



SEROPREVALENCE OF RUBELLA ANTIBODIES AMONG WOMEN ATTENDING ANTENATAL CLINIC IN A TERTIARY CARE HOSPITAL

Medical Microbiology

Dr.Sornajayanthi P* M.D., Professor, Department of Microbiology, Tirunelveli Medical College, Tirunelveli - 627011, Tamil Nadu, India *Corresponding Author

Dr.Kanagapriya M M.D., Assistant Professor, Department of Microbiology, Tirunelveli Medical College, Tirunelveli - 627011, Tamil Nadu, India.

Dr.Sucilathangam G M.D., Associate Professor, Department of Microbiology, Tirunelveli Medical College, Tirunelveli - 627011, Tamil Nadu, India.

ABSTRACT

Background: Rubella virus infection poses a great threat to the foetus whose mother acquires the infection. This study was therefore carried out to determine the seroprevalence of rubella virus IgG antibodies among the pregnant women attending a tertiary care hospital. **Materials and Methods:** Ninety sera were collected from pregnant women and screened for Rubella virus IgG antibodies. A structured questionnaire was administered to subjects to obtain socio-demographic data. The sera samples were analyzed using Enzyme Linked Immunosorbent Assay (ELISA) IgG Rubella kit. **Results:** Out of 90 pregnant women screened, 75(83.33%) subjects were sero-positive. Age group above 21-25 years recorded the highest prevalence 30(40%). **Conclusion:** An action revamping the national immunization policy should be considered along with Sero-surveillance of Rubella among women of childbearing age before conception for the assessment and analysis of the situation, and take appropriate action to eradicate Rubella.

KEYWORDS

Rubella virus, Pregnant women, seroprevalence, IgG antibodies, Enzyme Linked Immunosorbent Assay (ELISA)

INTRODUCTION

Rubella is an acute, mild exanthematous disease which can be characterized by low grade fever, morbilliform rash and lymphadenopathy affecting children and adults.⁽¹⁾ Rubella infection is caused by Rubella Virus which is a member of the family Togaviridae and the only member belonging to the genus Rubivirus. Rubella virus is a RNA virus with single stranded, positive sense RNA genome.⁽²⁾

Incubation period of this infection is 2-3 weeks and humans are the only reservoir. The mode of transmission is via aerosols and transplacental spread.⁽³⁾ It is a disease of public health importance in pregnant women because congenital Rubella Syndrome is a major issue for the fetus during the initial stage of pregnancy.⁽⁴⁾ Maternal infection during the first trimester of pregnancy may result spontaneous abortion or fetus born with congenital defects like sensory-neural hearing impairment, cardiac defects and cataract. This presentation is together called as Congenital Rubella Syndrome (CRS)⁽⁵⁾

Rubella infection may result in multiple fetal defects in about 80 to 90% of cases. Globally around 110,000 children are born with CRS every year, among which 40,000 cases are from India⁽⁶⁾. There is no specific treatment for this infection but the incidence can be reduced by using the live attenuated vaccine.⁽⁶⁾ Maternal antibodies against Rubella have a protective effect and it can prevent congenital rubella syndrome.

A single dose of rubella vaccine (live attenuated strain) gives more than 95% long lasting immunity against Rubella infection. The vaccines available for Rubella are either monovalent or in combinations with other vaccines like; Measles and Rubella vaccine (MR); Mumps, Measles and Rubella (MMR); Mumps, Measles, Rubella, Varicella (MMRV) are available in Indian market. Safety and efficiency studies of MMR/MMRV shows favorable results against multiple viruses.

In India Rubella vaccine has not been included in universal immunization program and used only in private sector covering a small proportion of population. In India, the child bearing women belonging to low socio-economic group reside in rural areas are come under high risk pregnancy group, as they are exposed to a wide range of infections due to poor environmental conditions and lack of poor hygiene practices. The main aim of this study is to evaluate the seroprevalence of Rubella antibodies among antenatal women attending the antenatal clinic.

AIMS AND OBJECTIVES:

- To evaluate the seroprevalence of rubella antibodies among women attending antenatal clinic in a tertiary care Hospital.
- To evaluate the study subjects based on their parity and the Seroprevalence of IgG antibodies.

