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Original Research Article

Maternal and perinatal outcome in Rh negative mothers

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ABSTRACT

Background: Incidence of Rh negativity in India is 5-10%. Rh negative pregnancy poses a risk only when there is incompatible mating, leading to antigen-antibody reaction, and hemolysis. However, it can be prevented by adequate measures.
Methods: This prospective observational study conducted at Government Medical College hospital and J.K. Lon hospital Kota 100 women with Rh negative blood group admitted for delivery were enrolled.
Results: Mean age of study participants was 26.87 years with SD of 3.62 years and the prevalence of Rh-negative pregnancy was around 2.9. Rhesus isoimmunization is a preventable cause of fetal morbidity and mortality.
Conclusions: Rhesus isoimmunization is a preventable cause of fetal morbidity and mortality. Routine antenatal screening and timely management with intrauterine transfusion are lifesaving method which should be incorporated in daily obstetrics practice.

Keywords: Erythroblastosis fetalis, Heterozygous, Hyperbilirubinemia, Isoimmunization

INTRODUCTION

In a pregnancy where the mother is RhD negative and the father is RhD positive, the probability of the fetus having RhD positive blood is dependent on whether the father is; heterozygous (i.e., only one RhD allele is present). If the father is homozygous, the fetus will necessarily be RhD positive, as the father will necessarily pass on a Rh D positive allele. If the father is heterozygous, there is a 50% chance that the fetus will be RhD positive, as he will randomly pass on either the RhD positive allele or not. If a fetus is RhD positive and the mother is RhD negative, the mother is at risk of RhD alloimmunization, where the mother mounts an immune response (develops antibodies) to fetal red blood cells.

This usually has minimal effect on the first such pregnancy; but, in a second such pregnancy, pre-existing maternal antibodies to RhD antigens on fetal red blood cells often leads to erythroblastosis fetalis, a condition which can be fatal to the fetus.[2]

Rh factor and antigen

The Rh factor is discovered by Landsteiner and Weiner 1941.[3] Rh factor is known as the Rhesus factor as it was observed that when blood from rhesus monkey was injected into Rabbit serum agglutinated the majority of human bloods. In 1941 Levine discovered rh antibody in Rh negative women whose pregnancies resulted in hemolytic disease of the baby or still birth.[4] Genetics Rh antigen are lipoprotein molecules, which are sparsely located at the erythrocyte surface. The rhesus gene locus is located on the short arm of chromosomeone. The Rh blood group system consist of 50 defined blood group antigens, among which the 5 antigens DCcE and e are the most important.[5]

The D antigen is the most potent immunogen among the Rh antigens, expressed early in the gestation and therefore, clinically the most important. An individual may be homozygous or heterozygous for each of these, inheriting one set from each parent.

Rho(D) immune globulin

Rho (D) immune globulin (RhIG) is a medication used to prevent RhD isoimmunization in mothers who are RhD negative and to treat idiopathic thrombocytopenic purpura (ITP) in people who are Rh positive. It is often given both during and following pregnancy. It may also be used when RhD-negative people are given RhD-positive blood. It is given by injection into muscle or a vein.[6] It is made from human blood plasma.[7]

The prevalence of D alloimmunization complicating pregnancy ranges from 0.5 to 0.9 percent. The incidence of the disease hydrops fetalis however is now on decline worldwide from 1.3-1.7% in 1980s to 0.17% in 1990. Without prophylaxis alloimmunization occurs in approximately 16% of D negative mother with D positive infant. The rate is 2% or less if the mother is ABO incompatible with the fetus. Currently the rate of alloimmunization amongst Rh negative mother is approximately 1.6 -1.9% which can be further reduced to 0.2 % by giving an additional third trimester prophylaxis. One of most dreadful implication of ABO incompatibility or Rh incompatible pregnancy is erythroblastosis foetalis. Hydrops is a rare but very serious complication of pregnancy with a high perinatal mortality (>50%).

Of all cases of fetal hydrops, 90% are due to a non-immune cause and 10% have an immune etiology. Non immune hydrops may be due to fetal cardiac abnormalities (20-30%), Chromosomal anomalies such as turner syndrome (50%), hematological aberrations such as alfa thalassemia (10%) and other cause (infections such as CMV or parvovirus B 19, syphilis), twin to twin transfusion syndrome, vascular malformations, placental anomalies, congenital metabolism disorder.[8]

METHODS

This prospective observational study conducted at Government Medical College Hospital and J.K. Lon hospital Kota from September 2020 to august 2022 .100 Women with singleton pregnancy and Rh-negative blood group admitted for delivery were enrolled. On admission, history of the patients taken regarding her age, address and occupation, Menstrual history and detailed obstetrical history taken regarding gravidity, parity, abortion, D&C following abortion and number of living term and preterm issues. Any history of anti D Ig in previous or present pregnancy. 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 fetalis in previous pregnancies. Inquiry is made regarding any history of bleeding per vaginumin the present pregnancy which included threatened abortion and APH. Any history of blood transfusion was taken into consideration.

