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Original Research

Prevalence Of Rh-Negative Blood Group And Fetomaternal Outcome In Rh Negative Pregnancy

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Abstract
Background: Before the discovery of Rh system, little was known about the aetiology of erythroblastosis fetalis. Rhesus (Rh) incompatibility refers to the discordant pairing of maternal and fetal Rh type. It is associated with carrying a Rh-positive fetus, which can result in consequences along the spectrum of HDN ranging from self-limited hemolyticanemia to severe hydrops fetalis.Hence; this study was conducted to assess the Prevalence of Rh-negative blood group and fetomaternal outcome in Rh negative pregnancy.**Material and methods:** A prospective observational study was carried out in 60 patients who were attending antenatal clinic and were admitted in obstetric unit of Department of Obstetrics and Gynaecology in K.M.Medical College and hospital Mathura. They were investigated from October 2022 to November 2023. On admission, history of the patients was taken regarding her age, address and occupation, Menstrual history and detailed obstetrical history was taken regarding gravidity, parity, abortion, D&C following abortion and number of living term and preterm issues. Any history of neonatal Jaundice in previous children and if present type of treatment if required and outcome of such a neonate,number of still births and history of hydrops foetalis in previous pregnancies and all ANC routine investigations were done.**Results:** Of the total 60 cases, maximum cases 55 delivered at 37-40 weeks, 1cases delivered after 40 weeks and 4 patients delivered between 30-37 weeks. Maximum cases delivered normally, 10 required caesarean section and 2 had forceps delivery. 8 Rh negative mothers had preeclampsia /PIH, 3 had abruption placentae, 2 had oligohydramnios and 1 had polyhydramnios, 4 had preterm delivery, 1 had still birth and 1 baby had NNHB Whose mother had oligohydramnios.There was no incidence of Isoimmunisation found in present study.**Conclusion:** Significant progress in medical services and technology over the past few decades has transformed the management of Rh disease. The advent of procedures such as amniocentesis and the spectrophotometric analysis of amniotic fluid has enabled effective monitoring of pregnancies, allowing for timely interventions that optimize perinatal outcomes. Early identification of the condition, particularly through the detection of elevated antibody titers, is critically important.
Key words: Rh-negative, Blood group, Fetomaternal

Introduction

Rhesus (Rh) incompatibility occurs when there is a mismatch between the Rh types of the mother and fetus. This condition is linked to maternal Rh sensitization and the potential development of hemolytic disease of the neonate (HDN). Individuals are categorized as Rh-positive if their red blood cells contain the Rh D antigen; those lacking this antigen are classified as Rh-negative. The clinical implications of this incompatibility become pronounced when an Rh-negative mother becomes sensitized to the D antigen, leading to the production of anti-D antibodies (alloimmunization). These antibodies can attach to and cause the destruction of Rh-positive red blood cells. This situation is particularly critical when an Rh-negative mother is carrying an Rh-positive fetus, as it may result in a range of HDN outcomes, from mild hemolyticanemia to severe hydrops fetalis.[1- 3] Rh incompatibility refers to the discordant pairing of maternal and fetal Rh

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type. It is associated with carrying a Rh-positive fetus, which can result in consequences along the spectrum of HDN ranging from self-limited hemolyticanemia to severe hydrops fetalis.[4]

One of most dreadful implication of ABO incompatibility or Rh-incompatible pregnancy is Erythroblastosis foetalis. It is a treacherous hemolytic disease of foetuses and newborn which affect less than 1% of all pregnancies, the excessively rapid destruction of erythrocyte which is characteristic of this disease, produces profound anasarca.[5] Red cell destruction by hemolysis is caused by specific antibodies entering the foetal circulation during pregnancy. These antibodies are produced by mother in response to antigenic stimulation of foetal red cell entering the maternal circulation by the way of placenta. These erythrocytes possess antigenic factor not present normally in the mother and therefore are capable of initiating antibody production.[6-9] The incidence of Rh incompatibility in Rh negative women carrying a Rh-positive foetus is about 10% of all Rh-negative pregnancies. Sensitization however occurs only in about 5% of these cases giving an incidence of 6-7/1000 of all the pregnancies and 1-15 Rh negative pregnancies.[10, 11] First pregnancy is rarely affected, and as a rule the degree of sensitization increase with subsequent pregnancies. Hence; the present study was conducted for assessing prevalence of Rh-negative blood group and fetomaternal outcome in Rh negative pregnancy.

