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Prevalence of Rubella Seronegativity in Post Partum Women

AyingbiL[1],GRV Prasad [1],RK Ratho [2], Mini P Singh[2]
Department of [1]Obstetrics and Gynaecology
Department of [2]Virology Post graduate Institute of Medical Education and Research, Chandigarh, India
Corresponding author; Ayingbi L

Abstract: Background*:Rubella is a mild vaccine preventable disease caused by Rubiviruswith the potential to cause multiple congenital malformations in the fetus if infected during pregnancy.This study was done to study the prevalence of seronegativity of rubella in post partum women and to counsel the seronegative group for rubella vaccination.*

Materials and methods:*This cross sectional study was conducted among 512 women delivered at PGIMER, Chandigarh from Jan 2015- Feb 2016.The collected blood samples were processed and screened for Rubella IgG antibodies in the Department of Virology, PGIMER Chandigarh using commercially available IgG ELISA kits (Dialab-Neudorf,Austria) as per themanufacturer instructions. Socio -demographic information on participants was collected.*

Results:*The rubella IgGseronegativity was found in 55/511 (10.76%) women.The result indicated prevalence of rubella IgGseronegativity of 18.91% in women of 16-20 years, 11.35% in 21-25 years and 6.8% in 31-35 years. Out of 79 women reporting bad obstetric history,9(11.39%) were IgG negative. Rubella IgGseronegativity was higher in women belonging to rural areas(12.30%) and lower socio economic classes (57.72%). Rubella IgGseronegativity was not associated with age,gestational age and parity.*

Conclusions:*As the immunity gap in the study population was high,rubella vaccination should be provided for all women of child bearing age.Nationwide surveillance of the susceptible population may highlight the existing burden of CRS in the country and might help the policy makers for implementation of new programmes to reduce the same.Post partum, being the safe and oppurtune time for women of child bearing age to get vaccinated, should be considered.*

Key word:*Rubella;IgG seronegativity;CRS, Vaccination, IgGEIA*

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I. Introduction

Rubella is a mild,self-limiting viral infection characterized by erythematous maculopapular rash,low grade fever and mild respiratory symptoms.[1]It is spread through acquired and vertical transmission.However,it is of concern due to its teratogenic effects resulting in complications like miscarriage,fetal growth restriction(FGR),fetal death or birth of an infant with congenital rubella syndrome(CRS).Severe congenital malformations like deafness, cataracts, glaucoma, congenital heart disease, progressive encephalopathy, mental retardation and osseous deformities.

Immunity is acquired either fromprior infection or exposure to infection or by vaccination. Once developed, immunity remains life-long and thus protects the women from further rubella infection.Many women reach child bearing age without acquiring natural immunity to rubella and they constitute the vulnerable group who needs vaccination for reducing the risk of CRS.In case of maternal infection before 11 weeks,the risk of congenital defects is reported to be 90%[2].

CRS affects more than 1,00,000infants every year all over the world[3].Seroprevalence data from South East Asian Region (SEAR) during 2000-2009 reported 46621 infants born with CRS annually in SEAR.In 2009,out of 193 WHO member states,123 states reported a total of 165 cases[4]. Before the introduction of rubella vaccine in 1969,the global incidence of CRS ranged from 0.8-4/1000 live births during rubella epidemics to about 0.1-0.2/1000 live births during endemics[5].In the United States, rubella epidemics occurred every 6 to 9 years before 1969[6].Highest incidence was reported in 5-9 years of age[7]. An estimated 12.5 million rubella cases were reported during the 1964-1965 rubella epidemic in the United States. Of these,approximately 2,000 cases of encephalitis, 11,250 fetal deaths attributable to spontaneous or therapeutic abortions, 2,100 infants who were stillborn or died soon after birth, and 20,000 infants born with CRS were reported[8].

By 2009,130 out of 193 WHO member countries had included rubella vaccine into their national immunization programs.After introduction of rubella vaccines in the United States in 1969, rubella cases declined from 57,686 in 1969 to 12,491 in 1976, and reported CRS cases got reduced by 69%, from 68 in 1970 to 23 in 1976[7]. In the WHO American region, from 2001 through 2004, an average of 14 cases of rubella were

reported, four CRS cases, and one rubella outbreak (defined as three or more cases linked in time or place).[9]The rise in susceptibility of rubella infection in pregnant women is reported to be from 1.4 % in 2004 to 6.9% in 2011 in the West Midlands[10].

