

Prevalence of ABO Incompatibility and It's Effect on Neonatal Hylerbilirubinemia in Newborns

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Abstract

Introduction: ABO incompatibility is the condition When a mother with blood type O is pregnant with a foetus that has a different blood type (type A, B, or AB), this situation is known as ABO incompatibility. Due to immune-based hemolysis, neonates with the ABO blood type heterospecific (mother group O, neonatal A or B) are at risk for hyperbilirubinemia.

Aim: To determine the incidence of ABO incompatibility among newborn delivered in our research setting and to quantify the cases of ABO incompatibility requiring intervention in the form of phototherapy, exchange transfusion.

Material and method: The present prospective study was conducted in the department of paediatrics, ASCOMS tertiary hospital, Jammu over a period of

seven months and a total of 100 newborns were included in the study. All the newborns were screened for ABO incompatibility and the presence of neonatal hyperbilirubinemia. The data was collected with the help of a structured clinical proforma. The statistical package for social science (SPSS), version 22, frequency and percentage distribution, mean, and inferential statistics were used.

Result: The average birth weight of newborns was 2.71 ± 1.09 Kg and the majority of the subjects were males (63%) with male to female ratio 1.7:1. The prevalence of ABO incompatibility was 19% and 89.4% new-born had jaundice within 24 hours of birth. Direct Coomb's test was positive and haemolytic changes in peripheral blood smear was found in 15.3% ABO incompatible neonates.

The majority of neonates (63.0%) were treated with phototherapy.

Conclusion: It was concluded that the majority of ABO incompatible neonates belonged to the type A blood group. All ABO incompatible neonates with hyperbilirubinemia were successfully treated with phototherapy only and 36.9% did not require any intervention.

Keywords: Hyperbilirubinemia, Blood group, ABO incompatibility, Phototherapy and Jaundice.

Introduction

Neonatal hyperbilirubinemia is a common illness that needs inpatient care and is a significant factor in readmissions to the hospital. It is estimated that about 80% of preterm newborns and 60% term newborns are affected with hyperbilirubinemia.^{1,2}

The neonatal hyperbilirubinemia is the leading cause of significant neonatal morbidity and mortality and it is observed that the most common cause of neonatal hyperbilirubinemia is maternal – fetal ABO incompatibility.³

ABO incompatibility is the condition When a mother with blood type O is pregnant with a foetus that has a different blood type (type A, B, or AB), this situation is known as ABO incompatibility. Natural anti-A and anti-B antibodies found in the mother's blood have a propensity to belong to the IgG class, which allows them to cross the placenta and hemolyze foetal RBCs producing various complications.⁴ It is estimated that about 15-20% pregnancies has ABO incompatibility and about 10% neonates suffers from neonatal hyperbilirubinemia due to ABO incompatibility.^{5,6}

Various studies found that the Because of immune-based hemolysis, neonates with the ABO blood type

heterospecific (mother group O, neonatal A or B) are at risk for hyperbilirubinemia.⁷

Thus, the present study was undertaken to determine the incidence of ABO incompatibility among newborn delivered in our research setting and to quantify the cases of ABO incompatibility requiring intervention in the form of phototherapy, exchange transfusion.

Material and methods

The present prospective study was conducted in the department of paediatrics, ASCOMS tertiary hospital, Jammu over a period of seven months after obtaining the ethical permission from institution. A total of 100 newborns were included in the study after taking the informed consent from their parents / legal guardian.

Inclusion criteria

1. All term and preterm newborn delivered in ASCOMS.
2. All booked and unbooked cases delivered at ASCOMS.

Exclusion criteria

1. Newborn with sepsis.
2. Newborn with congenital anomalies.
3. Newborn with Rh incompatibility with mother.
4. Newborn with G6 pd deficiency.
5. Newborn delivered outside ASCOMS.
6. Parents of newborn who didn't give consent.

All the newborns were screened for ABO incompatibility and the presence of neonatal hyperbilirubinemia. The newborns with the presence of neonatal hyperbilirubinemia were further treated phototherapy and exchange transfusion. The data was collected with the help of a structured clinical proforma. The statistical package for social science (SPSS), version 22, frequency and percentage distribution, mean, and inferential statistics were used to arrange, tabulate,

analyse, and translate the acquired data. Numbers and percentages were used to express categorical variables.

Observation and result

In the present study majority of the cases were booked (89%) and most of the new-borns were delivered at term (93%). The average birth weight of new-borns was 2.71 ± 1.09 Kg.