Material and methods

A prospective observational study was conducted involving 60 patients who attended the antenatal clinic and were subsequently admitted to the obstetric unit of the Department of Obstetrics and Gynaecology at K. M. Medical College and Hospital in Mathura. The investigation spanned from October 2022 to November 2023. The inclusion criteria for this study encompassed all Rh-negative pregnant women visiting the antenatal clinic at K.M. Medical College & Hospital, provided they met one of the following conditions: Singleton Pregnancy, Live Fetus in Utero, or a husband with a positive blood group. Conversely, the exclusion criteria comprised Rh-negative pregnant women who presented with any of the following: Intrauterine Fetal Demise, Multiple Gestation, inability to provide consent, or a husband with a negative blood group. Upon admission, a comprehensive history was collected from the patients, which included details regarding their age, address, occupation, menstrual history, and a thorough obstetrical history covering gravidity, parity, instances of abortion, dilation and curettage following abortion, and the number of living term and preterm infants. Additionally, any history of neonatal jaundice in previous children was documented, along with the type of treatment administered and the outcomes for those neonates. The study also recorded the number of stillbirths and any history of hydrops fetalis in prior pregnancies. All routine antenatal care investigations were performed, and the results were systematically recorded in a Microsoft Excel spreadsheet, followed by statistical analysis using SPSS software. Univariate analysis was employed to assess the level of significance.

Results

Of the total 60 cases, maximum cases 55 delivered at 37-40 weeks, 1cases delivered after 40 weeks and 4 patients delivered between 30-37 weeks. Maximum cases delivered normally, 10 required caesarean section and 2 had forceps delivery. The Table below reveals that there was no stillbirth or Early neonatal death (ENND) due to sensitization. There was Early neonatal death (ENND) due to other causes. 20 new-borns had anaemia (mild to severe) and 10 had NNHB (Neonatal hyperbilirubemia) which was mild to severe. None developed hydrops fetalis. Maximum babies had Hb% between 14-16 gm% (43%), 23% had Hb% between 16.1-18% gm% and (26%) had Hb% between 10-14 gm%. Only 4 babies had severe anemia. Serum Bilirubin in 54 babies was <2.8mg%,1 had level between 2.8-4.0mg% and 5 babies had level >4.0mg%. 8 cases were associated with PIH/preeclampsia and 3 cases were associated with abruption placentae. Only 1 was associated with polyhydramnios. Serum Bilirubin in 54 babies was <2.8mg%,1 had level between 2.8-4.0mg% and 5 babies had level >4.0mg%. 8 cases were associated with PIH/preeclampsia and 3 cases were associated with abruption placentae.only 1 was associated with polyhydramnios. Maturity: 55 were full term newborn,4 preterm and only1 was post term delivery. Anaemia: The incidence of anaemia was 33% in newborn,of which 4 had severe anaemia and 16 had mild to moderate anemia. Neonatal hyperbilirubinemia(NNHB): The incidence of NNHB (Neonatal hyperbilirubemia) was 17%,10 newborns has NNHB (Neonatal hyperbilirubemia) of which 2 had mild and 8 had moderate to severe NNHB (Neonatal hyperbilirubemia) . Out of 10 NNHB (Neonatal hyperbilirubemia) 8 were born full term and 2 were pre-term delivery. 8 Rh negative mothers had preeclampsia /PIH, 3 had abruption placentae, 2 had oligohydramnios and 1 had polyhydramnios, 4 had preterm delivery, 1 had still birth and 1 baby had NNHB (Neonatal hyperbilirubemia) Whose mother had oligohydramnios. There was no incidence of Isoimmunisation found in present study. Anti-D Prophylaxis was seen in 90 percent of the patients. While correlating ICT findings with DCT findings, significant results were obtained.