Congenital rubella is a vaccine preventable disease.40% of congenitally affected babies are born to primiparas. Vaccination of these susceptible women in post partum period is expected to eliminate the remaining 60% of cases[11].Vaccination policy can be targeted at three groups of population,infants, adolescent girls irrespective of their serological status and women of child bearing age.But the largest group of susceptible population is still represented by pregnant women who should be vaccinated post partum to protect them from rubella infection in subsequent pregnancies.CDC recommends that women to be tested again at the time of their first obstetrical visit and susceptible women to be vaccinated in post partum period.

In India,there are limited studies evaluating the prevalence of CRS in general population.

In a prospective study conducted in 2006 by Chakravarti et al in Delhi,the confirmed cases of CRS in 0-12 months age group with suspected intra uterine infection was 10.26%[12].Singh et al retrospectively evaluated records of 947 children with suspected intra uterine infection in Chandigarh from 1999-2006.Blood samples were screened for antirubellaIgM and overall prevalence was found to be 2.8%[13].

The seropositivity to rubella in adolescent girls (12-15 yrs) from 12 districts of Maharashtra was reported to be 76.4% in 1329 girls and girls in urban areas were found to have better immune status[14].In a community based study done in 148 girls aged 11-16 yrs in Tamil Nadu,13.5% were seronegative for rubella[15].

The prevalence of rubella susceptibility in pregnant population in a study conducted in Delhi was 12.8% in 2003-2004 by Gupta et al [16]. In another study done in Kerala from 2003-2006 by Padmaja et al, susceptibility rate was reported to be 34.3%[17].

All these studies indicate high prevalence of seronegativity in rubella rendering them susceptible for the same.However, if these susceptible women are identified before pregnancy they can be immunized before conception. Prevention remains the best strategy for elimination.The purpose of this study is to screen susceptibility to rubella infection in post partum period as this is an opportune and safe time to vaccinate the seronegative population to prevent repeated pregnancy wastage and congenital defects related to rubella infection in subsequent pregnancies .Screening of antibodies and selective immunization in post partum provide antibodies and will preventrubella related pregnancy complications. This study is also an important step in addressing the issue of prevalence of rubella seronegativity in reproductive age group in our community and to better highlight the still unrecognised public health problem of congenital rubella syndrome and the need to enforce immunization programmes in post partum period.

WHO recommends that all member states that have first dose measles containing vaccine (MCV1) coverage >80%, should introduce RCV in their immunization programme[5].The measles vaccination coverage in India is 74.1% for children aged12-23 months according to UNICEF CES (2009)[18]. Few states and union territories in India have reached measles vaccination coverage > 80% and rubella vaccine has been included in their state health policies.

According to CDC guidelines, single dose of MMR vaccine is recommended for persons aged≥12 monthsfor prevention of rubella. MMR vaccine is indicated for persons aged ≥12 months. MMRV vaccine is licensed for use only in children aged 12 months through 12 years.Currently, ACIP recommends 2 doses of MMR vaccine routinely for children with the first dose administered at age 12 through 15 months and the second dose administered at age 4 through 6 years before school entry. Two doses are recommended for adults at high risk for exposure and transmission (e.g., students attending colleges or other post-high school educational institutions, health-care personnel, and international travelers) and 1 dose for other adults aged ≥18 .[19]

Indian Academy of Paediatrics also recommends MMR vaccination at 15-18 months (first dose) followed by second dose at school entry (4-6 yrs of age).[20]

II. Materials And Methodology

This prospective study was conducted in the departments of Obstetrics and Gynaecology and Virology at PGIMER, Chandigarh fromJan 2015- Feb 2016. A total of 512 women admitted in labour room were taken as potential subjects for the study.Women with documented evidence of prior rubella infection or vaccination were excluded. All eligible women were counselled regarding possibility of rubella infection in future pregnancy, possible complications in pregnancy, regarding the benefit of rubella vaccination and the need of the same in case of seronegative statusand informed consent was taken. The seronegativegroups were followed and informed about theirseronegativestatus to get themselves vaccinated for rubella.

Study design: Cross sectional and observational

Sample collection : Blood sample: Approximately 3-4 ml of venous blood were collected aseptically by a trained health personnel in a sterile vacutainer.The samples were kept at room temperature till clotted and were transported to the Virology department for serum separation and testing.