MATERIALS AND METHODS

This Descriptive study was conducted at Department of Microbiology, Tirunelveli Medical College for the period of two months (April 2022 to May 2022). Ethical committee approval (IEC No:20222259 dt-12-3-2022) and informed consent were obtained for the present study.

Study population: Antenatal mothers attending the antenatal clinic in the Department of Obstetrics and Gynecology, Tirunelveli Medical College.

Inclusion Criteria:

- 1) Primigravid antenatal mothers
- 2) Multigravid antenatal mothers
- 3) Antenatal mothers with previous history of fever, rash and lymphadenopathy.
- 4) Antenatal mothers with bad obstetric history.

Exclusion Criteria:

- 1) Antenatal mothers with history of consanguineous marriage.

Sample Size: 90 antenatal mothers.

Data collection

Socio-demographic details such as name, age, occupation, last menstrual period and expected date of delivery were obtained using a structured proforma. Each participant was allotted with a unique ID number.

Sample collection

After explaining the sample collection procedure and following the standard aseptic precautions, 5ml whole blood was collected from each participant. The vacutainer was pre-labeled with the unique ID number.

Sample Transportation and storage

The collected samples were transported immediately to the Microbiology Laboratory. Serum was separated by centrifugation at 3000 rpm for 5 minutes and stored at -20°C.

Sample processing

Anti rubella antibodies Immunoglobulin G assay [Calbiotech Rubella IgG ELISA] was used to quantitative anti Rubella IgG in the test

samples based on the manufacturer's instructions.

Calculation of results

1. Cut-off value = Calibrator OD x Calibrator Factor (CF).
2. Antibody Index = Sample OD/ Cut-off value

Quality control

The study ELISA run fulfilled all criteria for validity.

1. The O.D. of the Calibrator should be greater than 0.250.
2. The Ab index for Negative control should be less than 0.9.
3. The Antibody Index for Positive control should be greater than 1.2.

Antibody Index Interpretation:

- ✓ <0.9 No detectable antibody to Rubella IgG by ELISA.
- ✓ 0.9-1.1 Borderline positive. Follow-up testing is recommend if clinically indicated.
- ✓ >1.1 Detectable antibody to Rubella IgG by ELISA.

RESULTS

The present study was conducted in the department of microbiology, Tirunelveli Medical College after obtaining proper ethical committee clearance. A total of 90 samples were collected from antenatal mothers attending the Antenatal clinic, Tirunelveli medical college, among which 75 (83.33%) samples had IgG antibodies against Rubella.

Among the collected samples, 42 were from the mothers from rural areas, out of which 35 samples had anti-rubella IgG antibodies. [Table-1]

Table 1: Distribution of the study participants among the rural and urban areas

Area	IgG positive (%)	IgG negative (%)
Rural (n=41)	34 (82.93)	7 (17.07)
Urban (n=49)	41 (83.67)	8 (16.33)
Total = 90	75	15

Table 2 describes the distribution of the IgG rubella antibodies among the different age groups of the antenatal mothers. Maximum seropositivity for IgG Rubella antibodies were seen among mothers who were above 30 years of age.

Table 2 Seroprevalence of Rubella IgG antibodies in different age groups

Age group	IgG positive (%)	IgG negative (%)
16-20 (n=9)	8 (88.88)	1 (11.11)
21-25 (n=38)	30 (78.94)	8 (21.06)
26-30 (n=30)	25 (83.33)	5 (16.66)
31-35 (n=10)	9 (90.00)	1 (10.00)
36-40 (n=3)	3 (100)	0 (0.00)
Total (n=90)	75 (83.33)	15 (16.66)

Among the 75 positive samples, the highest IgG antibodies were seen among the G3 mothers, 12 samples (100%). [Table 3]

Table 3: Comparison between gravida and IgG seroprevalence

Parity	IgG positive	IgG negative
G1 (42)	30 (71.43)	12 (28.57)
G2 (31)	29 (93.55)	2 (6.55)
G3 (12)	12 (100)	0 (0.00)
G4 (5)	4 (80)	1 (20.00)

Table 4 shows the distribution of the seroprevalence of IgG rubella antibodies among the three trimesters of the antenatal mothers. Among the mothers in III trimester the IgG rubella antibodies are detected comparatively high.