Complete general examination of the patients was done which included degree of anemia, pulse, BP, and pedal edema. Systemic examination will be done to exclude other medical disorders viz. respiratory disease, CVS disorders, chronic hypertension, chronic nephritis and any other chronic illness.

Obstetrical examination complete examination including fundal height, lie and position of the fetus, presentation, AFI assessment done and FHS were noted. Internal examination will be done in patients who presented with labour pains.

Investigation routine examination of the blood which included blood grouping and typing, Hb%, total and differential blood count, platelets, blood sugar, and urine for the presence of albumin was done by standard method. Husband blood grouping and typing of all the Rh-negative patients were done.

Rh antibody titre of the patients done at first visit in booked patient and were repeated accordingly at 28 weeks and 32 weeks. Patients whose husbands were Rh positive and having negative antibody titre offered antepartum Rh lG immunoprophylaxis. Ultrasonography done to know the gestational age, foetal wellbeing, amount of liquor, placental grading, maturation and to rule out any congenital malformations. The ultrasonography (USG) repeated at regular intervals as per need and colour doppler MCA PI whenever needed in sensitized female.

The labor monitored carefully, and the mode of delivery and the outcome of labor studied in detail. Injection methergine not given after delivery and the placenta examined for hyperplacentosis. Cord blood collected and will be sent for ABO/Rh typing, Hb% total serum bilirubin (total, direct and indirect) to know the neonatal status. Baby was thoroughly examined for any obvious congenital anomaly and weight, sex and condition noted particularly for hydrops fetalis. If neonate Rh positive, then the mother given postpartum immunoprophylaxis within 24 hours of delivery.

The new born followed for 3 days and watched for the development of jaundice. The babies who development NNHB managed either by sunrays exposure only or by phototherapy. The babies who had anemia immediately after birth carefully monitored and considered for exchange transfusion. They advised to attend postnatal clinic for check-up after 6 weeks of delivery.

Statistical analysis

Data analyzed using statistical package for the social sciences (SPSS) 20 statistical package. A descriptive analysis done on all variables to obtain a frequency distribution. The mean±SD and ranges will be calculated for quantitative variables. Continuous variables compared by the Student's t-test. Proportions analyzed with the Chi-square test. A p value of 0.05 or less will be considered statistically significant.

RESULTS

There were total of 11809 deliveries conducted during the study period. Out of these 342 were Rh negative pregnancies. In our study the incidence of Rh-negative pregnancy was 2.9%.

Table 1: ANC status of study participant.

Status of patients	No. of patients	Percentage
Booked	38	38
Unbooked	62	62
Total	100	100

Table 2: Parity distribution of study participants.

Parity	No. of patients	Percentage
Primi	41	41
Second gravida	33	33
Multi gravida	26	26
Total	100	100

Table 3: POG at time delivery (weeks) distribution of study participants.

Gestational age at delivery (weeks)	No. of patients	Percentage
28-34	4	4
34-37	16	16
37-42	79	79
>42	1	1
Total	100	100

Table 4: History of anti D immunoglobin in previous pregnancy in study participant.

History of anti D in previous pregnancy	No. of patients	Percentage
Yes	36	36
No	60	60
Not known	4	4
Total	100	100

In our study out of 100, 36% women having history of anti D Immunoglobin in previous pregnancy, 60% not having any History of anti D, 4% women were not knowing about anti D Immunoglobin status.

Table 5: Distribution of history of routine antenatal anti D prophylaxis (RAADP) in present pregnancy in study participant.

H|O anti D in present preg	No. of patients	Percentage
Yes	33	33
No	67	67
Total	100	100

Table 6: Maternal status of sensitization.

Status	No. of patients	Percentage
Sensitized	3	3
Not sensitized	97	97
Total	100	100

In our study out of 100, 3% cases were sensitized i.e. they were indirect coombs test positive, 97% cases were not sensitized i.e. indirect coombs test negative. All the 3 sensitized cases in our study were multigravida and had never taken any form of anti D prophylaxis in present or previous pregnancy and were unbooked cases.

Table 7: High risk factor in Rh negative women.

Maternal outcome	No. of patients	Percentage
HDP/preeclampsia	9	9
GDM	2	2
FGR	4	4
Oligohydrramnios	12	12
Polyhydramnios	3	3
Abruption placentae	2	2
No risk	68	68
Total	100	100

In our study out of 100 9% cases were associated with HDP/preeclampsia and, 2% cases associated with GDM, 4% cases associated with fetal growth restriction, 12% cases associated with oligohydramnios, 3% cases associated with polyhydramnios., 2% cases associated with abruption placentae.

Perinatal outcome

In our study out of 100 babies 85% babies having Rh positive blood group (12% A positive, 31% B positive, 33% O positive, 9% AB positive) and 15% babies having Rh negative blood group.

Table 8: Baby blood group distribution in Rh negative mother.