Rubella IgG detection:

The serum samples after centrifugation were stored in -20℃ deep freezer. Batches of stored sera were tested for the rubella IgG estimation by the commercially available ELISA kits as per the instructions of the manufacturer. The rubella IgG titres were determined using the prescribed protocol.The prevalence of rubella IgG positivity in general post partum women was determined for the total number of IgG positive samples. The kit used in our study was Dialab ELISA kit (Neudorf,Austria)for rubella IgGdetection.The sensitivity and specificity of this test were 96.4%(87.7-99.6) and >99..9% (90.5-100%) respectively.

Principle of the test

The rubella IgGEIA test kit was based on quantitative and qualitative detection of IgG antibodies to rubella in the test serum.The specimens were added to the microwellscoiled with rubella antigen and incubated.The samples containing anti rubella Ig antibodies bound to antigen coated on microwells and form immobile Ab-Ag complexes.The unbound materials on the microwell plate were removed by washing.After the washing procedure enzyme conjugated anti human IgG antibodies were added and incubated which bound to the immobilised Ag-Ab complexes.Substrate was then added and incubated to produce blue colour.Following this a stop solution containing sulphuric acid solution wasadded to microwell plate to stop the reaction producing colourchange.Thecolour intensity corresponded to the amount of rubella antibodies present in the specimen which was read by microplate reader at 450 nm.

Procedure

1. The ELISA microwell plate was arranged as given

	1	2	3	4	5	6	7	8
A								
B								
C								
D								
E								
F								
G								
H								

A1-Blank
B1-100 µL calibration 1
C1-100 µl calibration 1
D1-100µl calibration 2
E1-100µL calibration 2
F1-100µl calibration 3
G1-100µl calibration 3
H1-100µl calibration 4
A2-100µl calibration 4

2 . 100 µl of sample diluent to assigned wells from B2onwards was added
5ul of specimen to assigned wells from B2 onwards was added
↓mixedgently,covered and incubated at 37ºC for 30 mins
Each well was washed 5 times with 350 µl of wash buffer
All wells were completely washed and dried
↓ the plate was covered and incubated at 37ºC for 30 mins
Each well was washed 5 times with 350 µl of wash buffer
All wells were completely washed and dried
↓
50 µl of stop solution to each well was added
↓
The plate was read at 450/630-700nm in ELISA plate reader
Interpretation of results-QUALITATIVE AND QUANTITATIVE

RESULTS	Qualitative	Quantitative
	Index value	Concentration
NEGATIVE	<0.5	<5.0U/ml
POSITIVE	>1.1	≥10.0U/ml
EQUIVOCAL	≥0.5 and ≤1.1	5 -10 U/ml

For equivocal results,the specimen were retested with the same serum and interpreted according to the results obtained.

Statistical Analysis

Data wasanalysed using IBM- SPSS (Statistical Package for the Social Sciences, version 22), STATA 12.5 and Excel 2010 software. Numerical variables were examined for normality by using Kolmogorov-Simrnov test. Continuous parametric variables, if required,were analysed by applying student t test/analysis of variance (ANOVA) test.Categorical data like socioeconomic class, no. of abortions, history of CRS, h/o immunization with rubella vaccine, fetal complications etc. with rubella sero-negativity/sero-positivitywere analysed by using Chi-square test or its modified test e.g.Yate's corrected Chi-square test. Standard Logistic regression were applied to calculate Odds Ratio (OR) of having rubella sero-negativity if a patient had selected independent variable by controlling other independent variables i.e. prior rubella infection, rubella vaccination etc. Data was expressed in frequency, percentageand median as per variability of data.Two tailed P value ≤0.05 considered wasstatistically significant with 95% confidence interval.

III. Observations And Results

Outof the 512 postpartum women screened, rubella IgGseronegativitywas found in 55/511 (10.76%) women. Only one sample remained equivocal i.e. optical density(OD) between 0.9-0.1.This sample was tested again and each time equivocal results were obtained. The equivocal sample result has been excluded for statistical analysis. The majority of the women who were found to be immune (89.23%) did not have previous rubella infection or vaccination .This reflects the subclinical nature ofrubella infection.