Table 4: Comparison between the trimester and IgG seroprevalence

Trimester	IgG positive(%)	IgG negative(%)
I Trimester(n=11)	10 (90.9)	1 (9.1)
II Trimester(n=45)	34 (75.55)	11 (24.45)
III Trimester(n=34)	31 (91.19)	3 (8.81)

Maximum of the study participants have more than 2.1 Antibody index, which indicates that these individuals have better immunity to Rubella virus. The distribution of Antibody index among the study participants is shown in Table 5.

Table 5: Comparison of IgG antibody index among different age

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groups

AGE	IgG Antibody Index ≤1.0	IgG Antibody Index ≥ 1.1
16-20 (n=9)	1 (11.11)	8 (88.89)
21-25 (n=38)	8 (21.05)	30 (78.95)
26-30 (n=30)	5 (16.66)	25 (83.34)
31-35 (n=10)	1 (10)	9 (90)
36-40(n=3)	0	3 (100)

DISCUSSION

Rubella virus is an important public health problem and is mostly responsible for congenital infections, which leads to severe congenital abnormalities. The child bearing age group women with lack of Rubella IgG antibodies are susceptible to primary infection (5 – 25%)⁽¹⁾. Extrapolated data shows that 26% of Cataracts, 12-17% of congenital malformations and upto 29% of sensorineural deafness among infants in India is due to Rubella infection⁽⁷⁾. Serodiagnosis is the most useful and reliable method of choice to detect Rubella infection⁽⁸⁾.

The study was conducted between April 2022 to May 2022 in antenatal clinic department of Obstetrics and Gynecology, Tirunelveli medical College. In the present study, out of 90 serum samples from Antenatal mothers, 75 (83.33%) were positive for rubella IgG antibodies. It was similar to Manjunathan et al showed 86.8% whereas it was higher than the study conducted by Pradhan et al showed 68.4% positive for rubella IgG antibodies.^(9,10)

In India, antenatal cases were screened for the immunity status of Rubella between 1998-2002 and 2003-2006, which revealed 83.06% and 95.15% respectively^(11,12). Other studies from Western Cape Town and Sri Lanka have shown seropositivity of 89.5% and 76% respectively^(13,14).

In the present study the sero-prevalence of rubella IgG antibodies was higher among the urban population 83.67% which is similar to other studies conducted by Wondimeneh⁽⁵⁾ et al (81.1%) , Tamirat⁽¹⁵⁾ et al (90%), Ouyahia A⁽¹⁶⁾ et al (54.4%), Tahita C⁽¹⁷⁾ et al (95.5%) and Hasan⁽¹⁸⁾ et al (90.4%).

In the present study the seroprevalence of rubella IgG antibodies were higher among women over age group of 36 years (100%) which is similar to other studies conducted by Wondimeneh⁽⁵⁾ et al, Aamir Khan⁽¹⁹⁾ et al, and Olajide⁽²⁰⁾ et al showed that the mothers above 35 years of age showed higher IgG antibodies compared to other age groups.

In the present study multigravid mothers showed 100% seropositivity for IgG rubella antibodies. This was similar to other studies results like Ravindran⁽¹⁾ et al 91.6% and Wondimeneh⁽⁵⁾ et al (100%).

Among the study participants the mothers at the third trimester, were more immune to rubella infection (86.11%) which was similar to another studies conducted by Tamirat⁽¹⁵⁾ et al and Aamir Khan⁽¹⁹⁾ et al which showed 88.2% of the pregnant mothers were immune to rubella infection during the third trimester. Other study like Wondimeneh⁽⁵⁾ et al (82.5%) showed that the mothers in first trimester are more immune to Rubella infection.

The antibody index calculated for the present study was above 1.1 in 100% of the pregnant mothers of more than 36 years of age. Similar results were reported by Ravindran⁽¹⁾ et al, Manila K⁽²¹⁾ et al and Jorge B⁽²²⁾ et al, which showed that antenatal mothers of more than 33 years of age had antibody index of more than 1.5.

CONCLUSION

Rubella is a contagious viral infection which will affect the developing fetus, causing fetal death or congenital rubella syndrome in pregnant women. Pregnant women are not routinely screened for rubella antibodies. Hence screening of Rubella in all women of child bearing age should be encouraged. Since Rubella is a preventable viral disease, seronegative women should be vaccinated against Rubella. A nationwide Rubella immunization programme for adolescent girls should be made mandatory to prevent Rubella infection.

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