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**Original Research Article**

# Clinical study of Rh-isoimmunization in pregnant women

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## ABSTRACT

**Background:** Iso-immunization has been defined as the process whereby immune antibodies are produced in an individual in response to antigens from another individual of same species. Objective was to study the fetal outcome in immunized and non-immunized women and also to prevent isoimmunization during pregnancy and labour.
**Methods:** A total of 40 patients attending outdoor antenatal clinic or admitted in the indoor wards in obstetric unit of Obstetrics and Gynecology department were included in the present study which was hospital based cross sectional study. The study was carried out for one year at Government Medical College Jagdalpur, Chhattisgarh, India. Permission from Institutional Ethics Committee was obtained. From each and every patient included in the study, initially informed individual consent was taken.
**Results:** Maximum patients (25%) had an income of Rs. 200- 300 per month and minimum patients (10%) had an income of Rs. 500- 600 per month. Maximum cases of Rh – negative patients 87.5% are Hindus and 10 % are Muslims while only 2.5% are Christians. The percentage of patients below 20 years is 2.5, that between 20 to 25 are 67.5, between 26 to 30 is 27.5 and between 31 to 35 is 2.5. Thus, maximum patients belong to the age group 20 to 25 years and above 31 years.. Accordingly, 6 patients had history of abortion, 2 had pre- term deliveries, and 18 had full term deliveries. 4 had history of operation and 1 had history of jaundice in previous children. Cases with presence of Rh- Antibody in Maternal Circulation during Pregnancy. It was found that one out of 40 patients, had Rh- Antibody in titer of 1: 128 and 39 cases, did not show presence of Rh- Antibody in their circulation. Outcome of pregnancy in 40 patients studied. 3 patients had pre- mature labour, 26 had normal vaginal delivery, 10 had caesarean section and one patient was Ante- natal.
**Conclusions:** Present study reveals more than Maximum patients were from low socioeconomic group and minimum cases were from higher socio- economic group. Majority of cases were Hindus, next in order Muslims and then Christians. Age of maximum patients ranged from 20-25 years. Maximum patients had normal full term deliveries. In 65% cases, outcome of pregnancy was normal vaginal delivery.

**Keywords:** Isoimmunization, Rh negative antigen, Pregnant women

## INTRODUCTION

Iso-immunization has been defined as the process whereby immune antibodies are produced in an individual in response to antigens from another individual of same species.

Rh isoimmunization during pregnancy within 3 days after delivery, which will not be prevented by the administration of Rh immune globulin after delivery, is the most important cause of residual Rh isoimmunization. Rh antigen in 38$^{th}$ day old fetus of 10 mm size. It was the youngest fetus in which Rh antigen was demonstrated.

Therefore, realization of prophylaxis for Iso-Immunization after abortion.[1] 15% of Whites, 7% of Blacks, and 1% of Chinese do not have D antigen. The incidence of Rhesus negative among Chinese. Almost 150 cases, for the presence of Rh blood factor and found Rh negative amongst them.25% of women have raised level of HbF starting at 8- 10 weeks of gestation.

The number of cases, with TPH of 0.1 ml red blood cells or more, according to various authors, is as follows: NIL for spontaneous abortion, 2% for induced abortion, 1.5% for vaginal termination of pregnancy, 6.5% for termination by abdominal hysterectomy.

The effects of complete and incomplete anti Rh in suppressing Rh- immunization, that in incomplete anti Rh (IgG) suppressed but complete Rh (IgM) enhance immunization.[2]

The use of an immunoglobulin concentrate of IgG given intramuscularly showed that when a large dose was given with an intravenous injection of Rh positive red cells, there was complete suppression of Rh immunization.[3]

Rh-ve immunized cases found that 45 cases were between 20 -30 years of age, 28 between 30 -40 years and only 1 patient was above 40 years.[4]

Haemoglobin percentage recorded shows that maximum 19 have Hb% between 14.1 to 16 gm%, 13, 14 gm% and below and 4 cases from 16.1 to 18 gm%.[5]

Rh-isoimmunization and hemolytic disease of the new born. Presently the only justification for early or premature induction of labour is a pregnancy, complicated by Rhesus iso immunization is to prevent the death of fetus in utero.[6]

Spectrophotometric tracing – the optical density of amniotic fluid at various wavelengths on semi logarithmic paper measuring the deviation from base line at 450 micro meters.[7]

A clinical trial of antenatal administration of Rh immune globulin, initially at 34 weeks and subsequently at 28 and 34 week's gestation, in 1357 Rh- negative pregnant women who were delivered of Rh- positive babies, was effective in preventing the development of Rh isoimmunization during pregnancy or within 3 days after delivery.[8]

Among African Americans, about 8% are Rh negative, whereas among white Americans, about 15% are Rh negative. Only 1% to 2% of Asians and Native Americans are Rh negative.[9]

Women whose blood group is Rh- negative sometimes form Rh- antibodies when carrying an Rh-positive baby. This is more likely during birth, but occasionally happens in late pregnancy.[10]

## METHODS

A total of 40 patients attending outdoor antenatal clinic or admitted in the indoor wards in obstetric unit of Obstetrics and Gynecology department were included in the present study which was hospital based cross sectional study.

