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Feto-maternal outcome of Rh-Negative pregnancy presenting in a tertiary healthcare centre

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Abstract

Background: The term "Rhesus incompatibility" describes the mismatched Rh types of the mother and the fetus. It is linked to the onset of hemolytic disease of the newborn (HDN) ranging from haemolytic anemia to hydrops fetalis and also related to maternal Rh sensitization. The disease incidence is currently declining globally, having dropped from 1.3%–1.7% in the 1980s to 0.17% in the 1990s[1]. Erythroblastosis foetalis is one of the most terrible consequences of an ABO incompatible or Rh incompatible pregnancy. About 10% of all Rh-negative pregnancies result in Rh incompatibility in the Rh-negative mother carrying a Rh-positive fetus.

Methods: This observational study was carried out among 60 Rh negative pregnant women attending our antenatal clinic and delivered in our institution from October 2022 to March 2024.The Rh negative women were followed up with a series of investigations such as Indirect Coombs Test (ICT), MCA-PSV and with regular antenatal care (ANC). After birth neonates were followed up with blood grouping and Rh typing, direct coombs test (DCT), duration of phototherapy, duration of NICU stay , need for immunoglobulin and exchange transfusion were recorded to evaluate the maternal and neonatal outcomes.The data was collected and tabulated in Microsoft excel sheet and the percentages were calculated.

Results: This study included a total of 60 Rh negative mothers ,where 48 (80%) of them were aged less than 30 years and 12 of them (20%) were more than 30 years of age. Antenatally, 51 (85%) women were ICT negative and received RAADP, 9(15%) women were ICT positive and anti D titres were less than 1:16 followed up with MCA-PSV which was normal/less than 1.5MoM. The total preterm births were 6(10%).The total admissions to NICU were 12(20%) in our study. All the 9 babies born to ICT positive mothers turned out to be Direct Coombs test (DCT) positive and were managed with double surface phototherapy. For 2(3.3%) babies, human immunoglobulin was given. Only 1(1.6%) baby required exchange transfusion.

Conclusion: We conclude that, severe hyperbilirubinemia and hydrops foetalis, which were observed previously are drastically reduced with recent advances and the use of Routine antenatal Anti D prophylaxis (RAADP). Neonatal morbidity and mortality reduced drastically with newer advances like immunoglobulin reducing the need for exchange transfusion and better NICU care. ICT positivity of 15% despite of postnatal immunisation suggest that there is chances of silent fetomaternal haemorrhage during antenatal period, health care professionals should be more knowledgeble with prenatal screening, the value of blood grouping and Rh typing, anti-D immunisation following sensitising events like MTP, abortion, ectopic pregnancy, ECV and regular implementation of RAADP in clinical practice.

Keywords: Rh negative; Fetomaternal; Pregnancy; Preterm; Alloimmunization

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1. Introduction

Pathological conditions such as maternal-fetal isoimmunizations occur when a pregnant woman becomes sensitized to fetal blood antigens and develops isoantibodies against them. Where the Rh system is the most commonly implicated fetal blood antigen[1].The progression of Ab synthesis is irreversible once it starts and a growing synthesis of maternal anti-D antibodies (alloimmunization) is triggered by each consecutive pregnancy (Rh-negative mother) with a Rh-positive fetus[2-4].

The term "Rhesus incompatibility" describes the mismatched Rh types of the mother and the fetus. If the Rh D antigen is expressed by an individual's erythrocytes, they are considered Rh-positive; if not, they are considered Rh-negative[4]. It is linked to the onset of hemolytic disease of the newborn (HDN) ranging from haemolytic anemia to hydrops fetalis and also related to maternal Rh sensitization.

Landsteiner and Weiner discovered the Rh factor in 1941[5]. Levine identified Rh antibody in 1941 in Rh negative pregnant women whose pregnancies ended in stillbirth or hemolytic illness of the fetus[6].

Haemolytic disease of newborn incidence is currently declining globally, having dropped from 1.3%–1.7% in the 1980s to 0.17% in the 1990s[1].The percentage of Rh-negative individuals also differs based on race. Erythroblastosis foetalis is one of the most terrible consequences of an ABO incompatible or Rh incompatible pregnancy. Hydrops foetalis is a serious complication which leads to more than 50% perinatal mortality[8,10].