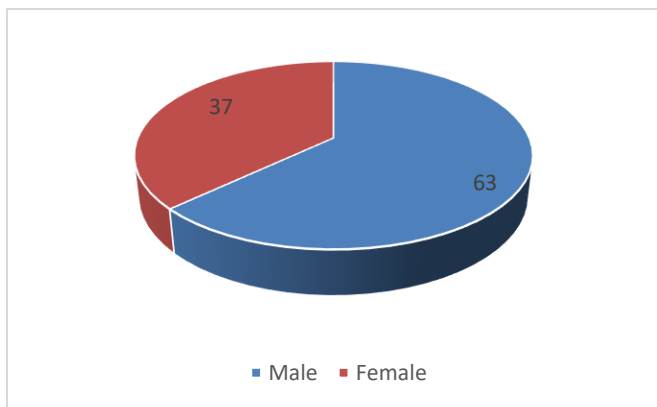


Figure 1: Gender of new-borns

The present study found that the majority (63%) study subjects were males as shown in figure 1 with male to female ratio 1.7:1.

Table 1: Demographic variables

Variable	No.	Percentage
Newborn’s age at admission		
<1 day	0	0
1-2 days	18	18
>2 days	82	82
Time of initiation of breast feeding		
< 30 minutes	11	11
> 30 minutes	89	89
Blood group of newborns		
A	34	34
B	8	8
AB	17	17
O	41	41
Gestational age (in weeks)		

37-38	69	69
39-40	27	27
41-42	4	4

Table 1 depicted the clinical demographic variable of new-borns. It was found that the majority of the new-borns were admitted in the hospital at the age of > 2 days (82%) followed by 1-2 days (18%). The most of the new-borns were breast fed after 30 minutes of the delivery (89%) followed by breast fed within 30 minutes (11%). The majority of the newborns had O blood group (41%) followed by A (34%), AB (17%) and B (8%). In majority of the subjects the gestational age was 37-38 weeks (69%) followed by 39-40 weeks (27) and 41-42 weeks (4%).

Table 2: Distribution of Neonates according to ABO Incompatibility

Variable	Frequency (N=100)	Percentage (%)
Newborn with ABO incompatibility	19	19%
Newborn without ABO incompatibility	81	81%

Table 2 showed the distribution of Neonates according to ABO incompatibility. In our study 19% neonates had ABO incompatibility whereas 81% neonates were without ABO incompatibility.

Table 3: Association of ABO incompatibility with socio-demographic factors (Gender, Blood group, Birth weight and Gestational age)

Variable	Frequency (N=19)	Percentage
Gender		
Male	12	63%
Female	07	36.8%
Blood Group		

A +ve	11	57.8%
B +ve	07	36.8%
AB+ve	01	5.2%
Gestational Age (in weeks)		
36-37	08	42.10%
37-38	04	21.0%
38-39	05	26.3%
39-40	02	10.52%

Table 3 depicted the association of ABO incompatibility with socio-demographic factors. It was observed that out of 19 ABO incompatible neonates, 63% were male and 07% were females. Further, 57.8% neonates had A+ve blood group, B+ve in 36.8% neonates and AB+ve in 5.2%.

Table 4: Distribution of neonates according to criteria for diagnosis and mode of treatment and onset of jaundice

Variable	Frequency(N=19)	Percentage
Onset of Jaundice		
< 24 hours	02	10.6%
>24 hours	17	89.4%
Direct Coomb's Test		
Positive	03	15.7%
Negative	16	84.3%
Peripheral Blood Smear		
Haemolytic	03	15.7%
Normal	16	84.3%

Table 4 depicts the distribution of neonates according to criteria for diagnosis and mode of treatment and onset of jaundice. It was found that 89.4% new-born had jaundice within 24 hours of birth. Direct Coomb's test was positive and haemolytic changes in peripheral blood smear was found in 15.3% ABO incompatible neonates.

