

SEROPREVALANCE OF RUBELLA IgG ANTIBODIES AMONG ADOLESCENT FEMALES IN A TERTIARY CARE HOSPITAL

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Abstract

Background: Rubella is a mild self-limiting exanthematous illness, caused by the enveloped positive sense single stranded RNA. Though it causes mild infections, it has teratogenic potential. Rubella infection in early pregnancy can lead to miscarriage, foetal death, or congenital rubella syndrome (CRS) and it is an important public health problem. The severity of infection in the foetus depends on the time of maternal infection. The most effective way of preventing CRS is through Rubella vaccination. The aim of this study is to determine the Seroprevalence of Rubella IgG antibodies among adolescents age group (10years-19 years) by Quantitative ELISA. **Materials and Methods:** This cross sectional study was conducted at Stanley medical college, Chennai, from November 2023 to April 2024. A total of 110 adolescent females were selected and their blood samples were collected. Quantiation of serum rubella IgG antibodies done by ELISA. **Result:** A total of 110 samples were tested. Among them 98(89.1%) adolescent females had significant titre for IgG antibodies. Although 12(10.9%) females were negative. Highest seropositivity among 17-19 years age group(52%).The urban adolescent females (84.7%)had a higher seropositivity compared with rural. **Conclusion:** The study indicates that a significant number of adolescents (10.9%) are seronegative, they are susceptible to rubella infection. Hence, motivate the public to take available free vaccines under the National Immunization Programme Schedule.

INTRODUCTION

Rubella is a mild exanthematous infection, caused by rubella virus occurs mostly in late winter and early spring.^[1] Rubella virus is an enveloped pleomorphic, spherical particle, 50-70nm in diameter, with a single stranded positive sense RNA belongs to Togaviridae family. It is transmitted by droplet infection. About 20-50% of rubella infections are asymptomatic. In symptomatic cases, after an incubation period of 2-3 weeks, patients develop swollen lymph nodes, malaise, rash and upper respiratory tract symptoms. Fever is not always a clinical presentation. Adult and adolescent can manifest with joint pain and inflammation.^[2]

Although it is a mild self-limiting illness, the virus has immense teratogenic potential. If the infection is contracted during early pregnancy in unvaccinated individual, it will cause disastrous consequences like foetal death (20%) or congenital defects known as Congenital Rubella Syndrome (90%) (CRS). The commonest malformations caused by rubella are

cardiac defects, deafness and cataract which constitute the Classical Congenital Rubella Syndrome. Several other features have been recognized in babies with CRS, including hepatosplenomegaly, thrombocytopenic purpura, myocarditis and bone lesions, constituting the Expanded Rubella Syndrome. Infants with CRS may excrete the virus for a year or more.^[3] Rubella causes a huge socioeconomic burden on the families and societies as a whole.^[4] Birth defects are uncommon if maternal infection occurs after the 20th week of gestation.^[5]

No specific Antiviral drugs available for rubella. The disease is preventable by vaccination. A single dose of vaccine gives more than 95% long lasting immunity which is similar to that induced by natural infection.^[6,7] Government of India launched one of the world's largest vaccination campaigns against measles and rubella on 5 February 2017,^[8] in five states/union territories - Karnataka, Tamil Nadu, Puducherry, Goa and Lakshadweep covering nearly 3.6 crore children. The campaign is targeted at

vaccinating more than 41 crore children in the age group of nine months to less than 15 years over the next two years across the country. After the MR campaign the MR vaccine was introduced during the month of February 2017 in the National immunization programme (NIP) and given as two doses schedule in the age group at 9 -12months and 16-24 months of age of the child.^[4] Eventhough MR vaccine has been added to the NIP, some of the children missing the regular vaccination may develop infection. If the infection develops during child bearing age group, the children born to them will be at a risk of developing CRS. Hence the aim of my study is to determine the seroprevalence of Rubella IgG antibodies among adolescent girls who are at a critical stage of child bearing age.