The incidence of Rh incompatability is 10% among the Rh negative women carrying a Rh negative fetus. Sensitization happens in only 5% of cases, that is 6-7/1000 pregnancies overall and 1 in 15 Rh negative pregnancies.[10].

Blood grouping, maternal Rhesus antibody (an indirect Coomb's test), ultrasound-guided amniocentesis are readily accessible for prenatal screening and Blood grouping, indirect bilirubin, reticulocyte count, and direct Coomb's test (DCT) are available for postnatal screening. Rhesus immunoglobulin immunoprophylaxis can be administered at 28 weeks of gestation and within 72 hours of delivery or pregnancy termination[12,14].

Anti-Rh IgG is the most widely used and successful preventive measure to lower the incidence of Rh isoimmunization. Due to postnatal Anti D, the rate of Rh isoimmunization has dropped from 16 to 1.5–2% and then to approximately 0.5% after Routine antenatal Anti D prophylaxis[15].

Therefore, this study was planned to evaluate the fetomaternal outcomes of Rh negative pregnancy in our hospital.

Objective of the study

The main objective of this research was to find out fetomaternal outcome of Rh negative pregnancy.

2. Materials and Methods

This observational study was carried out among 60 Rh negative pregnant women attending our antenatal clinic and delivered in Akash institute of medical sciences and research centre from October 2022 to March 2024.

This analysis was done with the objective to find out fetomaternal outcome of Rh negative pregnancy. Informed consent of all the patients were taken. The Rh negative women were followed up with a series of investigations such as Indirect Coombs Test (ICT), MCA-PSV and with regular antenatal care (ANC). After birth neonates were followed up with blood grouping and Rh typing, direct coombs test (DCT), duration of phototherapy, duration of NICU stay , need for immunoglobulin and exchange transfusion were recorded to evaluate the maternal and neonatal outcomes

The data was collected and tabulated in Microsoft excel sheet and the frequencies and percentages were calculated for analysis.

3. Results

A total of 60 Rh negative mothers participated in this study where 48 (80%) of them were aged less than 30 years and 12 of them (20%) were more than 30 years of age. Among the study participants, 24 (40%) of them were Primigravida

and the remaining 36 (60%) were Multigravida. 54 (90%) of them delivered at term and only 6 (10%) delivered preterm in less than 37 weeks of gestation [*Table 1*].

Table 1 Characteristics of the study participants (n=60)

Variables	Number of patients	Percentage
Age (in years)		
< 30 years	48	80%
>30 years	12	20%
ANC Registration Status of patients		
Booked	48	80%
Unbooked	12	20%
Parity distribution		
Primigravida	24	40%
Multigravida	36	60%
Gestational age		
< 37 weeks	6	10%
>37 weeks	54	90%

Antenatally, 51 (85%) women were ICT negative, received RAADP and 9(15%) women were ICT positive and Anti D titres were less than 1:16 and followed up with middle cerebral artery - peak systolic velocity (MCA-PSV) which was normal that is less than 1.5MoM. 9 women were ICT positive that is 15%, out of which 6 people have taken postnatal Anti D, 2 of them were not sure of postnatal Anti D immunisation, one women turned out to be ICT positive despite of taking RAADP and postnatal immunisation which prompts the chances of silent fetomaternal hemorrhage. The total preterm births were 6(10%) and the remaining 54 (90%) were term births. The total admissions to NICU was 12(20%) in our study [*Table 2*].

Table 2 Maternal and neonatal status of the study participants (n=60)

Variables	Number of patients	Percentage
Delivery		
Term Delivery	54	90%
Preterm Delivery	6	10%
Indirect Coomb's Test (ICT) Status		
ICT Negative mothers	51	85%
ICT Positive mothers	9	15%
Direct Coomb's Test (DCT) Status		
DCT Positive	9	15%
DCT Negative	51	85%
NICU Admissions		
Total	12	20%
Anti D status in ICT positive women		
RAADP	1	1.6%
Post natal Anti D	6	10%
Anti D status not known	2	3.3%

All the 9 babies born to ICT positive mothers turned out to be DCT positive and was managed with double surface phototherapy. For 2 (3.3%) babies, human immunoglobulin was given. Only 1 baby required exchange transfusion [*Table 3*].

