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Original Article

Fetomaternal Outcome of Rhesus Negative Patients

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ABSTRACT

Background: Rh incompatibility may cause maternal alloimmunization and hemolytic disease of the fetus and newborn (HDFN), potentially leading to fetal and neonatal complications. Despite effective Anti-D prophylaxis, Rh-negative pregnancy remains an important obstetric concern. This study evaluated fetomaternal outcomes among Rh-negative pregnant women. **Methods & Materials:** A cross-sectional study was conducted among 50 Rh-negative pregnant women at Sir Salimullah Medical College & Mitford Hospital, Dhaka, from January to December 2025. Participants were selected by purposive sampling. Data on obstetric history, antenatal care, Anti-D prophylaxis, maternal complications, mode of delivery, and fetal/neonatal outcomes were collected and analyzed using Statistical Package for the Social Sciences (SPSS). Ethical approval, informed consent, and confidentiality were ensured. **Results:** Among 5,000 obstetric patients screened, 4% were Rh-negative. Among the 50 participants, 60% were multigravida and 80% had booked antenatal care. Antibody titre was undetectable in 86%, while 10% had detectable antibodies. A-negative and O-negative were the commonest maternal blood groups (30% each). Term delivery occurred in 86% of pregnancies, and 84% resulted in healthy babies. Neonatal jaundice and intrauterine growth restriction occurred in 4% each, while no hydrops fetalis was observed. Anaemia was the commonest maternal complication (14%). Caesarean section was performed in 56% of cases, and 76% received postpartum Anti-D prophylaxis. **Conclusion:** Rh-negative pregnancies generally showed favourable maternal and fetal outcomes. However, improved antenatal antibody screening, regular monitoring, and timely Anti-D prophylaxis are needed to reduce alloimmunization and associated maternal, fetal, and neonatal complications.

Keywords: *Rh-negative pregnancy, Rh incompatibility, Alloimmunization, Anti-D immunoprophylaxis, Fetomaternal outcome.*

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INTRODUCTION

Rhesus (Rh) incompatibility is a significant factor leading to maternal alloimmunization and hemolytic disease in the fetus and newborn (HDFN). The Rh blood group system features various antigens, with the D antigen being the most clinically important due to its strong immunogenicity. Women who are RhD-negative can become sensitized after being exposed to RhD-positive fetal red blood cells due to pregnancy, childbirth, abortion, ectopic pregnancy, invasive obstetric procedures, fetomaternal hemorrhage, or blood transfusions. After sensitization takes place, maternal anti-D antibodies may traverse the placenta and eliminate fetal red blood cells, which can lead to fetal anemia, hydrops fetalis, hyperbilirubinemia, premature delivery, and intrauterine or perinatal mortality [1,2].

The provision of anti-D immunoglobulin prophylaxis has significantly decreased the occurrence of RhD alloimmunization and its related complications. Nonetheless, Rh-negative pregnancy continues to be a significant obstetric issue, especially in low- and middle-income nations where access to blood type screening, antibody assessments, anti-D immunoglobulin, and specialized fetal monitoring can be restricted. A systematic review found a pooled prevalence of 10.8% for RhD-negative blood type among expectant mothers and outlined issues concerning the availability and use of RhD immunoprophylaxis[3]. Global study has similarly shown the occurrence of Rh-negative pregnancies, emphasizing the need for timely detection, suitable prophylaxis, and diligent antenatal monitoring [4,5].

Both prenatal and neonatal health may be impacted by the clinical effects of Rh alloimmunization. Progressive fetal anemia, hydrops fetalis, fetal heart failure, intrauterine death, and neonatal problems are all possible outcomes of severe Rh illness. If left untreated, affected babies may experience severe unconjugated hyperbilirubinemia and severe anemia, which can result in kernicterus and other neurological issues [1,2]. Research from Kenya has shown that Rh-isoimmunized women have poor pregnancy outcomes, such as hydrops fetalis, intrauterine fetal death, low birth weight, low Apgar scores, and admission to neonatal intensive care [6]. Similar reports of a significant burden of fetomaternal Rh incompatibility have been made by other research, which have also highlighted the significance of prompt screening, antibody identification, fetal surveillance, and appropriate intervention [7-9].

