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Study on Maternal and Perinatal Outcome in Rh Negative Pregnancies at ESI-PGIMSR, ESIC Medical College & Hospital, Joka, Kolkata

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ABSTRACT

Background: *Rh antigens are lipoprotein molecules that are located on the surface of the erythrocytes. Incidence of Rh-negative blood group varies worldwide, ranging from 3-5.7% in Indian women When Rh-negative maternal blood is exposed to Rh-positive fetal blood (RBC) in maternal circulation, antibodies against Rh (D) may develop in the mother which once produced, remains in the woman's circulation and poses the threat of hemolytic disease for subsequent Rh-positive fetuses. Usually there won't be any sensitization against Rh antigen in primigravida unless there is history of early pregnancy hemorrhage, blood transfusion or invasive procedure like amniocentesis, CVS etc. The aim of this study is to determine the maternal and fetal outcomes in Rh-negative mothers.*

Method: *A hospital-based retrospective cross-sectional study was conducted among all pregnant women with Rh negative blood group delivered at ESIC Medical College between 01/06/2023 and 31/05/2024. In this study, all primigravida and multigravida with age between 18-45 years were included. Maternal outcome was assessed by associated high-risk factors, development of complications, and need for transfusion, and the perinatal outcomes were assessed in the form of low birth weight, preterm birth, Apgar Scores, mode of delivery, and neonatal Intensive Care Unit (NICU) admission. Rh isoimmunization was assessed by the result of the Coombs test, the incidence of hemolytic disease of the newborn, and prophylactic Anti D immunoglobulin administration was also noted.*

Result: *Out of 1898 total delivery conducted in the institute in this time period 52 were found to have Rh negative blood group. Among them 52% were primigravida and 98% were singleton pregnancy. 65% of patients were delivered by cesarean section and 17% of total deliveries were preterm. Only 8% of the pregnancies were associated with comorbidities and none were detected with Rh isoimmunization.*

Conclusion: *Rh incompatibility can be prevented by proper antenatal screening and timely intervention to reduce subsequent development of complications.*

Keywords: *Rh-negative, Isoimmunization, Preterm, Cesarean section, Heterozygous*

INTRODUCTION

The Rh factor (*i.e*. Rhesus factor) are red blood cell surface antigen that was discovered and then named after the monkeys in which it was first discovered by K. Landsteiner and A. S. Wiener in 1940 [1]. Rh blood group system contains 50 different antigens among which 5 antigens DCcE and e are clinically important [2].

The rhesus gene locus is located on the short arm of chromosome 1 and is autosomal dominant. So, 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) where 50% chance of fetus will be RhD positive whereas in case of a father being homozygous all fetus will be RhD positive. Due to the high immunogenic nature of the Rh-D antigen, maternal-fetal Rh factor incompatibility may lead to maternal Rh isoimmunization [2-8].

The incidence of Rh-negative blood group varies depending upon geographical and ethnic variety. Incidence rate seen among White populations (North Americans and Europeans): 15%; African populations: 4.8%; and Asian populations: 0.1–0.3%.[5,6,9] In a worldwide comparative study, the incidence of Rh-negative pregnancies in Indian women was reported to be low, varying from 3.0 to 5.7% [3-10].

The prevalence of Rh isoimmunization complicating pregnancy is <1% worldwide. The most common fetal complications in Rh-sensitized pregnancy include hemolytic disease of the fetus and newborn (HDFN), fetal or neonatal anemia, kernicterus, and early miscarriage due to hydropic changes (hydrops fetalis) [3-11].

So, to prevent Rh isoimmunization deltoid in 28-32 weeks POG antenatal if the indirect Coombs test is negative at 28 weeks POG and postpartum 300 mcg IM within 72 hrs if the baby is found to be RhD positive. The purpose of this study is to see the prevalence of Rh-negative pregnancy associated perinatal and neonatal outcomes and assess the status of current ongoing immuno-prophylaxis in a tertiary care hospital in eastern India.

