Sero-prevalence of Rubella Antibodies in Pregnant Women with Bad Obstetric History Attending A Rural Tertiary Care Hospital in West Bengal, India

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Abstract

Background: Rubella infection in pregnant mothers is of great concern as it acts as a teratogen causing abortions, still births, intra-uterine foetal deaths and multiple birth defects. In India, rubella causes significant bad obstetric pregnancy outcome including congenital deformities due to lack of proper surveillance and immunization coverage with rubella vaccination. **Aim:** To determine Sero-prevalence of rubella IgM and IgG antibodies in Bad Obstetric History (BOH) pregnant women in Tertiary Rural Medical College in Eastern India. **Materials and Method**s: Cross sectional study was conducted from 1st January 2017 to 31st March 2017 on sera of 100 antenatal mothers with bad obstetric history aged between 20-40 years of age group with pregnancy of ≥18 wks. Rubella IgM and IgG antibodies were assessed by ELISA. **Statistical Analysis:** Percentage, proportions and x^2 test were applied. **Results**: Eleven per cent (11%) sero-prevalence for IgM antibodies and 54% for IgG antibodies was observed with maximum sero-positivity among 20-25 years mothers. Repeated abortions were the commonest pregnancy outcome. **Conclusion:** All antenatal cases should be routinely screened for rubella, so that early diagnosis will help in proper management and foetal outcome and strong recommendation for universal coverage of MMR in early age group of children.

Keywords: Antenatal Mothers, Bad Obstetric History, IgM & IgG Antibodies, Recurrent Abortion, Rubella

1. Introduction

Rubella is an acute, contagious viral infection and mainly a disease of children affecting the skin and lymph nodes. The etiologic agent is a positive sense, single-stranded RNA virus of the family Togaviridae having worldwide distribution. Maternal infection due to the virus in pregnancy is of much concern as it acts as a teratogen causing multiple birth defects of the heart, eye and ear collectively known as Congenital Rubella Syndrome (CRS). It also may lead to abortions, still births and intra-

uterine foetal deaths[1]. Foetal damage is, however, related to the stage of pregnancy[2]. If the maternal infection occurs before 9 wks of pregnancy, the risk of fetal manifestation is 85%, but it is only 52% if between 9-12 weeks and damage is rare if after 16 weeks of gestation[3]. Causes of Bad Obstetric History (BOH) may be genetic, hormonal, abnormal maternal immune response, maternal infection and others factors[4]. Infection of Rubella infection in early pregnancy is one of the notorious silent contributors to undesirable pregnancy outcome.

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Sero-prevalence of rubella infection in pregnant women in India varies from 6.5% in asymptomatic to 26.8% in pregnant females with bad obstetric history.[5] Humans are the only known reservoir for rubella virus. Till date, there is no specific treatment for Rubella but the disease is preventable by a single dose of cost effective live attenuated Rubella Vaccine and gives more than 95% long lasting effective immunity. This is often given in combination with the measles and mumps vaccine i.e., MMR vaccine[6].

The endemicity of rubella in India has been well established. Sero surveys have confirmed that 6-47% of women in India are susceptible to rubella infection.[7] Although rubella vaccination has reduced the incidence of rubella virus substantially, WHO estimates that worldwide more than 1,00000 children are born with CRS each year, most of them in developing countries[8].

There are very few studies which were conducted to identify the serological status of rubella IgM and IgG antibodies among rural population especially in pregnant women. On that ground, the present study was conducted with aim to determine the seroprevalence of rubella IgM and IgG antibodies in pregnant women with bad obstetric history in a tertiary Rural Medical College and Hospital.