MATERIALS AND METHODS

After obtaining Institutional ethics committee clearance, a cross sectional study was conducted from November 2023 -April 2024 at Department of Microbiology, Obstetrics and Gynecology, Government Stanley Medical College, Chennai. Hundred and ten adolescent females in the age group of 10-19 years and not aware of Rubella Vaccination status were included in this study. A standard questionnaire was used to collect the data. In addition, history of any exanthematous fever and past and recent hospitalizations were also noted. Informed consent was obtained from all the participants. Under Aseptic precautions, 3ml of blood sample was collected by venipuncture, then the serum was separated by centrifugation and stored in aliquots at -20 degree Celsius till tested. Estimation of serum IgG level was done by Indirect ELISA (QUALISA) company. The optical density (OD) was measured at 450nm. As per kit instructions, OD of cut off and positive calibrators are plotted on Y axis in graph versus their corresponding anti Rubella IgG concentration of 0,15,30,100 IU/ml on X axis. The estimates of levels in patient sera are read off the graph using their individual sample. IgG antibody titre <13IU/ml signifies that the person is negative to rubella antibody, titres 13-15IU/ml is an

indeterminate result and titres >15IU/ml signifies positive to rubella antibody.

RESULTS

In this study a total of 110 adolescent girls in the age group of 10-19years were enrolled. The mean age of the study participants is 15.7years. 89.1% of the adolescent girls were found to be rubella seropositive with a mean titre of 28.8 IU/ml [Table 2]. 10.1% were seronegative having a titre less than 13 IU/ ml and were categorised as susceptible to Rubella infection. None of the patients showed clinical features of active infection of rubella.

In this study, among total 98 seropositive case for rubella, 22(22.4%) were in the age group of 10-13 years, 25(25.5%) were in the age group of 13-16 years, 51(52%) were in the age group of 17-19 years [Table 3]. Domicille location and seroprevalence was correlated. Among the susceptible subjects 83.3% of the girls were from urban and 16.7% were from rural areas [Table 4].

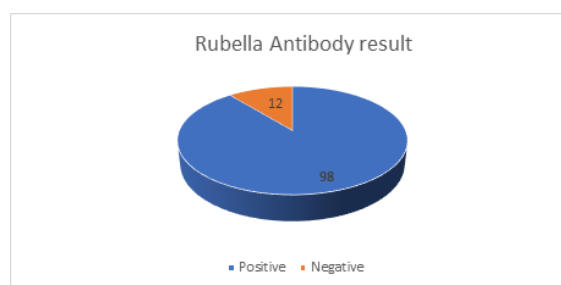


Figure 1: Rubella Ig G antibody result

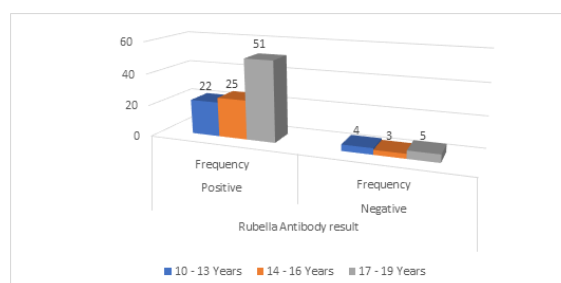


Figure 2: comparison of age groups between rubella seroprevalence

Table 1: Age wise distribution of cases.

Age	Frequency	Percentage
10 - 13 Years	26	23.6
14 - 16 Years	28	25.5
17 - 19 Years	56	50.9
Total	110	100.0

Table 2: Rubella IgG antibody result

Rubella Antibody result	Frequency	Percentage
Positive	98	89.1
Negative	12	10.9
Total	110	100.0