METHODS AND MATERIALS

A hospital-based retrospective cross-sectional study was conducted among mothers with Rh negative blood group who gave birth at ESI-PGIMSR, ESIC Medical College & Hospital between 01/06/2023 and 31/05/2024. Inclusion criteria include Primi and multigravida with ages ranging from 15-45 years with Rh negative blood group. Exclusion criteria were pregnancy before 24 weeks (period of viability) and Rh-positive blood group. The patients were monitored antenatally, during the delivery, and in the postnatal period.

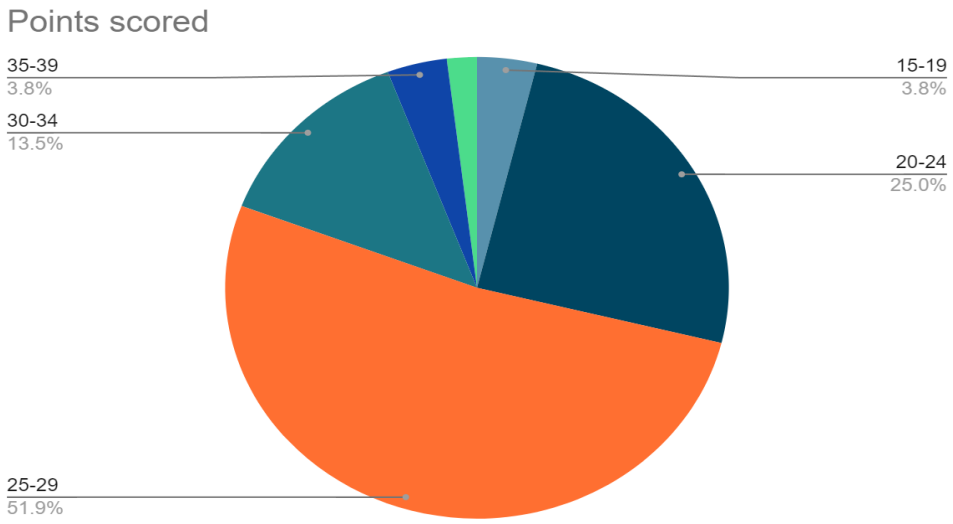
Maternal outcomes were noted in the form of the development of complications like pre-eclampsia, GDM (Gestational Diabetes Mellitus), mode of delivery, and development of PPH. The perinatal outcomes were assessed by low birth weight, preterm delivery, Apgar scores, and admission to the neonatal intensive care unit (NICU).

The Rh iso-immunization status was assessed using Indirect Coomb's test in the antenatal period, babies were screened with cord blood for Rh grouping, and Incidence of immunoprophylaxis using Anti-D immunoglobulin in both the antenatal and postnatal periods was noted.

RESULT

In the one-year study period, among the 1898 total patients delivered 52 patients were having the Rh-negative blood group.

The following table and pie chart show age-wise distribution in rh negative mothers.



Socio-Demographic Factor in Rh Negative Mother		
Age-wise Distribution	**Number**	**Percentage**
15-19	2	4%
20-24	13	25%
25-29	27	52%
30-34	7	13%
35-39	2	4%
40 and above	1	2%

Among all the Rh-negative mothers most were aged between 25-29 yrs with only 4% being teenage pregnancy.

The following table shows that most of the Rh-negative mothers were primigravida.

Obstetric Characteristic- Parity		
Primi	27	52%
Second	21	40%
Multi	4	8%

The following table shows among Rh-negative mothers none were below 34 weeks period of gestation, 9 patients delivered preterm, 2 post-dated and the rest were term delivery.

Obstetric Characteristic- Period of Gestation		
< 34 weeks	0	0%
34-36 weeks	9	17%
37-40 weeks	41	79%
> 40 weeks	2	4%

The following table shows that among Rh-negative mothers, only 4 had associated comorbidities.

Associated Comorbidities		
Present	4	8%
Absent	48	92%

The following table shows that the most common mode of delivery was by cesarean section.

Mode of delivery		
NVD	17	32%
LSCS	34	65%
Other (breach)	1	3%

The following table shows that 27% of babies had birth weight below 2.5 kg.

