

A study on neonatal hyperbilirubinemia due to ABO incompatibility in sick newborn care unit, Telangana

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ABSTRACT

Background: Hyperbilirubinemia is one of the most common clinical signs encountered in neonates which if untreated is potentially neurotoxic. The neonates at higher risk of jaundice should be identified at birth and kept under enhanced surveillance for occurrence and progression of jaundice and promptly intervened. **Aim:** This study aims to study and analyze the neonatal hyperbilirubinemia in the babies born to O positive mother. **Subjects and Methods:** A prospective observational cohort study of healthy term neonates born to O positive mothers with clinical jaundice was conducted in a sick newborn care unit (SNCU) attached to a tertiary level government maternity hospital. SPSS version 19 was used for statistical analysis. Descriptive statistics such as mean, median, standard deviation, and Chi-square test were calculated. $p < 0.05$ was taken as statistically significant. **Results:** A total of 100 babies, born to O positive mothers brought to SNCU with clinical jaundice of < 120 h of age, were studied. 72 babies had ABO incompatibility, of which 52 (72%) babies required phototherapy and 1 (1.3%) required exchange transfusion. There was no significant difference in the severity and outcome in both O-A and O-B incompatibility, although O-B incompatibility was more (65%). **Conclusion:** Blood group of mother should always be noted and babies born to O positive mothers must be followed for early identification and prompt intervention.

Key words: ABO incompatibility, Early identification, Neonatal hyperbilirubinemia, Phototherapy

ABO hemolytic disease of the newborn (ABO HDN) is the most common maternofetal blood group incompatibility. ABO HDN is restricted almost entirely to Group A or B babies born to Group O mothers with immune anti-A or anti-B antibodies. Although, HDN has been reported in a baby whose mother was Group A with high titres of anti B [1]. Unlike the rhesus disease, it is usually a problem of the neonate rather than the fetus. ABO-HDN in literature is described as a condition having a very low incidence in the population and characterized by a benign evolution because of a mild degree of hemolysis [2,3]. Anemia is rare with the main clinical problem being jaundice. However, severe hemolysis and anemia requiring exchange blood transfusion have been reported [4]. Early detection and treatment of neonatal hyperbilirubinemia is important in prevention of bilirubin-induced encephalopathy in the affected children [5]. Routine screening for ABO incompatibility between mother and fetus is not performed and according to Han *et al.*, it is not cost-effective to routinely screen for ABO incompatibility in the Asian population [6].

HDN due to rhesus incompatibility is preventable and preventable measures are in place in many countries. In contrast, there are currently no preventable measures for HDN due to ABO incompatibility [7]. Hence, ABO incompatibility is now the single most common cause of neonatal jaundice [8]. In this study,

we aimed at identifying the babies born to the O positive mothers at birth and closely monitored these babies to study the clinical manifestations and outcome of treatment.

SUBJECTS AND METHODS

A prospective observational cohort study of term neonates born to O positive mothers with clinical jaundice of < 120 h of age was conducted in a sick newborn care unit (SNCU) attached to a tertiary level government maternity hospital, Telangana, over a period of 6 months from November 2017 to April 2018. Prior ethics committee approval was taken and informed consent regarding participation in the study was obtained in the regional language. All preterm and low birth weight babies, neonate with other known causes of jaundice and hemolysis, neonates with history of birth asphyxia, sepsis, or congenital anomalies were excluded from the study.

The diagnosis of ABO incompatibility was made in the presence of indirect hyperbilirubinemia in a newborn infant with blood Type A or B and maternal blood type O, in the absence of other identified causes. Hemolytic findings due to maternal-fetal ABO blood group incompatibility were defined as the presence of at least two of the followings: (a) Jaundice and or anemia of varying degree, (b) circulating nucleated red blood

cells, (c) microspherocytosis, or (D) polychromasia on peripheral blood smears [7].

All the neonates were examined every 12 h until the first 5 days of life for occurrence of jaundice. The babies being discharged from the hospital at 48 to 72 h were seen again after 48–72 h of discharge. Thorough clinical examination of the baby was done to identify pallor, temperature, icterus, hepatosplenomegaly, and neurological signs like opisthotonus. Those babies who developed clinically significant jaundice, serum bilirubin was done by micro method. Direct Coombs test could not be done as it is not available at the SNCU. American Academy of Pediatrics criteria was used for making decision regarding phototherapy or exchange transfusion in these infants [9]. The babies were monitored clinically for rebound bilirubin rise within 24 h after stopping phototherapy in maternal ward and then discharged.

Statistical analysis

Data were collected on a structured pro forma designed and entered into Excel sheet. SPSS version 19 was used for statistical analysis. Descriptive statistics such as mean and Chi-square test were calculated. $p < 0.05$ was taken as statistically significant.

RESULTS

A total of 100 babies were enrolled in the study based on the inclusion and exclusion criteria. Of 100 babies, 25 babies were A positive, 47 were B positive, and 28 babies were O positive. 28 babies who had no incompatibility, 5 (18%) had hyperbilirubinemia requiring phototherapy, the cause of which was not known. The mean serum bilirubin level was 12.1 mg/dl with maximum level of 18.2 mg/dl. The mean age of developing jaundice was 76 h (Table 1).