Table 3: comparison of age groups between rubella seroprevalence

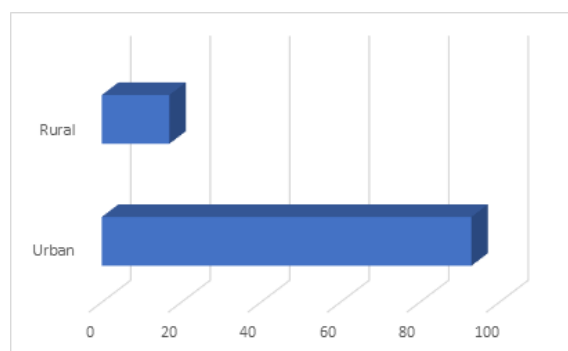
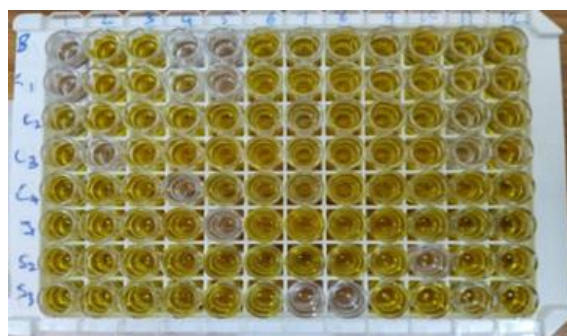
Age	Rubella IgG Antibody result			
	Positive(n-98)		Negative(n-12)	
	Frequency	Percentage	Frequency	Percentage
10 - 13 Years	22	22.4	4	33.3
14 - 16 Years	25	25.5	3	25.0
17 - 19 Years	51	52.0	5	41.7
Total	98	100.0	12	100.0

Table 4: correlation of domiciliary location with rubella seroprevalence

Domiciliary Location	Rubella IgG Antibody result			
	Positive(n-98)		Negative(n-12)	
	Frequency	Percentage	Frequency	Percentage
Urban	83	84.7	10	83.3
Rural	15	15.3	2	16.7
Total	98	100.0	12	100.0

Table 5: Rubella IgG titre value among study population

Ig G Titre Value	Number of study participants	Percentage
1 - 10 IU / ml	12	10.9
11 - 20 IU / ml	20	18.2
21 - 40 IU / ml	53	48.2
41 - 60 IU / ml	25	22.7

**Figure 3: correlation of domiciliary location with rubella seroprevalence****Figure 4: Rubella Ig G ELISA microtitre plate**

DISCUSSION

This study was aimed to determine the prevalence of protective immunity level by measuring the titre of the Rubella-specific IgG antibody among the adolescent girls aged between 10 to 19 years as they are susceptible to rubella infection. Quantitative ELISA (QUALISA) was done to detect the IgG antibody titre of the study participants.

In our study, 98(89.1%) of adolescent girls were seropositive out of 110 study population [Table 2]. In our participants anti rubella IgG comes from a previous vaccination during the childhood or from

natural infection. Because of the subclinical presentation, parents are unaware of the rubella infection. Seronegativity of our study participants was (12/110)10.9%. It is possible for them to contract the infection more frequently during pregnancy if they are not immunized. This study is concordant with a study conducted by Nalini Ramamurthy et al (2006) which showed seropositive was 86.4%.

Seronegativity was highest among 17-19 years age group which showed 41.7% [Table 3]. It may be due to they are unaware of vaccination or they are not exposed to disease. This study is similar to a study conducted by Dr. Vipul Dutt et al(2020) which showed maximum percentage of seronegativity in age group of 17 years(37.5%).^[14]

In this study, Rubella IgG seropositivity highest among urban population 84.7%. [Table 4] This seropositivity may be attributable to the fact that urban areas have larger population densities than other areas, making residents more prone to get the rubella virus through respiratory droplets. This study is concordant with a study conducted by Dipali prasad et al (2020) and Sharma et al(2011) which showed urban adolescents were had highest seropositivity of 85.2% and 80.2% respectively.^[15,16] The results of this study are consistent with studies conducted in abroad and India that have reported that 10–20% of women who are childbearing age are vulnerable to rubella. But a low susceptibility does not imply that there is no chance of developing CRS.^[12]

According to an analysis of CRS surveillance data from India, the percentage of CRS patients decreased from 26.01% in 2017 to 8.7% in 2021. This downward trend may be the result of fewer cases of rubella spreading due to community immunity rising as a result of MR immunization.^[17]