Table 1.Distribution of antibody titre

Value (U/ml)	Total number (n)	Geometric mean
0-49.99	**98**	**124.81**
50-99.99	**75**	
100-149.99	**114**	
150-199.99	**97**	
≥200	**127**	

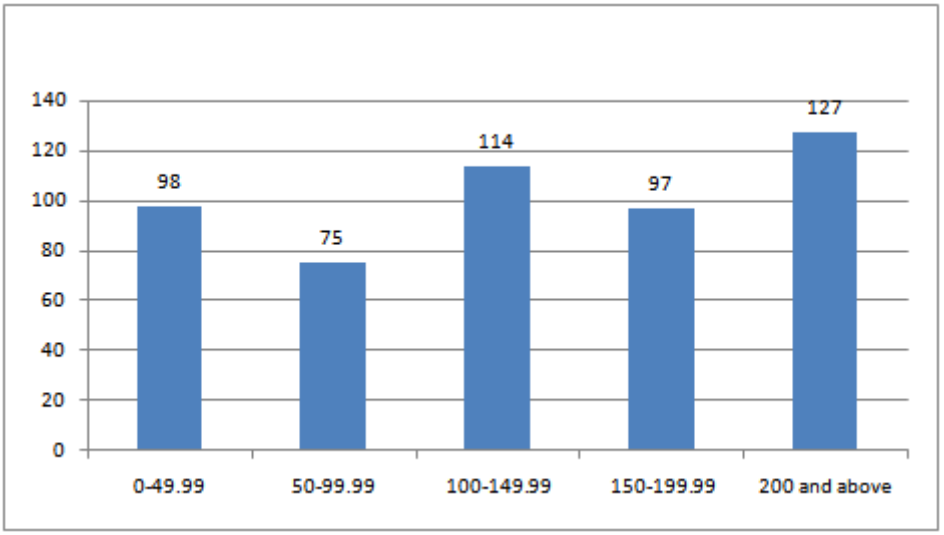

Fig1.Distribution of antibody titres

Table 2. Distribution of rubella IgG Ab by demographic factors

Characteristics	Total (n=511)	IgG positive (n=456)	IgG negative (n=55)	P value
a)Age (yrs) 16-20	37	30(81.08%)	7(18.91%)	0.09
21-25	273	242(88.64%)	31(11.35%)	
26-30	151	139(92.05%)	12(7.9%)	
31-35	44	41(93.18%)	3(6.8%)	
>35	6	4(66.66%)	2(33.33%)	

b)Place Urban	235(45.98%)	214(91.10%)	21(8.90%)	0.22
Rural	276(54.01%)	242(87.70%)	34(12.305%)	
c)Socio economic status Higher	216(42.27%)	200(92.59%)	16(7.40%)	0.04
Lower	295(57.72%)	256(86.77%)	39(13.2%)	
d)parity Primiparous	316	282(89.24%)	34(10.75%)	0.99
Previous one abortion	60	53(88.33%)	7(11.66%)	0.80
Bad obstetric history	79	70(88.60%)	9(11.39%)	0.84
Others	56	51(91.07%)	5(8.93%)	0.64

In this study,majority of the women belonged to the age of 21-30 years (82.9%) while women above 35 years comprised the least number to be screened(1.2%). The prevalence of rubella IgG seronegativity in women of 16-20 years was 7/37(18.91%) while 11.35% of seronegative women belonged to 21-25 years. The seroprevalence was found to increase with age reaching peak value in the age group of 31-35 years which declined after 35 years. However, the number of women recruited above the age of 35 years is less to substantiate these findings. The seroprevalence of rubella was not statistically significant between the groups (p value=0.09)

As depicted in table number 2, a total of 316 (89.24%) primiparae were screened out of which 34 women (10.75%) were rubella seronegative. Out of 88.33% women who had previous one abortion,11.66% were seronegative. Out of 79 women reporting BOH(2 or more consecutive spontaneous abortions,h/o intrauterine fetal death,intra uterine growth restriction,stillbirth,early neonatal death and or congenital anomalies),9(11.39%) were IgG negative and 8.9% was accounted by multiparous women who had previous normal deliveries or preterm deliveries. The women grouped in 'others' were those with either previous normal term deliveries or preterm deliveries.

More than half of the total study population (54%) belonged to rural areas. Rubella IgGseronegativity was higher in women belonging to rural areas(12.30%) as compared to those from urban areas(8.90%) though the result was not statistically significant (p=0.22). The seroprevalence of rubella IgG in lower socio economic classes was found to be 295/511(57.72%) and higher in women belonged to lower economic status as compared to higher socio economic status(13.2% vs 7.4%) and the difference was statistically significant (p value= 0.04). No statistical significance was found in the prevalence of rubella IgG seronegativity in the timing of delivery accounting for 10% in both term and preterm group. Among the study population, 60.19% were delivered at term and 39.3% were preterm deliveries.