In Bangladesh, there is still comparatively little information available about Rh-negative pregnancy and maternal alloimmunization. A study carried out at Bangabandhu Sheikh Mujib Medical University documented anti-D antibodies in RhD-negative mothers, highlighting how important it is to identify women who are at risk and to provide suitable Rh immunoprophylaxis[10]. When prophylaxis is insufficient or delayed, the likelihood of sensitization and later unfavorable pregnancy outcomes may rise. For this reason, a systematic evaluation of Rh-negative pregnancies matters, since it helps detect maternal, fetal, and neonatal complications and reinforces antenatal and perinatal care.

This study was carried out to evaluate the fetomaternal outcomes among Rhesus-

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negative patients in a hospital setting, covering maternal complications, mode of delivery, fetal outcomes, and neonatal outcomes.

METHODS & MATERIALS

Study design: A cross-sectional descriptive study was conducted in the Department of Obstetrics and Gynaecology, Sir Salimullah Medical College & Mitford Hospital (SSMC & MH), Dhaka, over a period of 12 months from January 2025 to December 2025.

Study Population: The study population comprised Rh-negative pregnant women admitted to the Department of Obstetrics and Gynaecology of SSMC & MH, Dhaka, at any gestational age. During the study period, 5,000 obstetric patients were screened, among whom 200 (4%) were identified as Rh-negative. Fifty eligible Rh-negative pregnant women were included in the study.

Sample Size: A total of 50 Rh-negative pregnant women were included in the study.

Sampling Technique: Purposive sampling technique was used for participant selection.

Selection Criteria

Inclusion criteria:

1. Rh-negative pregnant women admitted at any gestational age.
2. Rh-negative pregnant women whose husbands were Rh-positive.

Exclusion criteria:

1. Rh-positive pregnant women.
2. Women who did not meet the predefined inclusion criteria.
3. Study Variables and Outcome Measures

Research Instrument: Data were collected using a structured questionnaire and record form developed according to the study objectives and variables. The questionnaire included sections on demographic and socioeconomic characteristics, obstetric history, antenatal care, maternal and paternal blood-group status, previous administration of Anti-D immunoglobulin, antibody titre, current pregnancy outcome, mode of delivery, and fetal/neonatal outcomes. The instrument was pretested among 15 patients to assess clarity, accuracy, ambiguity, and face validity. Necessary modifications were made before final data collection.

Data Collection Procedure: Eligible Rh-negative pregnant women were identified from the Obstetrics and Gynaecology Department during the study period. Relevant information was collected through patient interviews, clinical examination, and review of hospital records. Information included demographic and socioeconomic characteristics, parity, antenatal care status, blood grouping and Rh typing of the mother and husband, pregnancy number at detection of Rh-negative status, previous obstetric history, previous Anti-D immunoprophylaxis, antibody titre, maternal complications, mode of delivery, and indications for caesarean section. Fetal and neonatal information included blood group and Rh status, fetal outcome, prematurity, IUGR, stillbirth, neonatal death, congenital anaemia, neonatal jaundice, and hydrops fetalis. Participants were followed during their hospital management until discharge.

Data Processing and Analysis: All completed questionnaires and records were checked for completeness and consistency. The collected data were edited, coded, entered, and analyzed using Statistical Package for the Social Sciences (SPSS). Descriptive statistics were used for analysis. Categorical variables were presented as frequency and percentage, while appropriate continuous variables were summarized using descriptive measures. The findings were presented in the form of tables, figures, and charts.

Ethical Considerations: Ethical approval was obtained from the ethical committee of Sir Salimullah Medical College & Mitford Hospital, Dhaka, following approval of the research proposal. Verbal informed consent was obtained from all participants before data collection. Participants were informed about the purpose of the study and their right to participate voluntarily or decline to answer any question without affecting their care. Confidentiality and privacy of participants' information were maintained, and collected information was used solely for research purposes.

RESULTS

Table I presents the Rh status, parity, antenatal care, and socioeconomic characteristics of the study participants. Among 5,000 obstetric patients screened, 200 (4%) were Rh-negative. Among the 50 Rh-negative women included in the study, 30 (60%) were multigravida and 20 (40%) were primigravida. Most participants (80%) were booked for antenatal care, while 20% were non-booked. Regarding monthly income, the majority (72%) had an income of <5,000 taka, followed by 20% with an income of 5,000–10,000 taka and 8% with an income of >10,000 taka. Overall, Rh-negative women constituted 4% of the screened obstetric population, with most study participants being multigravida, booked for antenatal care, and from the lower-income group.

Table I

Rh status, parity, antenatal care and socioeconomic characteristics.