Delivery Outcome- Birth Weight		
< 2500 gm	14	27%
>= 2500 gm	38	73%

The following table shows the distribution of patients delivered by LSCS according to indications.

Indication for Cesarean section		
Post cs	15	44%
Premature rupture of membrane	10	19%
Failure of induction or progress of labour	4	8%
Cephalo-pelvic disproportion	3	6%
Other	2	4%

The following table shows a comparison of the mode of delivery between primigravida and multigravida. Although the incidence of cesarean section is higher among primigravida the correlation is not statistically significant. (p-value - 171)

Gravida	**Vaginal delivery**	**Cesarean section**
Primi	7	20
multi	11	14

DISCUSSION

In our study, the prevalence rate of Rh-negative mothers among total delivery was 2.7%. In a study done by Singh A et al. showed that the prevalence of the Rh-negative factor was 1.43% [13]. A study done by Mondal B et al. concluded that Rh-negative prevalence was 2.3% [14]. In a study by Sreelatha et al. the incidence was found to be 2.98% [16].

In our study among Rh-negative mothers, 52% were primigravida, 40% 2nd gravida, and the rest were multigravida. According to the study by Agarwal et al. among the study population, 38.4% were primigravida, 33% second gravida, and 8% multigravida [9]. A study was conducted by Pinapothu et al in 2019. They also reported in their study that primigravida

showed the highest distribution i.e. 50.3% and 52.3% in year 2018- 19 and 2008-09 respectively [3].

In our study, 52% were aged between 25-29 yrs with only 4% being teenage pregnancy. Yadav M et al. in their study found that the mean age of women was 24 years [16].

In our study among Rh-negative mothers, 9 patients delivered preterm, 2 post-dated and the rest were term delivery. Yadav M et al. in their study found that most of them delivered at term (85; 89.5%), six preterm, and only four post-term [16].

Uma Jain et al. in their study found that In our study most of the patients delivered normally only (28.40%) patients delivered by LSCS [17]. In contrast to that, in our study, Cesarean section was the commonest mode of delivery (65%) and post cesarean pregnancy with scar tenderness was the commonest indication (44%) followed by premature rupture of membrane (19%).

In our study, 74% of primigravida were delivered by LSCS compared to 56% of second or multigravida, but the association was found not to be statistically significant. (p-value- .171)

Only 8% of cases were associated with maternal comorbidities in our study with the commonest being Hypertensive disorder of pregnancy (4%) followed by GDM and hypothyroid. Whereas Sharma M et al. in their study found that 9% of cases were associated with HDP/preeclampsia, 2% of cases were associated with GDM, 4% of cases were associated with fetal growth restriction, 12% of cases were associated with oligohydramnios, 3% of cases were associated with polyhydramnios., 2% of cases were associated with abruption placentae [18]. In a study done by Tripathi R 23 et al incidence of complications includes 8 cases of PIH/preeclampsia,1 case of polyhydramnios, and 3 abruptio placentae.

27% of delivered babies in our study population had birth weights less than 2.5 kg with a mean fetal weight of 2.7kg which is close to 2.8kg found by Yadav et al [16].

Blood group testing was done in all of the partners of Rh-negative mothers and all were found to be Rh-positive. None of the mothers were found to be Rh isoimmunized when screened with the Coombs test and received anti-D immunoprophylaxis antenatally.in contrast, Yadav et al. found Isoimmunization in one case (1.05%) only similar to a study conducted by Lurie et al (0.9%) [19] in contrast to a report by Al-Ibrahim et al (7.1%) [20] [2]. Only 2 of the fetuses were found to be Rh-negative with the rest being Rh-positive whereas Yadav M et al. found 95 out of 108 babies to be Rh-positive [16]. All of the mothers with Rh-positive babies received postpartum anti-D prophylaxis,

CONCLUSION

Rh-negative isoimmunization can be prevented by implementing proper antenatal and postnatal care. By thorough screening in pregnancy and timely proper interventions, sensitization can be prevented along with the subsequent development of complications following it.

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