Table 3.Distribution ofrubella IgG Ab test based on other characteristics

a)Period of gestation	Total (n=511)	Rubella IgG positive (n=456)	Rubella IgG negative (n=55)	P value
Preterm	201(39.33%)	180(89.55%)	21(10.44%)	0.85
Term	310(60.19%)	276(89.03%)	34(10.96%)	
b)Fetal growth Normal	417(81.60%)	370(88.72%)	47(11.27%)	0.43
Growth restricted	94(18.39%)	86(91.48%)	8(8.51%)	
c)Previous CMF babies Yes	16	15(93.75%)	1(6.25%)	1.000
No	495	441(89.09%)	54(10.91%)	
d)CMF babies in current pregnancy Yes No	46(9%) 455(91%)	43(93.40%) 413(90.76%)	3(6.50%) 52(11.42%)	0.46

The prevalence of growth restricted fetus in the study population was 94/511 (18.39%). Rubella seronegativity was higher in women who had babies with normal growth(11.27%) than women with growth

restricted babies(8.5%)and the difference is statistically not significant(p value= 0.43).In this study, out of 16 women who had previous history of a congenitally malformed fetus,only one was rubella seronegative (6.25%) and remaining all were seropositive (10.91%). 46(9%) women of the total study population had CMF babies in the current pregnancy out of which 6.5% were found to be IgGseronegative. 2 women had congenital malformation of fetus [one with vein of Galen malformation and another with suspected rhabdomyoma on prenatal USG]. However, these malformations are not expected to be due to rubella infection.Only 5 of the 511 women were screened for TORCH infection for previous history of recurrent abortions.Out of this 5 women,one was found to be seronegative.The antenatal TORCH screening was reported as equivocal and no repeat test was done.The results of this study matched 80%(4/5) with the previous antenatal screening reports.

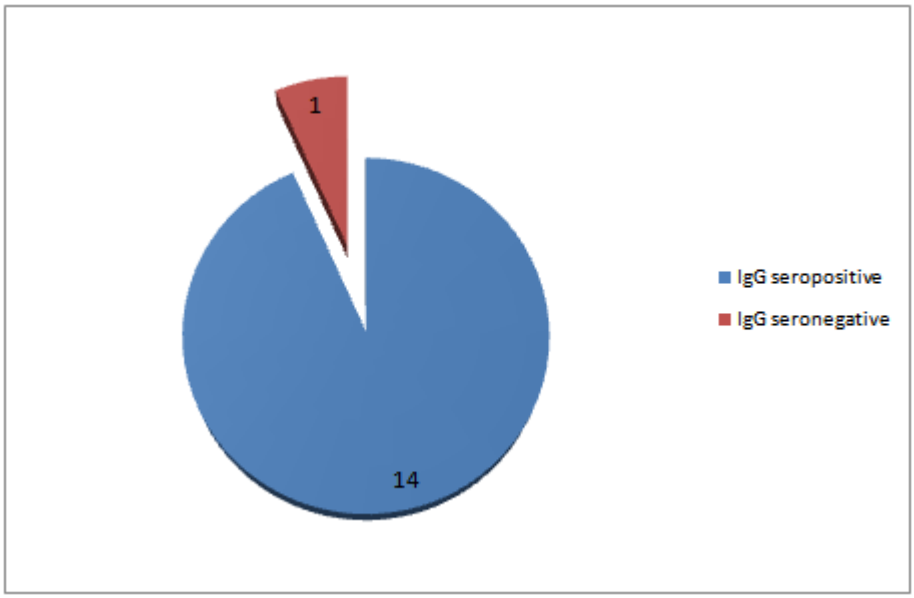

Fig.2 Distribution of still births in current pregnancy

A total of 15 women had still births in the study population .1 still birth was reported in rubella IgGseronegative mother while 14 were born to IgG seropositive mothers. The still born baby had cardiac malformation in prenatal ultrasonography with growth restriction. However,autopsy report did not collaborate with the antenatal ultrasound findings in view of autolysed organs in fetus.

Follow up after test results:

48 seronegative women were informed telephonically about the results and the need for rubella vaccination.They were also advised not to conceive at least for 2 months after getting vaccination. Some got vaccinated at PGIMER and at their nearby hospitals. Remaining women were willing to get the vaccination done before their next conception.

