

IMPACT OF MATERNAL RISK FACTORS ON NEONATAL HYPERBILIRUBINEMIA

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ABSTRACT

Background: Neonatal jaundice contributes to around 16-18% of NICU admissions, next to respiratory problems and sepsis. The present study was performed with the purpose of establishing the role of the various maternal factors with hyperbilirubinemia in neonates. **Material and method:** The cross sectional study was conducted on 200 neonates upto 15 days of life, admitted in Command Hospital (NC) for neonatal Hyperbilirubinaemia. The study was conducted for a period of 3 years from 01 Mar 2018 to 01 Mar 2021. **Result:** There was statistically significant relationship between hyperbilirubinemia and maternal diabetes and hypothyroidism. **Conclusion:** By identifying the various risk factors, we may be able to modify them and reduce the need for NICU admissions for Neonatal Hyperbilirubinemia.

KEYWORDS: Neonate, Physiological Jaundice, Pathological Jaundice, Hyperbilirubinemia.**INTRODUCTION**

Neonatal Jaundice is a common condition affecting the newborn especially in the first week. It is one of the most common causes of neonatal readmission to hospital with a rate as high as 80% in preterms and 60% in term neonates. Hyperbilirubinemia is encountered in around 8% to 11% of neonates. It is defined as total serum bilirubin above the 95th percentile for age during the first week of life. It is a multifactorial disorder with various signs, symptoms and complications.^[1]

Neonatal jaundice presents as yellowish discoloration of skin and sclera. Dermal icterus is first noticed in the face and proceeds to the body and then to the extremities as the bilirubin level rises. Physiological jaundice is the most prevalent type which is attributable to physiological immaturity of the bilirubin conjugation system. It usually appears between 24-72 hours and disappears by 10-14 days of life. Appearance of jaundice within 24 hr or presence for more than 2 weeks should be considered as pathological jaundice. An imbalance between bilirubin production and conjugation is the main mechanism of jaundice, which leads to an increase in bilirubin levels.^[2]

Neonatal jaundice is usually a self-limiting condition, but it becomes important because there is a close relationship between the increase in unconjugated bilirubin levels and neurotoxic effects that can lead to long-term complications such as cerebral palsy, kernicterus and hearing impairment. It is treated by various modalities which include phototherapy, exchange transfusion, IV

immunoglobulins and phenobarbitone.^[3] Despite years of investigation, many aspects of neonatal jaundice remain unexplained. The present study was performed with the purpose of establishing the role of the various maternal factors for example blood group, maternal hypothyroidism, maternal diabetes, perinatal infection, premature rupture of membranes, type and mode of delivery with exaggerated hyperbilirubinemia in neonates.^[4]

MATERIAL AND METHOD

The cross sectional study was conducted on 200 newborn babies upto 15 days of life, admitted in Post-natal and Neonatal Wards in view of Neonatal Hyperbilirubinaemia (S Bilirubin > 15mg/dl) of Command Hospital (NC). The study was conducted for a period of 3 years from 01 Mar 2018 to 01 Mar 2021. The data was collected seeking the maternal risk factors for neonatal jaundice and records were formed eliciting proper history from the mothers as well as from endorsed antenatal medical case sheets.

Inclusion Criteria: Neonates born at term and upto day 15 of life presenting with jaundice **Exclusion Criteria:** Preterm Neonates, Sick neonates requiring admission to Level II NICU and above, and Neonates with incomplete medical records.

The maternal risk factors included for correlation were ABO/Rh group, gestational diabetes, maternal

hypothyroidism, premature rupture of membranes, perinatal infections, type and mode of delivery.

Sample size was decided on the basis of formula $4pq/e^2$, where p was the prevalence, $q=1-p$ and e was the working error which was assumed to be 10%. Sample size finally calculated was 150. The statistical analysis of the collected data was based on SPSS software version 19 and the tests applied for qualitative data are chi square test and for quantitative data are 't' test. P value <0.05 was considered to be statistically significant.

RESULTS

A total of 200 neonates with hyperbilirubinaemia were included in the study and were further subdivided into four groups as per the severity of their hyperbilirubinaemia. Various maternal risk factors were segregated to be compared to the levels of bilirubin in each neonate and the findings were as follows.

Assessment of neonatal bilirubin in relation to various maternal blood groups showed no significant difference with different levels of bilirubin ($P=0.4$, Table 1). Based on Table 2 and Fig 1, although no significant difference among neonatal bilirubin levels in babies born to Rh negative mothers was seen but out of 40 cases, 28(70%) whose mothers were Rh negative had bilirubin levels between 15.0-19.9 ($P=0.06$).

