

# Seroprevalence of Rubella Antibodies in Women of Reproductive Age Group

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## ABSTRACT

**Introduction:** Rubella is a mild exanthematous disease of worldwide distribution. However, there is risk of adverse pregnancy outcome and congenital defects in foetus when it infects susceptible pregnant women. The endemicity of rubella has been well established in India; still very few surveys are done. Thus, it is important to know proportion of women of childbearing age who are susceptible to rubella so as to know the risk of adverse pregnancy outcome.

**Aim:** To know the seroprevalence of Rubella antibodies in women of reproductive age group

**Materials and Methods:** A total of 120 women of reproductive age group were selected randomly. About 2-3 ml of single blood sample was collected from selected women. Sera was separated and tested for IgG and IgM antibodies specific for rubella virus by ELISA .

**Setting and Design:** It was a cross-sectional study from December 2012 to August 2014. The study was conducted from December 2012 to August 2014 at Shri B M Patil Medical College, Hospital and Research Centre, BLDE University, Bijapur.

**Statistical analysis:** Association between seroprevalence of Rubella and socio-demographic factors was found by using  $\chi^2$ - test. Statistical analysis was done by software-SPSS17 version.

**Results:** Overall prevalence of seropositivity of rubella IgG antibodies was 31.66% indicating they were immune for rubella infection. Seropositivity for IgM antibodies was found in one (0.83%) woman. Higher (40%) incidence of seropositivity for IgG antibodies was observed in women presenting with adverse pregnancy outcome than that of normal pregnancy outcome (29.1%). Rubella IgG seropositivity in age group of 16-25 year was 26.31% which increased to 40% in age group of 26-35 years.

**Conclusion:** In our area substantial number of women reach child bearing age without acquiring natural immunity to Rubella. Hence, screening of rubella and immunization of women at risk are highly recommended in this area. Also continued evaluation of the susceptibility of women in the reproductive age to rubella infection is essential to set a strategy for prevention of congenital rubella syndrome.

**Keywords:** Congenital rubella syndrome, ELISA, Immunization, Women of child bearing age

## INTRODUCTION

Rubella is an acute febrile illness, which is caused by rubella virus, from Togavirus family genus Rubivirus. The disease is characterized by a rash and lymphadenopathy that affects children and young adults. It is the mildest of common viral exanthems. However, infection during early pregnancy may result in serious abnormalities of the foetus, including congenital malformations and mental retardation [1].

Various maternal infections for eg. Toxoplasma gondii, Rubella virus, Cytomegalovirus and Herpes simplex virus, transmissible in utero at various stages of gestation leads to unfavourable pregnancy outcome. Primary infections caused by them are the major causes for abortions, still births and congenital defects among foetuses of infected mother [2]. Among them Rubella virus is most consistent in its harmful effects on foetus. The virus can be transmitted to foetus through the placenta and is capable of causing abortions, still births and serious

congenital defects (Congenital Rubella Syndrome – CRS).If contracted during first trimester the risk of foetal infection is about 90% to suffer from CRS - blindness, hearing loss, heart diseases, psychomotor delay and mental retardation [3].

The endemicity of rubella has been well established in India. Immunity to rubella among child bearing age group of women can indirectly hint at the risk of acquiring CRS. Recent data from Vellore show that 9.8 per cent of children in India, with suspected congenital infections had congenital rubella, as the cause. Thus, it is important to know the proportion of the population susceptible to rubella especially in women of reproductive age so as to know the risk of adverse pregnancy outcome [4]. As rubella infection presents atypically and is asymptomatic so clinical diagnosis is unreliable and serological tests having good sensitivity and specificity are of great value in diagnosis of rubella [5].

The present study is undertaken to find out the role of rubella as a major foeto-pathogen associated with pregnancy wastage and thus to identify one of the preventable cause of fetal loss.

## MATERIALS AND METHODS

This cross sectional study was conducted between the period of December 2012 to August 2014. A total of 120 women in childbearing age (16-45) years, were selected randomly from Obstetrics and Gynaecology OPD of Shri B.M Patil Medical College Hospital & Research Centre, Bijapur. The study protocol was approved and ethical clearance was given for this study by the ethical committee of the university. A questionnaire form was filled for each woman by direct interview. The data requested include age, residence, level of education, occupation, pregnancy (pregnant and non-pregnant), trimester, parity. We excluded the women who have had history of recent illness with rash, or contact with a known case of rubella.