IV. Discussion

The prevalence of IgG seronegative for rubella is 10.76% in this study.This is in concordance with the study done in Delhi where rubella susceptibility in pregnant women was reported to be 12.8%[14].Another hospital based study in Delhi during 1988-2002 reported higher rate of 14.6% in pregnant women[12]. While Mathur etal fromLucknow reported susceptibility of 9.5% among non pregnant women of reproductive age group[21] .In Egypt,IgGseronegativity for rubella was reported as 12% in women of 20-30 years[22] while a higher rate of 31.4% was susceptible in Algeria[23] in the same age group. Italian studies reported the prevalence of rubella seronegativity rate varying from 8% to 14% in women of child bearing age[22].In Oman, since the introduction of MMR vaccine in expanded programme of immunization in 2001, post partum vaccination coverage is more than 99.5%.[26]

The prevalence of rubella IgGseronegativity of women in 16-20 years was found to be18.91%.The median age of the study population was 25 years.TheIgGseronegativity rate was found to be decreased with increasing age group (11.35% in 21-25 years,7.9% in 26-30 years,6.8% in 31-35 years)and then increased upto33.33% in women above 35 years . With increasing age and parity, there is chance of getting acquired immunity due to natural infection in those women who were not vaccinated during their childhood. The increased rate of IgGseronegativity in these women could not be explained based on this.The possibility could be the very few number of women above 35 years(n=6) were enrolled .However,there is no significant

difference between rubella IgGseronegativity and age groups indicating that rubella affects all age groups(p value= 0.09).Study by Yadav et al reported 42% of susceptibility to rubella in women from 20 to 29 years[24]. IgGseronegativity rate is lowest in elderly age groups >30 yrs (4.45%) as compared to 20-30 yrs (10.60%).This decreased rate of rubella susceptibility in elderly aged groups might be attributed to prior infection in childhood or previous pregnancies. Ashrafunnessa et al have also reported higher incidence of seroprevalence with age showing a peak at around 26-30 years of age(87%).The similar incidence was also reported by Mathur et al from Lucknow in the age group of 26-30 years(90%)[21]. The highest rate of rubella IgGseronegativity in this study was found in women of 21-25 years and this might increase the risk of CRS in future pregnancies if not vaccinated in time. In Argentina, higher rate of rubella susceptiblility (42%) was reported in 25-29 years of women[25].In Egypt, the highest susceptible women were from 26-30 years. Studies in Morocco also reported incidences of rubella IgGnegativitity of 17.8% in women of 20-24 years and 15.6% of 25-29 years17.8%[26]. These points towards the substantial number of women in reproductive age group worldwide whose babies are at risk and are responsible for future CRS syndromes in future. The higher prevalence of rubella seronegativity in younger age groups implies the need for screening and vaccination of susceptible group.

Rubella IgGseronegativity in primiparas was found to be 10.75% in this study. The prevalence of rubella seronegativity was found to be higher in women having previous 1 abortion (11.66%) and women with bad obstetric history (11.39%). The result was statistically not significant indicating the susceptibility of both the groups irrespective of their parity.A study conducted in Dhaka also cited insignificant difference among seroprevalence of different parity. In Nigeria,the rubella seronegativity was lower in multiparas (10.6%) than primiparas(16.20%) as reported by Olatunji et al[27].The higher susceptibility rate in primiparas suggests the higher incidence of CRS in first born babies. With each pregnancy,there is increase in rate of rubella immunity. Higher susceptibility rate of 38.7% were reported among women with bad obstetric historyin Delhi.Seronegativity rate was significantly lower inmultiparous women in various aged groups in a retrospective study done in Japan[24].

Women with bad obstetric history had susceptibility rate of 11.39%.Turbadkar et al have reported higher susceptibility of 38.7% among 380 women with bad obstetric history .The recurrent pregnancy wastages might be attributed due to infection in earlier pregnancies. Yadav et al reported IgGseronegativity of 39% in women of BOH.

A total of 12.30% of the seronegative women belonged to rural areas as compared to urban women(8.90%). The higher seroprevalence in urban areas(91.1%) may be attributed to the living conditions,socio economic status,better awareness of the disease and immunization. Rubella,being a subclinical viral infection transmitted through droplet infection,its incidence is expected to be more in crowded areas.Yadav et al reported higher incidence of IgGseroprevalence in urban women (57%) as compared to rural women(49%).Seth et al also reported that exposure of rubella is less in rural areas as compared to urban women possibly due to the less population density in rural areas.[28].The prevalence of IgGseronegativity was reported to be almost similar in women of rural and urban areas in a study conducted in Bangladesh[29].