Variable	Category	n (%)
Rh status among screened obstetric patients (n=5,000)	Rh-negative	200 (4.0)
Parity among Rh-negative participants (n=50)	Primigravida	20 (40.0)
	Multigravida	30 (60.0)
Antenatal care (n=50)	Booked	40 (80.0)
	Non-booked	10 (20.0)
Monthly income (n=50)	<5,000 taka	36 (72.0)
	5,000–10,000 taka	10 (20.0)
	>10,000 taka	4 (8.0)

Table II presents the pregnancy number at detection of Rh-negative status and antibody status among the participants. The majority (60%) were identified as Rh-negative during their 1st pregnancy, followed by 20% during the 2nd pregnancy, while 8%, 6%, 4%, and 2% were detected during the 3rd, 4th, 5th, and 6th pregnancies, respectively. Regarding antibody status, 86% had no detectable antibody titre, whereas 10% had a detectable titre and antibody results were unavailable for 4%. Among the immunized women, 6% had a rising titre, while 4% had a static titre, indicating that rising antibody levels were more common than static titres.

Table II
Pregnancy number at detection of Rh-negative status and antibody status.

Variable	Category	n (%)
Pregnancy number at detection (n=50)	1st pregnancy	30 (60)
	2nd pregnancy	10 (20)
	3rd pregnancy	4 (8)
	4th pregnancy	3 (6)
	5th pregnancy	2 (4)
	6th pregnancy	1 (2)
Antibody status (n=50)	Titre not detected	43 (86)
	Titre detected	5 (10)
	Not available	2 (4)
Titre pattern among immunized women (n=5)	Static	2 (40)
	Rising	3 (60)

Table III shows the blood-group distribution among mothers, husbands, and newborns. Among mothers, A-negative and O-negative blood groups were the most common (30% each), followed by B-negative (26%) and AB-negative (14%). Among husbands, B-positive was the most common group (26%), followed by O-positive (22%), A-positive (20%), and AB-positive (10%); blood-group data were undetected in 20%. Among newborns, B-positive was the most common blood group (30%), followed by O-positive (28%) and A-positive (20%). Overall, the distribution shows that most mothers had Rh-negative blood groups, whereas most husbands and newborns had Rh-positive blood groups.

Table III
Blood-group distribution of mothers, husbands and newborns.

Blood group	Mothers n (%)	Husbands n (%)	Newborns n (%)
A (+ve)	—	10 (20)	10 (20)
A (-ve)	15 (30)	1 (2)	2 (4)
B (+ve)	—	13 (26)	15 (30)
B (-ve)	13 (26)	—	2 (4)
O (+ve)	—	11 (22)	14 (28)
O (-ve)	15 (30)	—	1 (2)
AB (+ve)	—	5 (10)	5 (10)
AB (-ve)	7 (14)	—	1 (2)
Undetected	—	10 (20)	—
Total	50 (100)	50 (100)	50 (100)

Table IV presents the current pregnancy and fetal outcomes among the participants. Most pregnancies (86%) resulted in term delivery, while 10% were postdated deliveries and 2% each ended in second-trimester abortion or preterm delivery; no first-trimester abortion was recorded. Regarding fetal outcomes, the majority (84%) resulted in a healthy baby. IUGR and neonatal jaundice were reported in 4% each, while abortion, prematurity, stillbirth, and congenital anaemia occurred in 2% each. No case of hydrops fetalis was observed. Overall, most pregnancies resulted in term delivery with healthy neonatal outcomes.

Table IV
Current pregnancy and fetal outcomes.

Variable	Outcome	n (%)
Current pregnancy outcome (n=50)	1st trimester abortion	0 (0)
	2nd trimester abortion	1 (2)
	Preterm delivery	1 (2)
	Term delivery	43 (86)
	Postdated delivery	5 (10)
Fetal outcome (n=50)	Healthy baby	42 (84)
	Abortion	1 (2)
	IUGR	2 (4)
	Prematurity	1 (2)
	Stillbirth	1 (2)
	Congenital anaemia	1 (2)
	Neonatal jaundice	2 (4)
	Hydrops fetalis	0 (0)

Figure 1 present the associated maternal complications among the study participants. Anaemia was the most common complication, occurring in 14% of participants. Pre-eclampsia and polyhydramnios were reported in 6% each, followed by diabetes mellitus in 4% and premature rupture of membranes (PROM) in 2%. Overall, anaemia was the predominant maternal complication, while PROM was the least frequently observed complication.