After history and examination about 2-3 ml of blood sample was collected by venipuncture with all aseptic precaution in a sterile, dry plain test tube from each woman and was sent laboratory immediately. Serum was separated from whole blood and stored at 4°C until analyzed. Sera sample were tested for detection of IgG and IgM antibodies against Rubella using Rubella IgG and IgM ELISA kit (DELTA BIOLOGICALS) and manufacture's instruction were strictly adhered to in the performance and interpretation of the tests.

## RESULTS

In present study 120 women of child bearing age (16 - 45 years) were included. Considering all age groups overall rubella IgG seropositivity was found in 38 (31.66%) women in our study.

Rubella IgM seropositivity was found only in one case (0.83%).

In our study 75 women were pregnant, among them 19 (25.3%) are seropositive for rubella IgG antibodies . Out of 45 non pregnant women 19 (42.2%) were positive for rubella IgG.

Considering the age, 16-25 year age group includes maximum (76) women in our study, among them 20(26.31%) women were seropositive for IgG antibodies. Among 40 women of 26-35 years age group, 16 (40 %) were positive. Out of 4 women of >35 years age group 2 (50%) were seropositive for rubella IgG antibodies. There was an increasing trend in seropositivity from 26.31% in 16-25 years of age group to the incidence of 40 % in the age group 26-35 years However, there was insignificant difference of rubella IgG antibodies among 16 -25 & 26-35 years age groups  $p=0.27(>0.05)$

The prevalence of Rubella seropositive women was more in those residing in rural areas (34%) as compared to those of urban areas (21.7%). Statistically the difference was not significant ( $p>0.05$ ). A decline in the immune status with rising

socioeconomic status was also observed and the difference in seropositivity between upper and lower class was found to be not statistically significant ( $p<0.05\%$ ).

Out of 25 women with history of previous adverse pregnancy outcome, 10 (40%) were seropositive for rubella IgG antibodies which was higher than in women with normal obstetric performance before (29.1 %), the difference between the two being insignificant ( $p>0.05$ ) [Table/Fig-1]. None of the women included in this study gave history of immunization against Rubella.

Isolates	No. of women tested (%)	No. of women positive (%)	p-value
<b>Age group (years)</b>			
16-25a	76(63.33)	20(26.31)	Between a & b 0.27
26-35b	40(33.33)	16(40)	
36-45	04(3.3)	02(50)	
<b>Geographic Area</b>			
Rural	97(80.83)	33(34)	0.254*
Urban	23(19.16)	05(21.7)	
<b>Socioeconomic Status</b>			
Uppera	20(16.66)	06(30)	Between a & b 0.367*
Middle	42(35)	08(19.04)	
Lowerb	58(48.33)	24(41.37)	
<b>Previous Obstetric Performance</b>			
Adverse pregnancy outcome	72(60)	21(29.1)	0.06
Normal obstetric performance	25(20.83)	10(40)	

**[Table/Fig-1]:** Rubella seropositivity rates in different age groups, geographical areas, socioeconomic status, and previous obstetric performance

## DISCUSSION

In our study 120 women in reproductive age group were tested for rubella IgG and IgM antibodies, among these 38 (31.66%) were positive for rubella IgG antibodies and 1(0.83%) for rubella IgM antibodies. There is considerable variation in the prevalence of rubella antibodies among women of childbearing age. European women have relatively higher prevalence of rubella immunity (93.2%) as compared to women of African (86.7%) and Asian origin (78.4%). In India the reported figures vary from 53% to 94.1% [6]. Our finding of 31.66% does not falls within this range and is much lower than those in other studies of Singla et al., [6] (71.3%), Yadav et al., [7] (55%), Raza S et al., [8] (90.05%) conducted in various part of India and Nessa A et al., [9] (71.99%), Ouhaiya et al., [10] (68.6%), Hasan ARSH et al., [11] (89.1%) from outside India.

The reason for this difference in immunity is difficult to explain. However, factors such as net birth rate, population density,

opportunities for entry of virus, level of herd immunity at the time of virus introduction and socioeconomic factors of a given community may be responsible for this variation [6].

In our study rubella IgM antibodies seropositivity is only found in one case (0.83%). Studies of Jubaida N et al., [3], Yasodhara P et al., [12], Chopra S et al., [13] had reported 0.75%, 6.5% and 17.5% seropositivity of rubella IgM antibodies respectively in pregnant women.

Of note, in our participants we do not know the source of anti-rubella IgG whether from natural infection or from previous vaccination, because in our country, premarital or prenatal vaccination is not done routinely.

In our study seroprevalence of rubella IgG antibodies in non pregnant women is 42.2% which is more than found in pregnant women 25.3%. Similarly in study conducted by Singla et al., [6] it was 76.9% in non pregnant women which was more than found in pregnant women 67.2%. While the study conducted by Al-rubaii [1] in Iraq has reported higher prevalence in pregnant women (78.33%) than in non pregnant women (75.71%). The reason for this difference is not clear, hence we are in need for further studies stressing on non-pregnant women, then to follow them in pregnancy.