Higher rate of the seronegative group belonged to lower socio economic class(13.2%)as compared to higher socio economic group (7.4%).A study conducted in Delhi reported higher rate of rubella immunity in women from lower socio economic group[37]-24.The lesser incidence of susceptible population in higher socio economic group may be related with better awareness of the disease and immunization of the same and urban dwelling where the chance of spread of infection is more compared to rural areas. The IgG seronegativity in preterm deliveries(10.44%) and term deliveries(10.96%)were found to be almost similar.The result was statistically not significant indicating that rubella can affect both term and preterm deliveries (p value=0.85) though CRS may cause preterm delivery.

Intra uterine growth restriction of fetus was found in 18.39% in the study population.8.5% were found to be seronegative .Intra uterine growth restriction may be a sequelae of congenital rubella infection in utero andthis suggests the possibility of rubella infection and susceptibility of these mothers in subsequent pregnancies.

Lesser prevalence (6.25%) of rubella IgGseronegativity was noted in women who had malformed babies in previous pregnancies as compared to the women who had normal babies(10.91%). The seronegativity of rubella almost remained the same in current pregnancy also.Women who delivered normal babies had a seronegativity of (6.50%) as compared to those who had CMF babies (11.42%). There is possibility of these women getting immune in previous pregnancies.

Only 1/511(0.97%) of the total women had TORCH screening test in the antenatal period.This may point towards the need of screening test and vaccination of the susceptible women before pregnancy .The risk women in the study would have been averted if screened and vaccinated preconceptionally.The lack of awareness of rubella disease may be one factor for the increasing burden of CRS.

Rubella vaccine is not yet included in our national immunization programme till now.The government of India has made provisions for incorporating the vaccine in our immunization schedule along with measles

and mumps.Adding the vaccine in routine immunization programme would be cost effective, cost beneficial and programmatically feasible because measles vaccination is still ongoing and combination vaccine obviate the need for an additional injection. The cost of meruvaxvaccine(live attenuated rubella vaccine) in the market is 55 INR and 70 INR for MMR,It is still a feasible option based on the cost effectiveness of the vaccine for routine immunization in susceptible groups.

Post partum vaccination of the susceptible women aims at reduction of CRS in future pregnancies.Post partum, being the safe and opportune time for women of child bearing age to get vaccinated, should be considered.The immunization of the rubella seronegative women are often missed once they are discharged from hospital.Immunization can be covered once facilities for screening and vaccination are available in the hospitals at an affordable price or if the policy is included under a health care programme. The re-enforcement of screening and vaccination programme in post partum population should be considered from the side of policy makers.

Though a vaccine preventable disease, lack of survelliance and registry are hindrances in eliminating the disease. Many cases go unreported yet it is still prevalent in the community.There is need for creating awareness of the disease in the general population.Serologic screening and immunization of the susceptible group is an approach for reducing the burden of this disease.Serosurveillance is still doubtful in India because of cost factor of screening test.

Creating awareness of the disease, counseling and vaccination at the earliest (before getting discharged from hospital in post partum women)would surely help to give the maximum benefit to the susceptible women.

Limitations: The study population is not representable of the total population. They are recruited by a convenient sample technique which may limit the generalization of the results. At present, facilities are still lacking to provide vaccination to the susceptible group before getting discharged from hospital. Few of the susceptible women could not get immunised due to non availability of the vaccine.

V. Conclusions

Rubella, being a vaccine preventable disease, screening and vaccination should be targeted at population groups who are at risk including adolescents and women of child bearing age. There should be programmes that might help in creating better awareness of the disease among the health care providers and the general population; counseling and vaccination of the susceptible population. There is strong need for the awareness of the disease and the immunization in rural areas and in women belonging to lower socio economic groups.Nationwide surveillance of the susceptible population may highlight the existing burden of CRS in the country and might help the policy makers for implementation of new programmes to reduce the same.

There should be a provision for inclusion of rubella vaccine in national immunization programme.Implementation of post partum vaccination programme may help to cover up the susceptible group.Availability of the screening test and vaccine at an affordable price might encourage the population for the screening test .Catch up vaccination programmes in the community should be considered to cover up the susceptible group.

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