Original Article

Frequency of ABO Incompatibility in Neonates Presenting with Unconjugated Hyperbilirubinemia

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ABSTRACT

Objective: To find the frequency of ABO incompatibility in newborns presenting with neonatal jaundice.
Study Design: Cross sectional study
Place and Duration of Study: This study was conducted at the Medicine Unit II, Pediatric Department, Mayo Hospital, Lahore from November, 2017 to May, 2018.
Materials and Methods: 100 neonates who fulfill the inclusion criteria were included in the study. Then blood sample was obtained by using pricker from foot and three drops will be obtained. Antigens A & B was applied and blood group of neonate was noted. Blood group of mother was also assessed. If blood group of neonate was A, B or AB and blood group of mother was O, then ABO incompatibility was labeled. All data was entered in specially designed Performa. The data was analyzed through SPSS version 21.
Results: The neonates mean age was 16.53±9.99 hours. There were 59 (59%) male and 41 (41%) female neonates. The mean gestational age of neonates at birth was 37.67±1.71 weeks. The mean birth weight of neonates was 2354.58±379.16 grams. The mean unconjugated bilirubin level was 7.55±1.45 mg/dl. There were 28 (28%) had ABO incompatibility.
Conclusion: Thus the frequency of ABO incompatibility was high in neonates with hyperbilirubinemia. So ABO incompatibility can be a risk factor for neonatal hyperbilirubinemia.

Key Words: ABO incompatibility, neonates, neonatal jaundice, hyperbilirubinemia

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INTRODUCTION

Hyperbilirubinemia, or jaundice, is a life threatening disorder in newborns. It is a multifactorial disorder with many symptoms. The most frequent type of jaundice is physiological jaundice, however pathological jaundice is also widespread in some areas.[1] It is one of the most prevalent clinical conditions in neonates.[2] The incidence of jaundice is in 50% of term infants and 75% of preterm infants.[3]

Neonatal hyperbilirubinemia is a common clinical problem encountered during the neonatal period, especially in the first week of life.[4] The most common cause of hemolytic illness in newborns is ABO incompatibility, It occurs when the mother's and infant's ABO blood groups are incompatible.[5]

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Newborn children with maternal-fetal ABO incompatibility are more likely to have serious hyperbilirubinemia, and thus, prediction of possible risk factors, like the degree of hemolysis, gains importance.[5, 6] One study showed that the frequency of ABO incompatibility was 22.5% among neonates with neonatal jaundice.[7] In another study ABO incompatibility was found in 30.0% neonates.[8]

Literature has shown that the frequency of ABO incompatibility among neonates with jaundice or hyperbilirubinemia is not negligible. But very few work has been done in this regard. So through this study, we want to get the evidence so that we may be able to implement the results of this study in future and will be able to recommend to screen the neonates for ABO incompatibility and manage neonate accordingly.

MATERIALS AND METHODS

The cross sectional study was conducted from 04-11-2017 to 04-05-2018 in the Medicine department of Mayo Hospital, Lahore. It was after obtaining permission from the Institutional Board of the hospital. Informed written consent was obtained from patients. 100 sample size was calculated with 5% level of significance, 8.5% margin of error & taking expecting percentage of ABO incompatibility i.e. 22.5% in neonates with neonatal jaundice.

All neonates with after birth either gender presenting with unconjugated serum bilirubin level of >5 mg/dl were included from the study. Direct bilirubin level >2 mg/dl r >20% of total serum bilirubin levels were excluded from the study.

Demographic variables (name, age at presentation, gestational age at birth, gender and birth weight) was also obtained. Then blood sample was obtained by using pricker from foot and three drops will be obtained. Antigens A & B was applied and blood group of neonate was noted. At the same time serum sample was obtained for serum bilirubin levels. Blood group of mother was also assessed. If blood group of neonate was A, B or AB and blood group of mother was O, then ABO incompatibility was labeled (as per operational definition). All data was entered in specially designed Performa (attached).