As per Table 3 and Fig 2, 53 of the total 200 cases were the ones whose mother had gestational or familial diabetes. Out of total 9 cases with serum bilirubin 20-24.9, majority were found to be the babies of diabetic mothers. The results show significant correlation between maternal diabetes with levels of hyperbilirubinaemia in neonates ($P=0.04$). Table 4 and Fig 3 indicated that out of 52 neonates with maternal history of hypothyroidism, 28 (18.9%) had bilirubin levels between 10-14.9, followed by 18 (45%) with levels between 15-19.9, then 4 (44.4%) between 20-24.9 and 2 (66.7%) having levels even more than 25mg/dl. The correlation between maternal hypothyroidism with neonatal hyperbilirubinaemia was found to be highly significant in the current study ($P=0.0014$).

In the present study, 91 (45.5%) neonates out of 200 were born to mothers with perinatal infections whereas 85 (42.5%) were those whose mothers had premature rupture of membranes. Though perinatal infections in mothers showed higher risk of developing different levels of hyperbilirubinaemia but the correlation was not found to be significant (Table 5, $P=0.07$ & Table 6, $P=0.15$) According to Table 7, mode of delivery doesn't significantly affect the development of hyperbilirubinaemia.

Tables and Figures

Table 1.

Bilirubin Levels	Total		ABO Group				p Value
	Cases (n)	%age	A	B	AB	O	
10-14.9	148	74	37(25.0%)	33(22.3%)	17(11.5%)	61(41.2%)	0.403675
15-19.9	40	20	14(35%)	12(30.0%)	1(2.5%)	13(32.5%)	
20-24.9	9	4.5	4(44.4%)	1(11.2%)	0(0.0%)	4(44.4%)	
25 or more	3	1.5	1(33.3%)	0(0.0%)	0(0.0%)	2(66.7%)	
Total	200	100	56(28.0%)	46(23.0%)	18(9.0%)	80(40.0%)	

Table 1: Correlation of Maternal ABO group with neonatal Hyperbilirubinaemia.

Table 2.

Bilirubin Levels	Total		Rh Group		p Value
	Cases (n)	%age	Positive	Negative	
10-14.9	148	74	64(43.2%)	84(56.8%)	0.063484
15-19.9	40	20	12(30.0%)	28(70.0%)	
20-24.9	9	4.5	7(77.8%)	2(22.2%)	
25 or more	3	1.5	1(33.3%)	2(66.7%)	
Total	200	100	84(42.0%)	116(58.0%)	

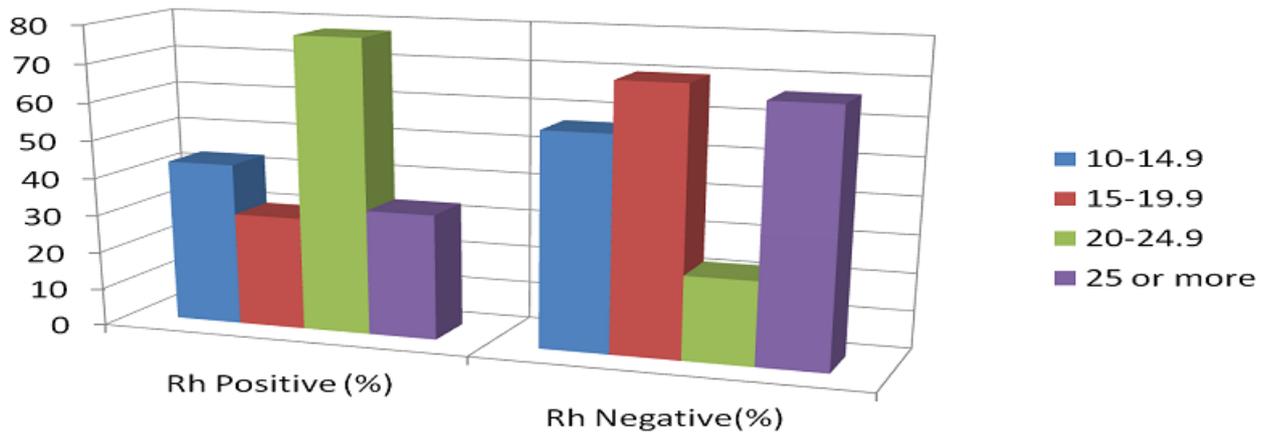


Table 2 & Fig 1: Correlation of Maternal Rh group with neonatal Hyperbilirubinaemia.