The study was carried out for one year at Government Medical College Jagdalpur, Chhattisgarh, India. Permission from Institutional Ethics Committee was obtained. From each and every patient included in the study, initially informed individual consent was taken.

Data was collected in pre-designed, pre-tested questionnaire. The data was then entered in the Microsoft Excel worksheet. Detailed history included age, address, occupation, education of the patient etc. were recorded as well as due menstrual history and obstetric history including gravida, Parity, number of mature and premature living children, number of pre- term labour, number of abortions, gestational age during each abortion and whether any of them were followed by dilatation and evacuation.

History of neonatal jaundice in previous children and whether any treatment was taken for it was also included. Number of still births, their gestational age, history of hydrops foetatis, history of bleeding per vaginum during pregnancy threatened abortion, ante- partum hemorrhage and history of caesarean section and external cephalic version was taken.

Past history included history of anti-D immunoglobulin injection in the previous pregnancy and any blood transfusion. Clinical examination was carried out carefully for pulse, BP, Pallor, Icterus, Edema and also height, weight, built was noted to know the nutritional status of the patient. Detailed systemic examination was carried out to find out the presence of cardiac, renal, respiratory and neurological disorders.

Local examination included eliciting for P/A to determine the duration of pregnancy examinations carried for presentation, position and status of presenting part of foetus and P/V done in patients presenting with labour pains.

All patients were investigated for hemoglobin; complete blood picture, urine, Blood grouping and Rh-typing. Special investigations for Rh-ve patient like ABO and Rh- typing of patient's husband and siblings, indirect Coomb's test and Kleihauer's test were also done.

## RESULTS

Table 1 shows the economic status of the patients. Maximum patients (25%) had an income of Rs. 200-300 per month and minimum patients (10%) had an income of Rs. 500-600 per month.

**Table 1: Distribution of cases according to economic status.**

| Income per month | No. of patients | Percentage |
|---|---|---|
| 100-200 | 4 | 10 |
| 201-300 | 10 | 25 |
| 301-400 | 7 | 17.5 |
| 401-500 | 8 | 20 |
| 501-600 | 4 | 10 |
| 600 and Above | 7 | 17.5 |

**Table 2: Distribution of cases according to religion.**

| Religion | No. of patients | Percentage |
|---|---|---|
| Hindus | 35 | 87.5 |
| Muslims | 4 | 10.0 |
| Christians | 1 | 2.5 |

Table 2 shows that maximum cases of Rh-negative patients 87.5% are Hindus and 10% are Muslims while only 2.5% are Christians.

**Table 3: Distribution of patients according to age groups.**

| Age in years | No. of patients | Percentage |
|---|---|---|
| Below 20 | 1 | 2.5 |
| 20-25 | 27 | 67.5 |
| 26-30 | 11 | 27.5 |
| 31-35 | 1 | 2.5 |
| Above 35 | - | - |

Table 3 shows that the percentage of patients below 20 years is 2.5, that between 20 to 25 are 67.5, between 26 to 30 is 27.5 and between 31 to 35 is 2.5. Thus maximum patients belong to the age group 20 to 25 years and above 31 years.

**Table 4: Distribution of patients according to gravidity.**

| Gravida | No. of patients | Percentage |
|---|---|---|
| 1 | 18 | 45.0 |
| 2-3 | 19 | 47.5 |
| 4-5 | 3 | 7.5 |
| 6-7 | - | - |

Table 4 shows distribution of patients according to gravidity. It is obvious from the table that maximum patients were gravida 2-3, and minimum were gravida 4 or more.

Table 5 shows distribution of cases according to parity. Thus 21 patients (52.5%) were primi para, 15 (37.5%) were 2nd para, 3 (7.5%) were 3rd para and 1 (2.5%) was 5th Para.

Table 6 shows distribution of cases according to obstetrics history. Accordingly, 6 patients had history of abortion, 2 had pre- term deliveries, and 18 had full term deliveries. 4 had history of operation and 1 had history of jaundice in previous children.

**Table 5: Distribution of cases according to parity.**

| Parity | No. of patients | Percentage |
|---|---|---|
| 1 | 21 | 52.5 |
| 2 | 15 | 37.5 |
| 3 | 3 | 7.5 |
| 4 | - | - |
| 5 and Above | 1 | 2.5 |

**Table 6: Grouping of cases according to obstetrics history.**

| Grouping of cases | No. of cases | Percentage |
|---|---|---|
| No of women with abortions | 6 | 15 |
| No of women with pre- term deliveries | 2 | 5 |
| No of women with full term deliveries | 18 | 45 |
| No of women with history of operation | 4 | 10 |
| No of women whose previous babies had jaundice | 1 | 2.5 |

Table 7 shows number of cases with presence of Rh-Antibody in Maternal Circulation during Pregnancy. It was found that one out of 40 patients, had Rh- Antibody in titer of 1: 128 and 39 cases, did not show presence of Rh- Antibody in their circulation.