CONCLUSION

In this study, seropositivity of Rubella IgG among adolescent girls is 89.1%, which may be due to natural infection as the immunisation status is unknown. After the introduction of Rubella vaccine in National Immunisation Programme since 2017 and due to 95% efficacy of vaccine, there may be increased protectivity against Rubella infection, if the vaccination service is properly utilised. Hence, public awareness among urban, rural and remote areas should be created, for the free utilisation of the Rubella vaccine as per the NIP schedule to prevent teratogenic effects of infection.

REFERENCES

1. WHO, seroprevalance of rubella in pregnant women sumeet
2. European centre for disease prevention and control
3. World Health Organisation. Media centre. Rubella. Fact sheet as reviewed in March 2017. Available at: <http://www.who.int/media centre/factsheets/fs367/en>
4. Press information Bureau, Government of India, Ministry of Health and Family Welfare, 05-February-2017 15:26 IST. Health Ministry launches single vaccine for dual protection against measles and rubella as part of Universal Immunization Programme.
5. Jawetz 26 th edition, page no.607
6. World Health Organisation. Media centre. Rubella. Fact sheet as reviewed in March 2017. Available at: <http://www.who.int/media centre/factsheets/fs367/en>.
7. Dewan P, Gupta P. Burden of Congenital Rubella Syndrome in India. A Systematic Review. *Indian Paediatric*. 2012; 49:377-99.
8. WHO. Country office for India. India launches one of the world's largest vaccination campaigns against Measles and Rubella syndrome with WHO support. Available at: <http://www.who.int/media centre/events/2017/Measles Rubella/en>.
9. Seventy-nine percentage coverage in measles-Rubella Campaign. *The New Indian Express*. 15 March 2017. Available at: <http://www.newindianexpress.com/states/tamilnadu/2017/mar/15/79-percentcoverage-in-measles-rubella-vaccine-drive-1581506.html>
10. Yadav S, Gupta S, Kumar S. Seroprevalence of Rubella in women of reproductive age. *Indian J Pathl Microbiol* 1995;38(2):139-142
11. Sangita Yadav, Vineeta Wadhwa, Anita Chakarvarti. Prevalence of Rubella Antibodies in School going Girls. *Indian Pediatrics* 2001; 38: 280-283
12. O. Dimech, W. (2016). Where to Now for Standardization of Anti-Rubella Virus IgG Testing. *Journal of Clinical Microbiology*, 54(7), 1682–
13. Nalini Ramamurthy, S. Murugan, D. Raja, Varalaksmi Elango, Mohana & D. Dhanaganan. Serosurvey of rubella in five blocks of Tamil Nadu. *Indian J Med Res* 123, January 2006: 51-54
14. Dr Vipul Dutt, Dr Vineet Rastogi and Dr Barun Bhai Patel (2020) 'Seroprevalence of Rubella Antibodies Among School Going Adolescent Girls in the Age Group of 10 to 18yrs of Pune', *International Journal of Current Advanced Research*, 09(02), pp. 21298-21301. DOI: <http://dx.doi.org/10.24327/ijcar.2020.21301.4181>
15. Rubella seroprevalence among unvaccinated adolescent girls in chennai ramyaa rajendiran1 , shanthi ramesh2* and jagdeep ramesh3 1consultant pediatrician, deepam hospital, chennai, *2associate professor, department of paediatrics, sree balaji medical college hospital, chennai, 3crri, department of paediatrics, sree balaji medical college hospital, chennai.
16. Prasad D, Prasad N, Prakash V, Parven S, Mishra U. Seroprevalence of unvaccinated adolescent girls susceptible to rubella virus infection seen in a tertiary care hospital of Patna, Bihar, India. *Int J Reprod Contracept Obstet Gynecol* 2020;9:1972-5.
17. Congenital rubella syndrome surveillance in India, 2016–21: Analysis of five years surveillance data