All Data was entered in SPSS version 21. Quantitative data like age (hours), birth weight, unconjugated bilirubin & gestational age at birth were presented by Mean and SD. Qualitative variables like gender, blood group of mother and neonate and ABO incompatibility was presented as frequency & percentage. Data was stratified for gestational age at birth (on dating scan), gender and birth weight. Post-stratification, chi-square test was applied with P-value ≤0.05 was taken as significant.

RESULTS

In our study, total 100 neonates were included. The mean age of neonates was 16.53±9.99 hours. There were 59 (59%) male and 41 (41%) female neonates. The mean gestational age, birth weight, unconjugated bilirubin level of neonates was 37.67±1.71 weeks, 2354.58±379.16 grams and 7.55±1.45 mg/dl respectively. Table: 1.

There were 33 (33%) neonates with blood group A, 21 (21%) neonate had blood group B, 22 (22%) neonates had blood group AB while 24 (24%) had blood group O. There were 22 (22%) mothers with blood group A, 25 (25%) neonate had blood group B, 17 (17%) mothers had blood group AB while 36 (36%) had blood group O. Table: 2 There were 28 (28%) had ABO incompatibility while 72 (72%) did not had ABO incompatibility. Table: 3

Data was stratified for age of neonates. In neonates aged 1-12 hours, ABO incompatibility was present in 10 (25%) neonates. In neonates aged 13-24 hours, ABO incompatibility was present in 10 (25.6%) neonates. In neonates aged 25-36 hours, ABO incompatibility was present in 8 (38.1%) neonates. P value was insignificant (p>0.05). Table: 4

Data was stratified for age of neonates. In neonates aged 1-12 hours, ABO incompatibility was present in 10 (25%) neonates. In neonates aged 13-24 hours, ABO incompatibility was present in 10 (25.6%) neonates. In neonates aged 25-36 hours, ABO incompatibility was present in 8 (38.1%) neonates. P value was insignificant (p>0.05). Table: 4

Table No.1: Descriptive statistics of Age, Gender, Gestational Age, Birth Weight

		Frequency (%)
Age	Mean± SD	16.53± 9.99
Gender	Male	59(59%)
	Female	41(41%)
Gestational Age(weeks)	Mean± SD	37.67± 1.71
Birth Weight(grams)	Mean± SD	2354.58± 379.16
Unconjugated bilirubin(mg/dl)	Mean± SD	7.55± 1.45

Table No.2: Frequency of Neonatal and Maternal Blood Group

	Frequency(%)			
	A	B	AB	O
Neonatal Blood Group	33(33%)	21(21%)	22(22%)	24(24%)
Maternal Blood Group	22(22%)	25(25%)	17(17%)	36(36%)

Table No.3: Distribution of ABO incompatibility

	Frequency(%)
Yes	28(28%)
No	72(72%)

Table: 4 Comparison of ABO incompatibility with Age, Gender, Gestational age, birth weight & unconjugated bilirubin

		ABO Incompatibility		**P value**
		Yes	**No**	
Age in hours	1-12	10(25.6%)	30(75%)	0.510
	13-24	10(25.6%)	29(74.4%)	
	25-36	8(38.1%)	13(61.9%)	
Gender	Male	11(18.6%)	48(81.4%)	0.012
	Female	17(41.5%)	24(58.5%)	
Gestational Age	Preterm	13(32.5%)	27(67.5%)	0.413
	Term	15(25%)	45(75%)	
Birth Weight (gm)	1500-2000	8(42.1%)	22(57.9%)	0.314
	2001-2500	11(25%)	33(75%)	
	2501-3000	9(24.3%)	28(75.7%)	
Unconjugated bilirubin	5.1-7.5	15(30%)	35(70%)	0.656
	7.6-10.0	13(26%)	37(74%)	

Data was stratified for gestational age of neonates. In preterm neonates, ABO incompatibility was present in 13 (32.5%) neonates. In term neonates, ABO incompatibility was present in 15 (25.0%) neonates. The difference was insignificant (p>0.05). In neonates weighted 1500-2000 grams, ABO incompatibility was present in 8 (42.1%) neonates. In neonates weighted