**Table 7: Number of cases with presence of Rh-antigen.**

| Rh-antigen | No. of cases | Percentage |
|---|---|---|
| Presence of Rh-antibody in maternal circulation | 1 | 2.5 |
| Absence of Rh-antibody in maternal circulation | 39 | 97.5 |

**Table 8: Gestational age at which women had labour.**

| Gestational age | No. of cases | Percentage |
|---|---|---|
| Before 30 weeks | 1 | 2.5 |
| 31-34 weeks | 8 | 20.5 |
| 35-37 weeks | 3 | 7.7 |
| 38-40 weeks | 27 | 69.2 |

Table 8 shows the gestational age at which women had labour. It is evident that majority of patients (27) delivered between 38-40 cases of gestation and minimum (1) patient delivered before 30 weeks.

Table 9 shows the outcome of pregnancy in 40 patients studied. 3 patients had pre- mature labour, 26 had normal

vaginal delivery, 10 had caesarean section and one patient was Ante- natal.

**Table 9: Distribution of cases according to outcome of pregnancy.**

| Outcome of pregnancy | No. of cases | Percentage |
|---|---|---|
| Premature labour | 3 | 7.5 |
| Normal vaginal delivery | 26 | 65 |
| Caesarean section | 10 | 25 |
| ANC (last follow up) | 1 | 2.5 |

## DISCUSSION

The discovery of Rh- factor, the recognition of its clinical importance and the practical applications of this knowledge in therapy, constitute one of the great romances of modern researches where theory, observation and practice have, in the span of very few years, pierced themselves together to form a coherent picture. With the advent of an effective means of prevention of immunization by administration of injection Anti- D, post-delivery as well as ante natally in selected cases and good blood bank facilities, it is thought that the problem of iso immunization may be eradicated in the near future in developed countries. On the contrary, in the developing countries, it is going to take years before even the administration of Anti- D post-delivery or after abortion becomes a routine.

Logombal A in his study, in 57 patients, found that two-third of these cases fall into 20 – 29 years age group, but sensitization increases with advancement of age.

Chaturvedi DS, in 75 Rh- ve immunized cases found that 45 cases were between 20 – 30 years of age, 28 between 30 – 40 years and only 1 patient was above 40 years.

Bergstorm demonstrated Rh antigen in 38th day old fetus of 10 mm size. It was the youngest fetus in which Rh antigen was demonstrated. Therefore, realization of prophylaxis for Iso- Immunization after abortion.

Landsteiner and Wiener discovered the Rh- antigen. They also observed that the placenta was permeable to antibodies.

Goswami BK et al studied 23 patients of these 11 were primipara, 9 were para 2- 4 and 3 were para 3 and above. Jain PC et al at Maternity Hospital, Kanpur analyzed that out of 68 Rh-ve mothers examined, 26 belonged to group B. 21 to blood group O. 15 to group A and 6 to group AB. Levine in 1941 observed that relationship between the presence of Rh- antibody in Rh- ve women, and hemolytic disease of the baby. Levine et al detected Rh-antibody in breast milk.

A clinical trial of antenatal administration of Rh immune globulin, initially at 34 weeks and subsequently at 28 and 34 week's gestation, in 1357 Rh- negative pregnant women who were delivered of Rh- positive babies, was effective in preventing the development of Rh isoimmunization during pregnancy or within 3 days after delivery.[7]

Among African Americans, about 8% are Rh negative, whereas among white Americans, about 15% are Rh negative. Only 1% to 2% of Asians and Native Americans are Rh negative. When Rh- negative patients are exposed to the Rh antigen, they may become sensitized. Two mechanisms are proposed for this sensitization. The most likely mechanism is the occurrence of an undetected placental leak of fetal red blood cells into the maternal circulation during pregnancy. The other proposal is the "grandmother" theory. This theory suggests that Rh- negative women may have been sensitized from birth by receiving enough Rh- positive cells from her mother during her own delivery to produce an antibody response.[8]

Women whose blood group is Rh- negative sometimes form Rh- antibodies when carrying an Rh-positive baby. This is more likely during birth, but occasionally happens in late pregnancy. It can cause anemia, sometimes death. Giving the mother anti-D after the first birth does reduce the problems, but giving anti- D during pregnancy is likely to help as well, although more research is required to confirm these possible benefits and identify possible harms.[9]

## CONCLUSION

The present study was carried out in 40 cases that were Rh negative and were examined for sensitization, in Gynecology and Obstetrics Department of Medical College, Jagdalpur. Of the total admissions, 1.7% patients were Rh negative. Amongst the Rh negative women admitted, 77.5% were booked and the rest were unbooked cases. Maximum patients were from low socioeconomic group and minimum cases were from higher socio-economic group. Majority of cases were Hindus, next in order Muslims and then Christians. Age of maximum patients ranged from 20 – 25 years.47.5% patients were 2-3 gravida, 45% were primi gravida and only 7.5% were 4-5 gravida. Regarding parity maximum 52.5% were primipara, 37.5% were para 2nd, 7.5% were para 3 and only 2.5% were para 4 and above. Maximum patients had normal full term deliveries. In 65% cases, outcome of pregnancy was normal vaginal delivery.

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