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Table 1: Distribution of blood group in Rh negative pregnancies

Blood group	Number	Percentage
O -ve	22	36.67%
A -ive	17	28.33%
B -ive	15	25%
AB -ive	6	10%

Table 2: Distribution of patients according to haemoglobin levels

Hb%	No. of patients	Percentage
<10	4	7%
10-14	16	26%
14-16	26	43%
16-18	14	23%
Total	60	100%

Table 3: Distribution of patients according to serum bilirubin concentration

Serum bilirubin in gm %	No. of patients	Percentage
<2.8	50	83%
2.8-4.0	2	3%
>4.0	8	14%
Total	60	100

Table 4: Fetomaternal outcome

Fetomaternal outcome		Number	Percentage
Maturity	Full term newborn	91.67	91.67
	Preterm	6.67	6.67
	Post-term	1.67	1.67
Anemia	Mild to moderate	26.67	26.67
	Severe	6.67	6.67
Neonatal hyperbilirubinemia	Mild	3.33	3.33
	Moderate to severe	13.33	13.33
Preeclampsia/ PIH		8	13.33
Abruption placentae		3	5.00
Oligohydramnios		2	3.33
Polyhydramnios		1	1.67

Graph 1: Distribution of patients according to Anti-D prophylaxis

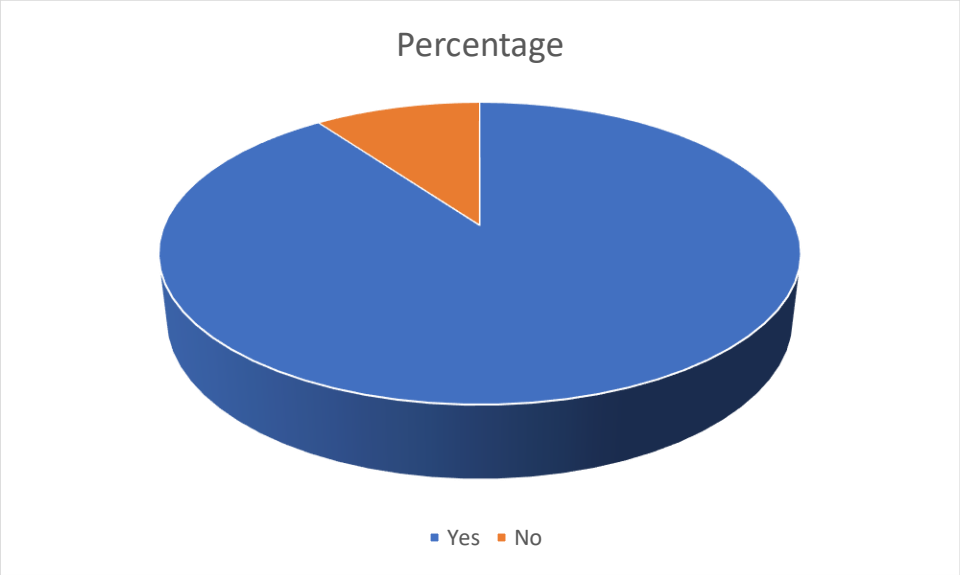

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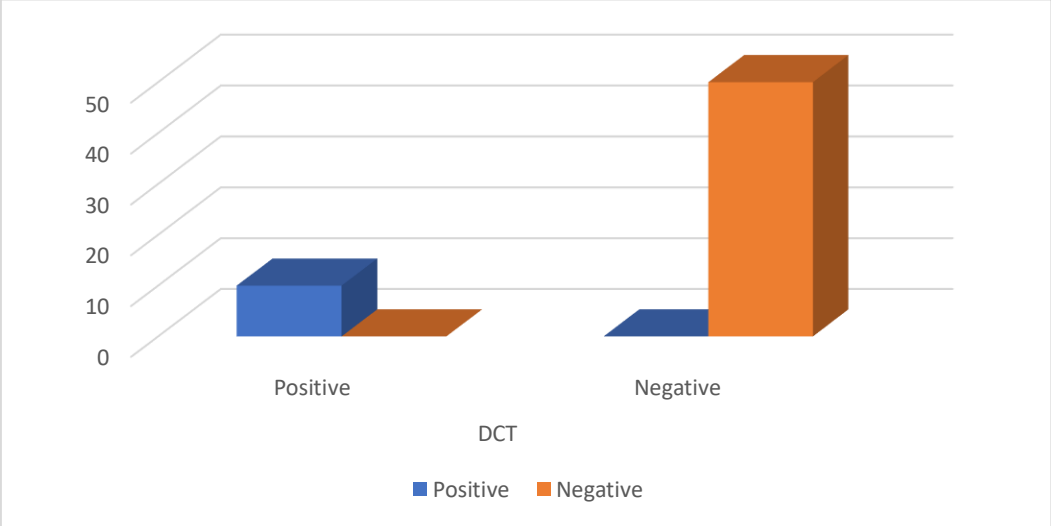
Table 5: Comparison of ICT with DCT