In this study according to age, 16-25 year age group prevalence of rubella IgG antibodies was found to be 24.3% which gradually increased in the age group of 26-35 year (42.85%) and is still more in > 35 years (50%). Similar increasing trend in seropositivity as age increases is found in the study conducted by other authors [6,9]. We have not considered third age group for comparison as only four women were included from that group in our study. However study conducted by Vijayalaxmi P et al., [14] and Gupta E et al., [4] had reported decreasing seroprevalence of rubella IgG antibodies as age increases. The gradual increase in seroprevalence of rubella infection with age in our study indicates a continuous exposure of population to rubella virus infection [9].

In our study the seropositivity of rubella IgG antibodies was more (40%) in women with history of previous adverse pregnancy as compared to women with normal obstetric performance before (29.1%), statistically the difference between these two groups is insignificant which is similar to the study conducted by Singla et al., [6] from Amritsar, India and Jubaida et al., [3] from Bangladesh.

In the study conducted by Gandhoke et al., [15] in Delhi over 15 years, 5022 samples from pregnant women were evaluated; the seroprevalence of rubella infection was higher in women with bad obstetric history (87%) compared to those with normal pregnancy outcome (83%).

Higher incidence of seropositivity observed in women presenting with adverse pregnancy outcomes in our study suggests that rubella could be a cause of repeated pregnancy wastage in these women [6].

Considering socioeconomic status, rubella seropositivity rates were found to be higher in women of lower socioeconomic

class (41.37%) than in women of upper class (30.%) similar trend were reported by Jubaida et al., [3] Singla et al., [6] Yadav et al., [7]. In contrast to these studies, study conducted by Turgut H et al., [16], Turkey had reported higher seroprevalence of rubella antibodies among women of higher socioeconomic status (87.5%) than in women of lower socioeconomic status (80%). One of the probable reason for higher seroprevalence in lower socioeconomic status women in present study may be that in lower class population crowded living conditions might increase the chances of exposure to rubella infection [6].

In our study the seropositivity of rubella IgG antibodies was more in those residing in rural areas (34%) as compared to those of urban areas (21.7%). Statistically the difference was not significant ( $p > 0.05$ ). Similar findings are reported in study conducted by Bamgboye AE et al., [17] in Nigeria and Mwambe B et al., [18] the difference in their study is insignificant between these two groups. However, study conducted by Singla et al., [6] other authors [10,11] have reported higher seroprevalence of rubella antibodies in urban women.

The possible explanation in our study of higher prevalence of rubella in rural women could be relatively poor hygienic environment in rural area, which might expose them more to rubella virus infection. Thereby developing more natural immunity in rural area compared to urban area [18].

None of the women included in this study gave history of immunization against Rubella. Similar observations have been made in study conducted by Chakravarti et al., [19] and Singla et al., [6] from New Delhi.

Currently, MMR vaccine is not a part of National Immunization Schedule in India. States with immunization coverage more than 80% administer second dose in routine immunization by MMR or measles vaccine. MMR was introduced in state immunization program of Delhi in 1999 as a single dose administered between 15-18 months of age (MMR-I). States of Punjab and Kerala, and Union territory of Chandigarh with high routine immunization coverage are possible candidates to incorporate MMR vaccine in their schedule besides Goa, Puducherry, Sikkim and Delhi which currently have this vaccine in their state immunization schedules. States with immunization coverage less than the above were advised catch up campaigns with measles vaccine [20].

To our best knowledge, this is the first study in North Karnataka area to provide rubella sero-prevalence data among women of child bearing age. Our study clearly indicates that significant number of women is susceptible to rubella infection in this area which in turn can increase the incidence of CRS in children.

## CONCLUSION

In our area substantial number of women reach childbearing age without acquiring natural immunity to Rubella. Hence, screening of rubella and immunization of women at risk are highly recommended in this area. There is considerable variation in the prevalence of rubella antibodies among

women of child-bearing age, depending on geographical area and the socioeconomic strata. Therefore, continued evaluation of the susceptibility of women in the reproductive age to rubella infection is essential to set a strategy for prevention of congenital rubella syndrome. There is also need to formulate rubella immunization programme which will be effective to prevent repeated pregnancy wastage and infants with congenital rubella syndrome.

It should be noted that this is a preliminary regional level study and further nationwide surveys with large population sizes are needed to determine the need for national immunization and screening of rubella infection among women of child bearing age.

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