Rest of the 72 babies who had ABO incompatibility, 52 (72%) babies developed hemolysis, for which they were treated with phototherapy and 1 baby (1.3%) required exchange transfusion. These results show that incompatibility has significantly increased the chances of morbidity (Chi-square 22.96, $p < 0.5$). Hence, these babies require close follow-up even after discharge.

Of the 72 babies with ABO incompatibility, 37 (51%) were male and 35 (49%) were female. The mean birth weight is 2.90 kg. 31 (43%) were primigravida and 41 (57%) were multigravida mothers. 40 (56%) were born out of lower segment cesarian section, 32 (44%) were normal vaginal delivery. Of 25 cases with A blood group, 20 (80%) required phototherapy. Out of 47 cases with Group B blood group, 32 (68%) required phototherapy. Only one case required exchange transfusion which had B blood group. Mean age at admission is 65.13 h of age (ranging from 13 h to 120 h). The mean initial level of bilirubin is 16.39 mg/dl. The mean reticulocyte count was $13 \pm 5.3\%$. All the cases had favorable outcome without any neurological manifestations because of close follow-up of all the cases. One case which underwent exchange transfusion was also followed and did not develop any neurological sequelae due to early management. In the present study, of 52 cases requiring phototherapy 25 (48%) were male and 27 (52%) were female showing gender does not predict hemolysis as $p = 0.9$ which is not statistically significant. The demographic details and clinical profile of neonates with A or B blood group are shown in Table 1.

In the comparison of newborn infants with blood Group A or B, both groups had similar demographic parameters such as birth weight, gender, and day of admission. Similarly, there were no statistically significant differences in clinical parameters such as initial bilirubin levels, hemoglobin levels, duration of phototherapy, and outcome.

DISCUSSION

In the present study, there was no significant correlation between the serum bilirubin levels and the sex of the newborn, and observation was comparable with that of studies by Kumar *et al.* [10], Akgül *et al.* [11], Shah *et al.* [12], and Preethi *et al.* [13]. Male newborns had more risk of jaundice, in studies by Singh *et al.* [14], Mantani *et al.* [15], Sharma *et al.* [16], and Maisel and Watchko [17]. Infants of multigravida and primigravida mothers were affected to a similar extent as predicted in a study by Dufour and Monaghan [8]. In a study by Akgül *et al.* [11], the mean age on the day of admission to hospital was 4.4 ± 2.4 (0–9)

Table 1: Demographic and clinical profile of neonates with blood Group A or B

Variables	Blood Group A n=25 (%)	Blood Group B n=47 (%)	p value
Gender (M/F)	12 (48)/13 (52)	25 (53)/22 (47)	0.67
Mean birth weight (kg)	2.88±0.3	2.90±0.34	-
Parity (primi/multi)	10 (40)/15 (60)	21 (45)/26 (55)	0.7
Mean age at admission (h)	73.15±31.7	60.37±29.4	-
Presence of hemolysis	20 (80)	32 (68)	0.28
Initial bilirubin (mg/dl)	16.46±2.4	16.35±4.3	-
Jaundice in first 24 h	1 (4)	3 (6.3)	0.6
Anemia (Hb <13 g/dl)	4 (16)	7 (14.8)	0.9
Duration of phototherapy (h)	53.7±10.3 (Range: 38–96)	54.5±9.8 (Range: 48–110)	0.4
Exchange transfusion	0 (0)	1 (2.1)	-
Intravenous immunoglobulin given	0 (0)	0 (0)	-
Discharged successfully	25 (100)	47 (100)	-

days while it was 3.04 days in the present study which may be due to early recognition of cases. The mean initial bilirubin was 19.9 ± 5.7 (7.1–41.3) mg/dl in a study conducted by Kattimani and Ushakiran [18] while it was 16.39 (8.6–24.5) mg/dl in the present study. In the present study, mean age at admission was 65.13 h (range: 13–120 h) which is comparable to the mean age of 2.9 ± 0.89 days in a study conducted by Kattimani and Ushakiran [18]. In the present study, 72% babies required phototherapy and 1.3% required exchange transfusion while in a study by Bhat and Kumar [19], phototherapy was required in 46% of the cases and none required exchange transfusion.

We found that out of 72 babies developing hemolysis 47 (65%) were of B blood group and 25 (35%) were of A blood group. Similar B blood group preponderance was found by Kattimani and Ushakiran [18]. As “B” blood group is the second most common blood group in India after “O” blood group, we can explain the higher incidence of OB incompatibility in our set up. In the present study, there was no significant difference in severity and outcome in both O-A and O-B incompatibility; although O-B incompatibility was more. Similar observations were made by Kumar *et al.* [10], Ella *et al.* [20], and Bhat and Kumar [19]. However, McDonnell *et al.* [21] and Stiller *et al.* [22] concluded that ABO incompatibility might cause more fetal anemia in patient with type B blood group. The present study was limited to only symptomatic ABO incompatibility. Small sized study population was another limitation of this study.

CONCLUSION

The present study concludes that in high flow resource constraint maternity hospitals, where maximum numbers of deliveries take place, all the babies who develop clinical jaundice must be checked for the mother’s blood group. All babies born to O positive mother developing clinical jaundice should be evaluated for blood group as soon as possible to identify the high-risk neonates developing jaundice and/or anemia due to ABO incompatibility. We also conclude that the blood group (A/B) has no effect on the parameters that may influence the outcome of ABO incompatibility.

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