Table 3.

Bilirubin Levels	Total		Maternal Diabetes		p Value
	Cases (n)	%age	Yes	No	
10-14.9	148	74	32(21.6)	116(78.4%)	0.040821
15-19.9	40	20	15(37.5%)	25(62.5%)	
20-24.9	9	4.5	5(55.6%)	4(44.4%)	
25 or more	3	1.5	1(33.3%)	2(66.7%)	
Total	200	100	53(26.5%)	147(73.5%)	

Distribution of levels of hyperbilirubinaemia in IDM

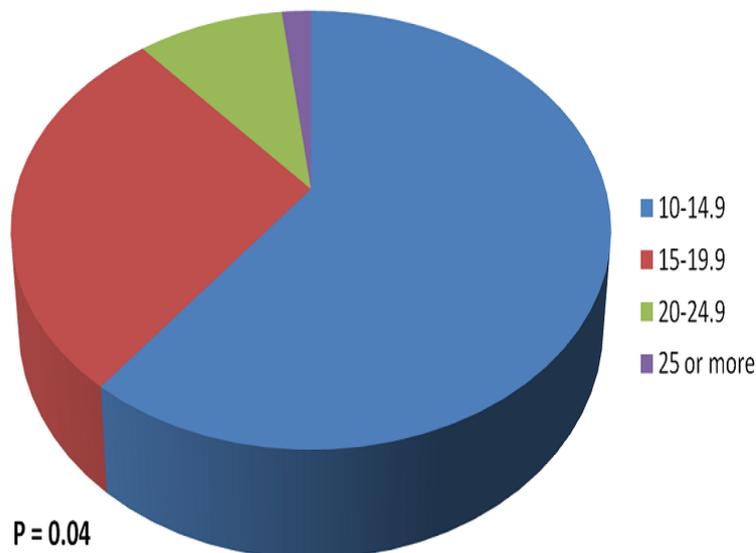


Table 3 & Fig 2: Correlation of Maternal diabetes with neonatal Hyperbilirubinaemia.

Table 4.

Bilirubin Levels	Total		Maternal Hypothyroidism		p Value
	Cases (n)	%age	Yes	No	
10-14.9	148	74	28(18.9%)	120(81.1%)	0.001414
15-19.9	40	20	18(45.0%)	22(55.0%)	
20-24.9	9	4.5	4(44.4%)	5(55.6%)	
25 or more	3	1.5	2(66.7%)	1(33.3%)	
Total	200	100	52(26.0%)	148(74.0%)	

Fig. 3 Correlation of Maternal Hypothyroidism with levels of neonatal Hyper bilirubinaemia

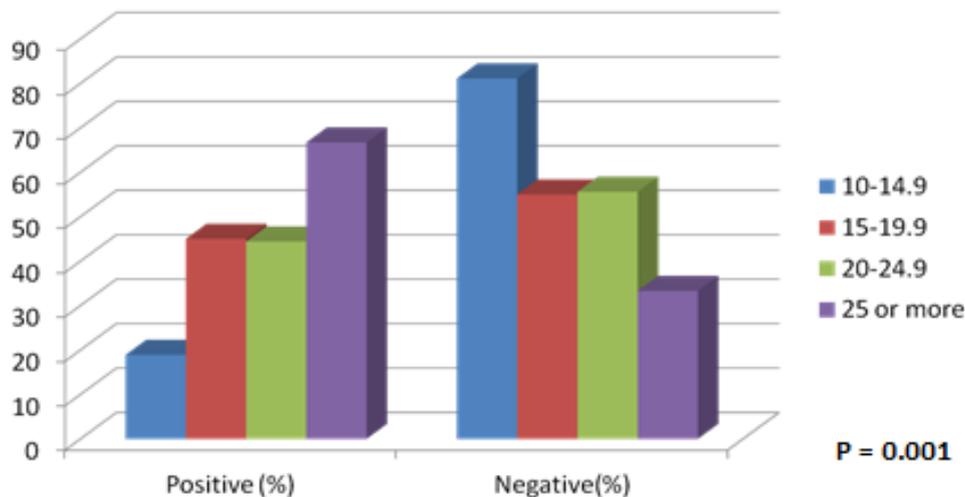


Table 4 & Fig 3: Correlation of Maternal hypothyroidism with neonatal hyperbilirubinemia.