2. Materials and Methods

An observational, analytic and cross-sectional study was conducted among antenatal mothers aged between 20-40 years of age with pregnancy ≤18 wks. having bad obstetric history, attending at the Gynae and Obstetrics OPD in Burdwan Medical College and Hospital from 1st January 2017 - 31st March 2017. Women with documented Rubella vaccination, primigravida, pregnancy >18 wks. and unwilling to participate were excluded. As a purposive sample, complete enumeration process was adopted to determine the sample size after considering inclusion and exclusion criteria. In this study, Bad Obstetric History (BOH) implies unfavourable foetal outcome in previous pregnancies - two or more consecutive spontaneous abortions, intrauterine foetal deaths/growth retardation, still births, early neonatal death and/or congenital anomalies[4]. Every mother with BOH attending in OPD (G&O) was explained properly the purpose of study and thereafter informed written consent was taken from every willing participant mother. Information of Socio-demographic profiles and pertinent medical history were recorded on pretested predesigned schedule by observation and interview. Blood samples were collected in a well lighted and ventilated room in the premises of hospital. Prior permission was obtained from The Ethics Committee, Medical Superintendent, Head of the Department (G&O) and Unit in charge (G&O) of Burdwan Medical College and Hospital to conduct the study.

For assessment of serological study of rubella IgM & IgG antibodies, adequate amount of sample i.e., 5ml of venous blood was collected in a sterile container with strict aseptic precautions from each study subject. The serum was separated and stored in numbered aliquots at -20°C till assayed for Rubella IgM and IgG antibodies by commercially - available (ELISA) kits-DS-EIA-ANTI-RUBELLA-M-FAST and DS-EIA-ANTI-RUBELLA-G-FAST (Diagnostic System Italy). The test was performed according to the manufacturer's instructions and the result was read at optical density 450 nm. and recorded accordingly. After the end of study period, hundred blood samples were collected, and thus total sample size became 100 for statistical analysis. Percentages, proportions and chi-squire test were applied, wherever appropriate, to identify important relationships between variables by determining the level of significance. In this study, a p-value of ≤ 0.05 was considered as statistically significant.

3. Results

In this study total 100 Bad Obstetric History (BOH) ante-natal mothers were screened and Hundred (100) blood samples were collected from them for serological detection of IgM & IgG antibodies against rubella virus. It was found that among hundred tested blood samples, 11 (11%) were found positive for rubella IgM antibodies and 54 (54%) for rubella IgG antibodies. Among 100 women, 92 (92%) were from rural area and 8 (8%) from urban area. Age group-wise prevalence for IgM antibodies showed maximum sero-positivity of 13.46% (07/52) among 20-25 years mothers and was closely followed by 26-30 years mothers (10.34%, 03/29) (Table 1) which decreased with age, reaching 7.69 % (01/13) in the age group 31-35 years.

Higher sero-positivity for rubella IgG was found in the age group 20-25 years (69.23%, 36/52) followed by 26-30 years (41.37%, 12/29) age group which decreased to 16.66 % (01/06) in the age group 35-40 years, (Table 1).

Previous pregnancy outcomes among the pregnant women with bad obstetric history and serological status in relation to rubella IgM antibodies were depicted in (Table 2). In this study, here it has been revealed that repeated abortions were the commonest outcome (17.95%, 07/39) followed by intra-uterine deaths (13.33%, 02/15). Intrauterine growth retardation and early neonatal death were equal in numbers (i.e., 14%, 14/100) but none of them was positive for rubella IgM antibodies. Statistical analysis showed that these relationships were not significant.

However, none of the women screened in this study, received rubella vaccination or aware of rubella and its complications.

4. Discussion

As a natural phenomenon, when a woman is infected with rubella viruses during pregnancy, the normal immune response results in production of IgM antibodies followed by IgG antibodies. IgM antibodies against Rubella persist for about 3 months, while IgG antibodies are detectable for a lifetime, providing immunity and preventing or reducing the severity of reinfection. Thus, if IgM antibodies are present in a pregnant woman, a current or recent infection with the organism is predicted. It is evident that maternal infections of rubella in early stage of pregnancy play a critical role in pregnancy wastage.

Infection with rubella virus is initially in apparent with the infection being mild and the rash and lymphadenopathies transient. The incubation period is 13 to 20 days during which the virus is transmitted by respiratory route replicating in the nasopharynx and lymph nodes[1]. The diagnosis is often missed as it is difficult to diagnose clinically. Hence sero-diagnosis is the most useful and reliable method to detect the infection.