Table 5: Mode of Treatment

Mode of treatment	Frequency	Percentage
Phototherapy	12	63.1%
No intervention	07	36.9%

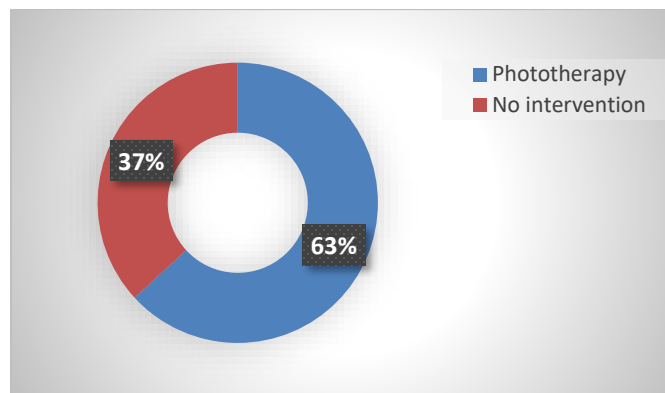


Figure 2: Subjects required phototherapy

Figure 2 illustrates the findings that the majority of individuals (63.0%) needed phototherapy while 37% did not. The current study reported that no ABO incompatible new-born received exchange transfusion and were treated with phototherapy only.

Discussion

The data of present study was analysed and discussed with previously available literature. The data of present study was analysed and discussed with previously available literature.

The majority of patients in the current study were booked (89%) and the majority of infants were delivered at term (93%). The average neonatal weight was 2.71±1.09 kg. Furthermore, 12% of babies were found to be ABO incompatible. The male to female ratio was 1.7:1 in our study. These findings are correlated with the study conducted by Gopu S et al. (2018) reported that most of the study subjects were males, the average birth weight was 2.88±0.3 kg and 2.90±0.34 kg of new-borns with blood group A and blood group B.⁸ In another study conducted by Abbas SH et al. found that the

overall prevalence of ABO incompatibility was 17.33%, the average birth weight was 2.62 ± 1.16 kg and hemolysis was seen among 5.3% subjects.⁹

It was found that the majority of the new-borns were admitted in the hospital at the age of > 2 days (82%) followed by 1-2 days (18%). The most of the new-borns were breast fed after 30 minutes of the delivery (89%) followed by breast fed within 30 minutes (11%). The majority of the newborns had O blood group (41%) followed by A (34%), AB (17%) and B (8%). In majority of the subjects the gestational age was 37-38 weeks (69%) followed by 39-40 weeks (27) and 41-42 weeks (4%). These findings are consistent with the study performed by Akgul S et al. (2013) found that mean age of hospital admission was 4.4 ± 2.4 days.⁶ In another study conducted by Kattimani VS et al. (2018) found that the mean age of hospital admission was 2.92 days.¹⁰ Kaplan M et al. (2010) found that all the majority of the newborns had exclusive breast feeding.¹¹ Abbas SH et al. (2020) found that the majority of the cases had type O blood group (41.3%) followed by A blood group (34.7%), B group (22.7%) and AB (1.3%).⁹

It was observed that out of 19 ABO incompatible neonates, 63% were male and 07% were females. Further, 57.8% neonates had A+ve blood group, B+ve in 36.8% neonates and AB+ve in 5.2%. It was found that 89.4% new-born had jaundice within 24 hours of birth. Direct Coomb's test was positive and haemolytic changes in peripheral blood smear was found in 15.3% ABO incompatible neonates. These results are correlated with the study conducted by Thakur AK et al. (2020) observed that the 12.5% newborn had jaundice within 24 hours of birth. Direct Coomb's test was positive and hemolytic changes in peripheral blood smear was found in 12% study subjects.¹³

In our study majority of individuals (63.0%) needed phototherapy while 37% did not. The current study reported that no ABO incompatible new-born received exchange transfusion and were treated with phototherapy only. These findings are consistent with the study conducted by Kattimani VS et al. (2018) found that the most (98%) of the subjects require phototherapy.¹⁰ These findings are in accordance with the study carried out by Gopu S et al. (2018) showed that in majority of the cases the phototherapy was done to treat the neonatal hyperbilirubinemia.⁸ Similarly, Abbas SH et al. (2020) showed that the all the neonates with hyperbilirubinemia were treated with phototherapy and majority of the cases were treated with phototherapy for ≥ 24 hours.⁹ Similarly, Dr. Menon M et al. (2016) found that majority of the newborns were treated with phototherapy for > 24 hours.¹²

Conclusion

The present prospective study concluded that the overall prevalence of ABO incompatibility was 19% and 89.4% ABO incompatible neonates had hyperbilirubinemia and the majority of the subjects had A+ve type blood group. All the new borns with hyperbilirubinemia in term of ABO incompatible neonates were successfully treated with phototherapy.

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