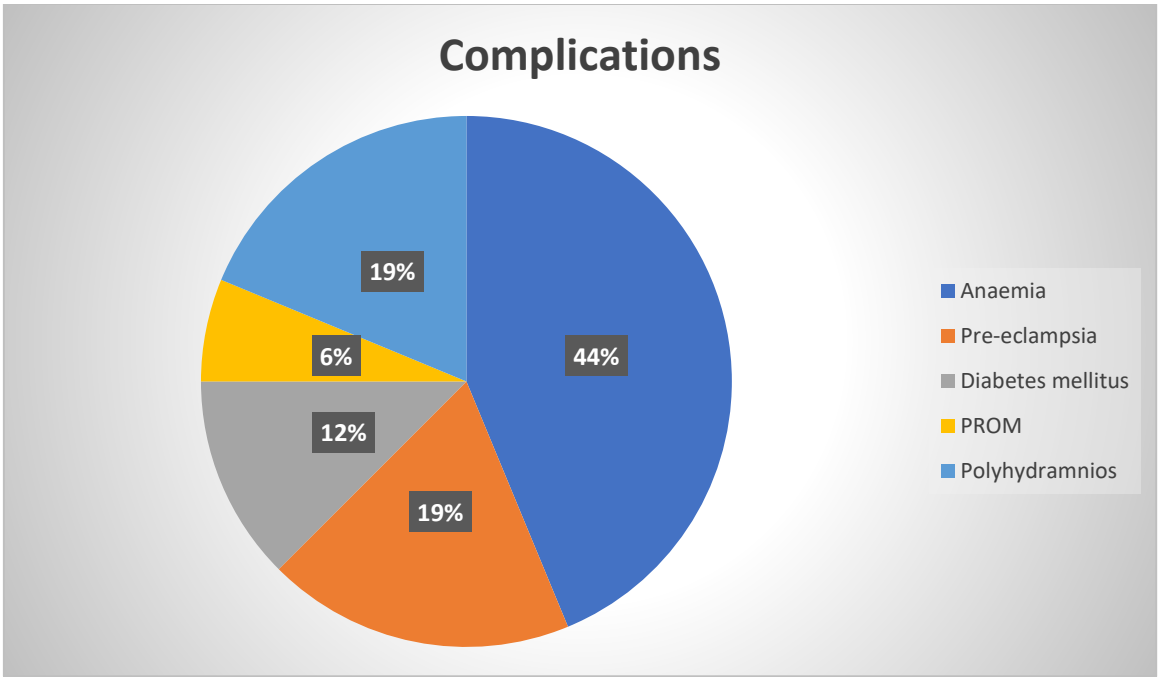


Figure 1. Associated maternal complications.

Table V shows the mode of delivery and indications for caesarean section. Among the 50 participants, caesarean section was the most common mode of delivery (56%), followed by spontaneous vaginal delivery (34%) and vaginal delivery after induction (10%). Among the 28 women who underwent caesarean section, repeat caesarean section was the most frequent indication (28.6%), followed by fetal distress and cephalopelvic disproportion (CPD), each accounting for 14.3%. Unfavourable cervix, failed induction, cervical dystocia, pre-eclampsia with fetal distress, and oligohydramnios each accounted for 7.1%, while IUGR and breech presentation accounted for 3.6% each. Overall, repeat caesarean section was the predominant indication for operative delivery.

Table V
Mode of delivery and indications for caesarean section.

Variable	Category	n (%)
Mode of delivery (n=50)	Spontaneous vaginal delivery	17 (34)
	Vaginal delivery after induction	5 (10)
	Caesarean section	28 (56)
Indication for CS (n=28)	Unfavourable cervix	2 (7.1)
	Failed induction	2 (7.1)
	Cervical dystocia	2 (7.1)
	Pre-eclampsia with fetal distress	2 (7.1)
	IUGR	1 (3.6)
	Oligohydramnios	2 (7.1)
	Fetal distress	4 (14.3)
	CPD	4 (14.3)
	Breech presentation	1 (3.6)
	Repeat caesarean section	8 (28.6)

Table VI presents anti-D immunoprophylaxis and previous obstetric outcomes among multigravida women. Regarding anti-D prophylaxis, 76% received postpartum Anti-D, while only 2% received antepartum Anti-D. 4% were already immunized, and 6% refused Anti-D prophylaxis. Rh-negative newborns were reported in 10% of cases. Regarding previous obstetric outcomes, spontaneous vaginal delivery and caesarean section were the most common outcomes, each accounting for 16%, followed by early neonatal death (10%) and stillbirth (8%). Intrauterine death occurred in 4%, while abortion, missed abortion, and premature delivery were reported in 2% each. Overall, postpartum Anti-D prophylaxis was substantially more common than antepartum prophylaxis, while previous pregnancies showed a range of favourable and adverse obstetric outcomes.