Baby blood group	No. of patients	Percentage
A+	12	12
B+	31	31
O+	33	33
AB+	9	9
Rh negative	15	15
Total	100	100

In our study out of 100 Rh negative women 64% babies were healthy shifted to mother side 20% babies were NNJ, 10% babies were anemic 1% baby was hydrops fetalis there was only one case of prove isoimmunization in grand multiparous unbooked women with positive ICT never

received anti D shifted NICU for exchange blood transfusion expired at day 2 which was 1 early neonatal death. 3% babies developed respiratory distress, 2% were fresh IUFD, out of two IUFD one associated with sever oligohydramnios, and other associated with sever eclampsia both are unbooked referred patient not associated with isoimmunization.

Table 9: Perinatal outcome.

Neonatal outcome	No. of patients	Percentage
Neonatal jaundice	20	20
Neonatal anemia	10	10
Hydops fetalis	1	1
IUFD	2	2
Respiratory distress	3	3
Healthy mother side	64	64
Total	100	100

Table 10: Neonatal intervation done.

Neonatal intervention	No. of patients	Percentage
TSB monitoring	72	73.5
Phototherapy	20	20.4
Exchange transfusion	6	6.1
Total	98	100

In our study out of 98 live birth 72 (73.5%) babies required TBS monitoring 20 (24.4%) babies required phototherapy, 6 (6.1%) babies required exchange transfusion.

Table 11: NICU outcome.

Outcome	Number
Early neonatal death	1
Improved	33

DISCUSSION

This hospital based prospective observational study was conducted in the J. K. Loan Hospitals, Kota, Rajasthan, India. This study was design to evaluate the maternal and perinatal outcome among Rh negative blood group pregnant women and to review management strategies for the best fetomaternal outcome There were total of 11809 deliveries conducted during the study period. Out of these 342 were Rh negative pregnancies. In our study the incidence of Rh-negative pregnancy was 2.9 % which is similar to the national average of 3% to 5%. Which was comparable to the study done by Sreelatha et al 2.4%, Eleje et al 2.1%, Alakanand et al 2.4%, Siva et al 3.51%, and Mondal et al 2.4%.[9-13] The prevalence in our study was higher than other studies because our center is tertiary referral center. In Table 2, our study was comparable according to parity, Agarwal et al who found 38.4% primigravida 33.6% second gravid 20% third gravid and 8% were multigravida.[14] Shradha et al 42% mothers were primigravida, 24% were the second gravida, 14.7% were the third gravid, and only 9.3% were the fourth gravida.[15] in Table 3. Our study was comparable according to POG at time of delivery Shradha et al 62% at 37-40 weeks, 18% at 40-42 weeks, and 20% before 37 weeks.[15] Table 4 show comparison study with Shradha et al.[15] Only 34% patients have received anti-D in previous pregnancies and according to Eleje et al 46.5% received anti D prophylaxis in the previous pregnancy.[10] Various studies have shown the risk of alloimmunization after postpartum anti D only is 2% risk after antepartum and postpartum anti D is 0.1% Similar results were shown by the studies Trina et al and Shradha et al where antenatal anti D prophylaxis was given to 30% cases and 34% cases respectively. [16,21] Our incidence was lower than Haripriya et al because of large sample size in their study.[17] Our study (Table 7) was comparable to Sreelatha et al 1.32% polyhydramnios, 9 [1.7%] women had oligohydramnios.[9] Our study in Table 8 was comparable to Eleje et al found 49 [80.3%] of 61 babies were rhesus incompatible with mother.[10]

Haripriya et al out of 243 neonates 71 were Rh negative 105 were o positive 37 were B positive, 21 were A positive and 9 were AB positive.[17]

Limitations

Limitations of the study were: any maternal (e.g. significant APH) or fetal (non- reassuring heart rate pattern) condition necessitating immediate delivery and failure to give consent.

CONCLUSION

Rhesus isoimmunization is a preventable cause of fetal morbidity and mortality. All pregnant women as soon as pregnancy is diagnosed should be checked for blood group. If blood group is negative, husband's blood grouping should be done. If positive, indirect Coombs' test should be done to diagnose antibody titer. Recommended antenatal and postnatal prophylaxis should be taken to prevent isoimmunization. In utero fetal transfusion can also be helpful in decreasing the severity of disease in fetuses. Patients should be referred to specialist centres prior to the development of hydrops. IUT in a free loop of cord and unnecessary preterm birth are best avoided. After delivery baby's blood group, haemoglobin, DCT, S. bilirubin and reticulocyte counts should be done to monitor baby postnatally. So that baby can get early treatment for raised S. bilirubin. With all these measures, we can decrease the burden of disease in India. It unfortunately, the incidence of this disease is decreasing at a very slow place in India, in part because of lack of adequate medical information on it and vast degree of unawareness of its importance amongst the general public and in part because of the high cost of medication used to prevent it. Increased morbidity in term of congenital anemia and jaundice poses a great burden to medical professionals leading to increased NICU admissions, phototherapy and need for exchange transfusion. Family planning should also be

encouraged for immunized women, since the severity of haemolytic disease increases with increasing parity.

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