Several studies have showed that 10-20% of the women in the childbearing age in India with Bad Obstetric History (BOH) were suffered from rubella infections. In those studies, the sero-prevalence varies from 4.66% to 28.6%. Ahmed et al.,[9] at Karachi, Pakistan, reported that sero-positivity for rubella IgM was 18% in women with BOH. Cao et al.,[10] at Hefei, China and Yashodara et al.,[11] from Hyderabad revealed in their studies 16.29 % and 12.5% positivity for rubella IgM antibodies respectively. In another study by Mathur et al.,[12] it was 13.8% whereas Chopra et al.,[13] reported that 17.5% antenatal women positive for rubella IgM antibodies. Study by Naveen Thapliyal et al.,[14] considered 28.6% cases for the same. Our study findings with 11.0% seropositivities of IgM antibodies in antenatal women with previous bad obstetric history, was closely corresponded with the observations above mentioned ones.

Table 1. Age-wise distribution of BOH mothers with their rubella IgG & IgM antibody seropositivities (n = 100)

Age (yrs)	No. of BOH mothers (%)	IgG positive (%)	IgM positive (%)
20-25	52 (52)	36 (69.23)	07 (13.46)
26-30	29 (29)	12 (41.37)	03 (10.34)
31-35	13 (13)	05 (38.46)	01 (7.69)
35-40	06 (6)	01 (16.66)	00 (0)
TOTAL	100 (100)	54 (54)	11 (11)

Table 2. Previous pregnancy outcome in BOH mothers in relation to their serological status of rubella IgM antibodies (n = 100)

Previous pregnancy outcome	No. of BOH mothers	IgM positive (%)	IgM negative (%)
Repeated abortion	39	07 (17.95)	32 (82.05)
Intra-uterine death	15	02 (13.33)	13 (86.67)
Premature delivery	17	02 (11.76)	15 (88.24)
Congenital anomaly	01	00 (0)	01 (100)
Intra-uterine growth retardation	14	00 (0)	14 (100)
Early neonatal death	14	00 (0)	14 (100)
Total	100	11 (11.00)	89 (89.00)

Higher Sero-positivity for rubella IgG in our study in the age group of 20-25 years (69.23%, 36/52) followed by 26-30 years (41.37%, 12/29) age group was possibly pertinent to more frequent exposure of infections to susceptible younger age groups due to many factors like lack of hygiene knowledge, education and awareness of rubella disease with its vaccination; overcrowding as well as the waning of sero-positivity with age. These findings were similar to the study done by Kumar et al.,[15]

It has been well established that infection with rubella virus is disastrous in early gestation leading to poor pregnancy outcomes i.e., recurrent abortions, intra uterine death, preterm delivery or a variety of congenital defects. Our study indicated that recurrent abortion was the commonest outcome (17.95%) closely followed by intra uterine foetal deaths (13.33%) and congenital anomalies (0%). These findings were similar to the observation of Ramana et al.,[5] who reported that IgM sero-positivity in women with history of repeated abortions, Intrauterine Foetal Death (IUFD) and congenital anomalies were 13.33%, 12.73% and 0.0% respectively. Other workers, however, reported it to be 7.52%, 6.25% and 4.1% respectively.[16] This variance in relation to presence of congenital anomalies in this study, may be due to geospatial susceptibility, repeated outbreaks of rubella, purposive sample technique along with others factors.

All the women screened in this study, did not received rubella vaccination earlier as per their version. This reflects actual scenario of very poor geospatial coverage of Rubella vaccination among women particularly in these rural areas.

5.   Conclusion

The present study suggests the need for antenatal screening along with continuous effective surveillance for rubella infection to detect cases and to control the outbreaks. Early intervention and proper management of these cases are required to curb the disease burden. This study revealed that younger age group is affected more so that it emphasizes the need to formulate an effective rubella immunization programme in all children, adolescent girls and women of childbearing age group before conception to boost the immunity and as a preventive measure against its disastrous pregnancy outcomes. Cost effective rubella vaccination of all children can achieve the goal of reduction and complete prevention of this vaccine preventable infection. Therefore, the importance of the rubella vaccination should be emphasized upon and awareness should be created among the people, particularly in slum and rural vulnerable areas about rubella and its adverse effect to pregnancy outcomes.

6.   Limitations

Sample size is small and single centred institutional based study. Titre values were not determined by other techniques and thus comparative statistics not done.

7.   Acknowledgement

8.   Conflict Of Interest: Nil

9.   References

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