We analysed the fetomaternal outcomes, where 12 mothers had PIH/Preeclampsia (20%), 6 of them (10%) had Oligohydraminos and 3 mother (5%) had Polyhydraminos. Among the babies, 9 of them (15%) had neonatal jaundice, 3 babies (5%) had respiratory distress as depicted in *Table 3*.

Table 3 Fetomaternal outcome of the study participants (n=60)

Variables	Number of patients	Percentage
Maternal outcome		
PIH/Preeclampsia	12	20%
Oligohydraminos	6	10%
Polyhydraminos	3	5%
Fetal outcome		
Neonatal jaundice	9	15%
Respiratory distress	3	5%
Phototherapy	9	15%
Human Immunoglobulin	2	3.3%
Exchange Transfusion	1	1.6%

4. Discussion

According to studies, Rh negative mothers carrying a Rh positive fetus may produce anti-D antibodies following a small fetomaternal hemorrhage. Even 0.1ml is sufficient to cause sensitisation and it usually does not affect the first pregnancy and will not result in clinical consequences as the initial response is the production of IgM antibodies that do not cross placenta[4-6,9,15,17].

A research done by Freda et al on the prevention of Rh isoimmunization concluded that the circulating anti-A and anti-B antibodies protect Rh-negative mothers from becoming sensitized to the baby's antigen[7].

This observational study was planned to evaluate the fetomaternal outcomes among 60 Rh negative pregnant women in our hospital.

In the present study, 24 (40%) of them were Primigravida and the remaining 36 (60%) were Multigravida. This was similar with studies done by Shradha et al[17] and Sharma et al[9] where 42% and 41% mothers respectively were primigravida and also Agarwal et al[16] found 38.4% primigravida in their study. In our study most of the mothers 54 (90%) delivered at term (>37 weeks) and only 6 (10%) were preterm (<37weeks). This was comparable with studies done by Sharma et al[9] and Shradha et al[17], where 20% of both their respective mothers delivered preterm and the remaining at term.

In our study, antenatally, 51 (85%) women were ICT negative and 9 women were ICT positive that is 15%, out of which 6 people have taken postnatal Anti D, 2 of them were not sure of postnatal Anti D immunisation, one women turned out to be ICT positive despite of taking RAADP and postnatal immunisation which prompts the chances of silent fetomaternal hemorrhage. 6 out of 9 (66.6%) despite of taking the postnatal Anti D turned out to be ICT positive which is alarming and emphasizes the need for regular implementation of RAADP in clinical practice.

We analysed the fetomaternal outcomes in our study, where 12 mothers had PIH/Preeclampsia (20%), 6 of them (10%) had Oligohydraminos and 3 mothers (5%) had Polyhydraminos. Our findings were similar to the Tripathi et al study[10], where their study participants showed 15% with PIH/Preeclampsia, 4% with Oligohydraminos and 2% with Polyhydraminos. In contrary to our study, Sharma et al showed slight differences of 9% with PIH/Preeclampsia, 12%

with Oligohydraminos and 3% with Polyhydraminos[9]. Sreelatha et al showed 1.32% of Polyhydraminos and 1.7% of Oligohydraminos in their study[19].

5. Conclusion

Based on the present study, we draw the conclusion that severe hyperbilirubinemia and hydropsfoetalis, which were observed previously are drastically reduced with recent advances and the use of Routine Antenatal Anti D prophylaxis(RAADP) and postnatal Anti D. Neonatal morbidity and mortality reduced drastically with newer advances like immunoglobulin reducing the need for exchange transfusion and better NICU care.ICT positivity of 15% despite of postnatal immunisation suggest that there is chances of silent fetomaternal haemorrhage during antenatal period, health care professionals should be more knowledgeble with prenatal screening, the value of blood grouping and Rh typing, anti-D and more vigilant with immunisation following sensitising events like MTP, abortion, ectopic pregnancy, ECV and regular implementation of RAADP in clinical practice.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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