Table 5: Correlation of perinatal infections with neonatal hyperbilirubinaemia.

Table 5.

Bilirubin Levels	Total		Perinatal Infections		p Value
	Cases (n)	%age	Yes	No	
10-14.9	148	74	68(45.9%)	80(54.1%)	0.071588
15-19.9	40	20	14(35.0%)	26(65.0%)	
20-24.9	9	4.5	6(66.7%)	3(33.3%)	
25 or more	3	1.5	3(100%)	0(0.0%)	
Total	200	100	91(45.5%)	109(54.5%)	

Table 6: Correlation of premature rupture of membrane with neonatal hyperbilirubinemia.

Table 6

Bilirubin Levels	Total		PROM		p Value
	Cases (n)	%age	Yes	No	
10-14.9	148	74	69(46.6%)	79(53.4%)	0.158232
15-19.9	40	20	13(32.5%)	27(67.5%)	
20-24.9	9	4.5	3(33.3%)	6(66.7%)	
25 or more	3	1.5	0(0.0%)	3(100%)	
Total	200	100	85(42.5%)	115(57.5%)	

Table 7: Correlation of mode of delivery with neonatal hyperbilirubinaemia.

Table 7.

Bilirubin Levels	Total		Mode of Delivery		p Value
	Cases (n)	%age	VD	C-Section	
10-14.9	148	74	65(43.9%)	83(56.1%)	0.187708
15-19.9	40	20	11(27.5%)	29(72.5%)	
20-24.9	9	4.5	2(22.2%)	7(77.8%)	
25 or more	3	1.5	1(33.3%)	2(66.7%)	
Total	200	100	79(39.5%)	121(60.5%)	

DISCUSSION

Neonatal jaundice contributes to around 16-18% of NICU admissions, next to respiratory problems and sepsis. Based on data described before jaundice is one of

the most common neonatal problem. Complications may lead to death in the first month and infants who survive may suffer from mental retardation, movement disorder, seizures, speech and hearing impairments. Therefore

timely diagnosis and treatment are very important to prevent such complications. The present study was done to find out the relationship between maternal factors and development of neonatal jaundice.^[5]

There are conflicting reports regarding influence of sociodemographic factors on neonatal hyperbilirubinemia. In the present study sociodemographic factors like age, socioeconomic status and education did not show any statistically significant association.^[6]

A study on epidemiology of neonatal jaundice was conducted by Gale *et al*⁷ proved that high-serum bilirubin was associated with maternal diabetes mellitus. Likewise in the current study majority of neonates with hyperbilirubinemia were found to be babies of diabetic mother. The results show significant correlation between maternal Diabetes and neonatal jaundice. Similar results were observed by various other studies like Varghese *et al*^[8] and Farooq *et al*.^[9]

Various studies were conducted to investigate neonatal effects of maternal thyroid disease. However no significant correlation was established between maternal hyperthyroidism and neonatal jaundice.^[10,11] Contrary to this our study suggests that there is a strong correlation between maternal hypothyroidism and neonatal hyperbilirubinemia.

In our study assessment of neonatal bilirubin in relation to various maternal blood groups showed no significant difference with different levels of bilirubin. On contrary study conducted by Pankajakshy *et al*⁶ showed there was significant relation of jaundice with blood group of mother.

In the present study, 45.5% were born to mothers with perinatal infections whereas 42.5% were those whose mothers had premature rupture of membranes. Though Perinatal infections and PROM in mothers showed higher risk of developing different levels of hyperbilirubinaemia but the correlation was not found to be significant. Similar results were seen in the study conducted by Bajpai *et al*^[12] whereas taneja *et al*^[13] documented significant correlation between maternal infections and jaundice.

There are variable results regarding role of mode of delivery in development of jaundice.^[14] Though C-sections have shown higher percentages of bilirubin levels in neonates in the current study but the results were not found to be significant.

CONCLUSION

Neonatal jaundice is one of the major cause of neonatal morbidity and NICU admission. Hence it is important to identify the preventable causes of neonatal jaundice. Early diagnosis and management of diseases like diabetes, sepsis will help to reduce the incidence of

neonatal hyperbilirubinemia. Preventing the risk correlated with maternal factors or identifying neonates with these risk factors is firstly important in effective management of infants, which can be taken into account by improving maternal and public health education.

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