy.

ABO incompatibility was shown to be the most common cause of newborn jaundice in the current investigation. Neonatal hyperbilirubinemia has been strongly linked in the literature to ABO incompatibility.[27] While the ABO incompatibility in the current study was lower than the 35.5% recorded by Menon and Amanullah[28] in a case-control study conducted in India, it was higher than the 18% ABO blood group incompatibility presented among neonates with jaundice in the Adoba *et al.*,[21] study and 5.9% reported by Najib *et al.*,[7] in a prospective longitudinal study conducted in Iran.

One of the reasons for baby jaundice is immune-mediated hemolysis of the newborn's blood caused by maternal antigens, which might result from ABO incompatibility.[29] As a result, it's critical to ascertain the neonate's blood type prior to discharge, particularly for infants born to O-blood group moms. This will help to detect ABO incompatibility and give the mother the right guidance about the likelihood of jaundice and the necessity of seeking medical attention for the child. Furthermore, the results of this investigation were consistent with a Turkish study on the variables influencing newborn jaundice. Thirty cases, or 11.3%, of newborn jaundice were Rh incompatible.[30] Furthermore, this investigation aligned with earlier research carried out in Mekelle, Northern Ethiopia.[31] Hemolytic effects might be caused by Rh incompatibility between the mother and the fetus. This occurs when a mother who is Rh negative and a fetus who is Rh positive generate antibodies in the mother's blood that target the red blood cells of the fetus. Hyperbilirubinemia can arise from the breakdown of fetal red blood cells.[32]

Most of the neonates included in the current study had normal birth weight. This was run in parallel to the finding of Al-Jiboury *et al.*,[25] which showed that most cases with hyperbilirubinemia had normal weight. Meanwhile, opposite finding was reported by Duke *et al.*,[33] study which conducted in Southern Nigeria. Another studies done by Menon and Amanullah[28] and Devi and Vijaykumar[34] confirmed by earlier observation that the neonatal jaundice was associates with low neonatal birth weight in India.

CONCLUSION

The study reveals that the prevalence of the jaundice was 38.8% among the newborn cases ≤ 1 week and need admission at Mosul City. Blood group incompatibility was the most common cause.

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