ICT	DCT		Total
	Positive	Negative	
Positive	10	0	10
Negative	0	50	50
Total	10	50	60
p-value	0.001 (Significant)		

Graph 2: Comparison of ICT with DCT



Discussion

The assessment of maternal ABO blood group, Rh type, and the presence of anti-D antibodies (via the indirect Coombs test) should be conducted during the initial prenatal visit. Women identified as Rh D negative who exhibit a positive result on the anti-D antibody screening test are classified as Rh alloimmunized.[6, 7] Subsequently, it is essential to evaluate the fetal Rh D status to ascertain whether the pregnancy is at risk for hemolytic disease of the fetus and newborn. Notably, if the fetus is determined to be Rh D negative, no intervention is necessary, regardless of the maternal antibody titers. In cases where paternity is established, if the father is Rh D negative, the fetus will also be Rh D negative. Conversely, if the father is Rh D positive, he may possess either homozygous or heterozygous traits for the D allele. Should he be homozygous for the D allele, the fetus will be Rh D positive.[8, 9] During pregnancy, rhesus D (Rh) D-negative women who carry an Rh D-positive fetus are at risk of being sensitized to produce immune anti-D antibodies following a feto-maternal hemorrhage (FMH), leading to hemolytic disease of the fetus and newborn (HDFN).[12] HDFN induces fetalanemia with increased risks of fetal death, severe neonatal hyperbilirubinemia, and kernicterus.[13] According to a recent systematic study by Bhutani et al., there are 3.7 lakh cases of Rh hemolytic disorder worldwide each year. India is responsible for about 56,672 of these years.[14] Furthermore, a hospital-based study reported an overall incidence of Rh alloimmunization to be nearly 1.3% in north Indian women during the antenatal period. The Rh alloimmunization rate was 10.7% and 0.12% in Rh-negative and Rh-D positive mothers, respectively.[15]

In the present study, 55 were full term newborn,4 preterm and only1 was post term delivery. The incidence of anaemia was 33% in newborn,of which 4 had severe anaemia and 16 had mild to moderate anemia. The incidence of NNHB (Neonatal hyperbilirubemia) was 17%,10 newborns had NNHB (Neonatal hyperbilirubemia) of which 2 had mild and 8 had moderate to severe NNHB (Neonatal hyperbilirubemia). Out of 10 NNHB (Neonatal hyperbilirubemia) 8 were born full term and 2 were pre-term delivery. 8 Rh negative mothers had preeclampsia /PIH, 3 had abruption placentae, 2 had oligohydramnios and 1 had polyhydramnios, 4 had preterm delivery, 1 had still birth and 1 baby had NNHB (Neonatal hyperbilirubemia) Whose mother had oligohydramnios. There was no incidence of Isoimmunisation found in present study.Rh-negative women may have silent bleeds in the 3rd trimester resulting in iso-immunization. To protect against this, antenatal Anti-D prophylaxis was introduced. A single-dose regimen of 300mcg IM in the deltoid is effective, economical, and offers better compliance. A single-dose regimen is equally effective as a two-dose regimen.13 RAADP (Routine antenatal anti-D prophylaxis) should be given only if the ICT at 28 weeks is negative.[16] For all Rh-negative mothers, cord blood testing of the baby should be done. If the baby is Rh-positive, 300mcg IM should be administered through deltoid within 72 hours. If anti-D administration is missed during the 72-hour window,

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it is advisable to give it as soon as possible. Partial to complete benefit has been noted for up to 10 days and some benefit for up to 28 days.[16,17]

Conclusion

Significant progress in medical services and technology over the past few decades has transformed the management of Rh disease. The advent of procedures such as amniocentesis and the spectrophotometric analysis of amniotic fluid has enabled effective monitoring of pregnancies, allowing for timely interventions that optimize perinatal outcomes. Early identification of the condition, particularly through the detection of elevated antibody titers, is critically important. Additionally, emerging treatment options, including intrauterine transfusion and intravenous immunoglobulin therapy, have contributed to a reduction in both mortality and morbidity associated with the disease. It is anticipated that the integration of these techniques, along with antepartum and postpartum immunoprophylaxis, will further decrease the incidence of fetal complications and, consequently, perinatal mortality.

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