Table VI
Anti-D immunoprophylaxis and previous obstetric outcomes among multigravida women.

Section	Variable	n (%)
Anti-D immunoprophylaxis (n=50)	Antepartum Anti-D given	1 (2)
	Postpartum Anti-D given	38 (76)
	Already immunized	2 (4)
	Refused Anti-D	3 (6)
	Rh-negative newborn	5 (10)
Previous obstetric outcome (n=30)	Abortion	1 (3.3)
	Missed abortion	1 (3.3)
	Premature delivery	1 (3.3)
	Intrauterine death	2 (6.7)
	Spontaneous vaginal delivery	8 (26.7)
	Stillbirth	4 (13.3)
	Caesarean section	8 (26.7)
	Early neonatal death	5 (16.7)

DISCUSSION

In the present study, 4.0% of the screened obstetric patients were Rh-negative. Among the participants, 60% were multigravida, 40% primigravida, 80% booked for antenatal care, and 20% non-booked; 72% had a monthly income below 5,000 takas. Similarly, a Dhaka-based study reported 67% multipara and 33% nullipara, with 26.67% attending their first ANC visit and 35.55% their second visit [11]. The similar predominance of multigravida/multipara women suggests a comparable obstetric profile among hospital-based pregnant women.

In the present study, 60% were identified as Rh-negative during their first pregnancy and 20% during the second. Antibody titre was undetectable in 86%, while 10% had detectable antibodies; among immunized women, 60% had a rising and 40% had a static titre. Previous studies reported antibody prevalence of 10.9% and Rh alloimmunization of 17.1% [12,13]. These findings are similar to previous studies and emphasize the importance of antibody screening and titre monitoring.

In the present study, A-negative and O-negative were the most common maternal groups, while B-positive predominated among husbands and newborns. Most husbands and newborns were Rh-positive. Previous studies similarly reported predominance of the O blood group among mothers and partners, with 14.3% of newborns being Rh-negative [5,14]. These findings support the importance of ABO and Rh typing during pregnancy.

In the present study, 86% of pregnancies resulted in term delivery and 84% in healthy babies. IUGR and neonatal jaundice occurred in 4% each, while prematurity, stillbirth, and congenital anaemia occurred in 2% each; no hydrops fetalis was observed. A previous study reported neonatal jaundice in 16%, anaemia in 4%, IUFD in 2%, and no hydrops fetalis [15]. These findings are broadly similar, particularly for anaemia, stillbirth/IUFD, and absence of hydrops fetalis.

In the present study, anaemia was the most common maternal complication, followed by pre-eclampsia and polyhydramnios, diabetes mellitus, and PROM. A previous prospective study reported very low rates of birth complications or adverse events, with hypertension, missed abortion, and premature labour each occurring in 0.1% overall [16]. These findings indicate variation in the pattern and frequency of maternal complications among Rh-negative pregnancies.

In the present study, caesarean section was the most common mode of delivery, followed by spontaneous vaginal delivery. Repeat caesarean section was the leading indication, followed by fetal distress and CPD. A previous study of Rh-negative pregnancies also reported caesarean delivery as an important mode of delivery [6]. These findings are similar to previous studies.

In the present study, 76% received postpartum Anti-D prophylaxis, while only 2% received antepartum prophylaxis; 4% were already immunized and 6% refused prophylaxis. Among multigravida women, previous spontaneous vaginal delivery and caesarean section each accounted for 26.7%. A recent systematic review identified previous pregnancies and inadequate prophylaxis as important risk factors for alloimmunization [17]. These findings highlight the importance of timely Anti-D prophylaxis.

Overall, Rh-negative pregnancies generally had favourable outcomes, but improved antenatal antibody screening and timely Anti-D prophylaxis are needed to reduce Rh alloimmunization and associated complications.

CONCLUSION

Rh-negative pregnancies in this study generally had favourable maternal and fetal outcomes, with most resulting in term delivery and healthy babies. However, limited use of antepartum Anti-D prophylaxis and the presence of maternal complications highlight the need for improved antibody screening and timely Anti-D immunoprophylaxis to reduce Rh alloimmunization and related complications.

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