2001-2500, ABO incompatibility was present in 11 (25%) neonates. In neonates weighted 2501-3000 grams, ABO incompatibility was present in 9 (24.3%) neonates. There was insignificant difference between these variables. (p>0.05). Table 4

Data was stratified for unconjugated bilirubin. In neonates with unconjugated bilirubin 5.1-7.5 mg/dl, ABO incompatibility was present in 15 (30%) neonates. In neonates with unconjugated bilirubin 7.6-10.0 mg/dl, ABO incompatibility was present in 13 (26%) neonates. P value was insignificant (p>0.05). Table 4.

DISCUSSION

Neonatal jaundice is the most common phenomena worldwide, and is the leading cause of admission in the 1st week of life.[9] The epidemiology of newborn jaundice has been documented to vary widely around the world. In the first three days of life, almost 60% of full-term neonates and 80% of pre-term babies present with jaundice. [10] In Bangladesh, ABO & Rh incompatibility were found to be the cause of jaundice in 13.29% or 3.31 percent of neonates, respectively.,[11] while these factors had rates of 27.39% & 9.01% in Iran study.[12]

One of the most common disorders in newborns is hyperbilirubinemia, which affects 60.0-70.0 percent of term & 80.0 percent of preterm infants. It's known to be related with significant disease like neonatal bilirubin encephalopathy & even death. [13]

There were 33 (33%) neonates with blood group A, 21 (21%) neonate had B blood group, 22 (22%) neonates had AB blood group while 24 (24%) had blood group O. There were 22 (22%) mothers with blood group A, 25 (25%) neonate had B blood group, 17 (17%) mothers had blood group AB while 36 (36%) had O blood group. There were 28 (28%) had ABO incompatibility while 72 (72%) did not had ABO incompatibility.

One study showed that the frequency of ABO incompatibility was 22.5% among neonates with neonatal jaundice.[7] In another study ABO incompatibility was found in 30.0% neonates.[8] One study 2016, ABO incompatibility was seen in 5.2% in neonates.[14]

Kalakheti et al., found that A total of 37(18.49%) babies had acquired hyperbilirubinemia, with 14(38%) from the group of babies with the ''O'' positive blood group & 23.0(62.0%) from the group of babies with blood groups other than the 'O' +ve blood group. There was 2.60 times greater chance of having hyperbilirubinemia in babies with ABO incompatibility than ''O'' Positive babies after other important variables.

Among different variables associated significantly, ABO incompatibility was found to be a main risk factor for neonatal hyperbilirubinemia. Hyperbilirubinemia was shown to be two times more often in neonates with ABO incompatibility than in newborns with the O '+ve' blood group.[15]

In a local study, HDN was diagnosed in 20.5% associated with ABO incompatibility.[16] The most common hemolytic outcome of maternofetal blood group incompatibility is ABO hemolytic disease of the newborn, which affects predominantly non-group-O newborns born to group O mothers with immune anti-A or B antibodies.[17]

In babies with ABO incompatibility, only blood group-O can be used for exchange transfusions. The best option would be group O (Rh compatible) packed cells that are suspended in O group / AB plasma total blood (Rh compatible with baby).[1]

Considering that ABO incompatibility between the mother and the baby can result in severe newborn jaundice required an exchange transfusion & even kernicterus, the importance of predicting possible risk factors for hyperbilirubinemia, including the degree of hemolysis.[18]

CONCLUSION

Thus the frequency of Abo incompatibility was high in neonates with hyperbilirubinemia. So ABO incompatibility among neonates with jaundice or hyperbilirubinemia is not negligible. ABO incompatibility can be a risk factor for neonatal hyperbilirubinemia. Now in future, we will recommend to screen the neonates for ABO incompatibility and manage neonate accordingly.

Author's Contribution:

Concept & Design of Study:	Saqib Munir
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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