

<http://www.pjbs.org>

**PJBS**

ISSN 1028-8880

**Pakistan  
Journal of Biological Sciences**

**ANSI***net*

Asian Network for Scientific Information  
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

## Study of Prevalence of Immune Status in Adult Females For Rubella Virus Infection

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**Abstract:** A prospective study was planned to determine the prevalence of anti-rubella antibody in female of reproductive age in Karachi to eliminate rubella virus infection to prevent CRS (Congenital Rubella Syndrome) by evaluating the importance of immunization of infants and susceptible females. About 1,225 women, referred to Dr. Ehsanullah's Laboratory Karachi, during year 1999 to 2004 from various maternity homes for antenatal checkup, were included in this study. Rubella IgG antibodies determined by Enzyme Linked Immuno Sorbent Assay (ELISA). About 81% pregnant women were found to be seropositive by clinical or subclinical rubella infection/immunization (immune group) and 18% of pregnant women were seronegative for Rubella antibody of the IgG class with high risk of CRS (susceptible group), which can be reduced or eliminated by immunization programme for infants and adult females before marriages.

**Key words:** German measles, rubella virus, immune status, congenital rubella, syndrome

### INTRODUCTION

Rubella (German measles) is predominantly a mild, highly contagious childhood illness (Committee on Infectious Diseases, American Academy of Pediatrics, 1994) that poses a serious threat to the fetus, if the mother contracts the illness during pregnancy, caused by a Rubella virus (RNA), a member of genus Rubivirinae (<<http://www.pubmedcentral.gov/about/copyright.html>>) within the family of Togaviruses, a different virus from the one that causes regular measles. Rubella is less contagious than measles but still easily transmitted by coughing or sneezing via respiratory transmission or shedding in esopharyngeal secretions to become highly transmissible from human to human and close contact (Cooper *et al.*, 1996). Rubella virus enters via inhalation and infects cells of the respiratory tract. It is then spread via the lymph nodes to the blood, where it induces an immune response, which leads to lasting immunity. German measles's symptoms with incubation of 2-3 weeks, range from asymptomatic to febrile illness, in children, with generalized rashes, fade within 48 h, adenopathy in back of neck and in adults females, headache, sore throat, loss of appetite, joint pain (Rubella Information from the March of Dimes).

Rubella in pregnant women frequently causes miscarriage, stillbirth or Congenital Rubella Syndrome (CRS), range from 52-90% (Peckham, 1972) in their fetuses because of crossing of placenta. CRS is a devastating disease characterized by cataracts and other

retinopathies, hearing defects (The March of Dimes Birth Defects Foundation [www.google.com](http://www.google.com) (Report)3-11-2004), heart defects, septal metaplasia, low birth weight, interstitial pneumonia, cardiac lesions such as PDA, aortic stenosis, Fallot's tetralogy and diseases of the liver and spleen that may result in a low platelet count with bleeding under the skin, risk of juvenile diabetes and mental retardation less frequently, cerebral palsy (Cooper, 1990; Cooper and Alford, 2001).

The incidence and severity of congenital defects are greater if infection occurs during the first month of gestation. Up to 85% of expected mothers infected in the first trimester will have a miscarriage or a baby with CRS. 20% of the children born after such an infection suffer the severe congenital abnormalities associated with CRS. 10-20% of these children die within the first year of life. Rest of children with congenital rubella syndrome show delayed developmental with list of possible defects with no specific treatment. Eye and hearing defects least improved by early surgery. Babies with hearing or vision loss, mental retardation require special education programmes. The risk of congenital rubella syndrome drops to around one percent, after maternal infection in the early weeks of the second trimester and there is rarely any risk of birth defects when maternal rubella occurs after 20 weeks of pregnancy (Miller *et al.*, 1982). There is no effective way to prevent rubella in a susceptible pregnant woman who was exposed to the illness nor effective treatment for rubella during pregnancy (Peckham *et al.*, 1979).

Vaccination<sup>11</sup> (CDC, 1995; Anonymous, 1990) will prevent rubella in susceptible women to protect their future children from the congenital rubella syndrome so immunization of infants and adult susceptible females help in reduction of susceptible pregnant women and elimination of rubella like in USA as announced by Julie L. Gerberding, director of the Centers for Disease Control and Prevention (Anonymous, 2005a).

The aim of present study to eliminate the virus infection of rubella in female of reproductive age and prevention of infants by immunization.

### MATERIALS AND METHODS

It is a prospective study which comprise of about 1,225 women, from private maternity homes for antenatal check up and referred to Dr. Ehsanulla's Laboratory for rubella IgG antibody titre by Enzyme Linked Immune Sorbent Assay (ELISA) during year 1999 to 2004. Test was performed by Rubella-Virus (Human), DSL-USA according to manufacturers instructions. Results were read on preprogrammed spectrophotometer Quantum II. Cases positive for IgG antibody to rubella considered immune and Negative considered susceptible to rubella.

### RESULTS AND DISCUSSION

About 999 out of 1,225 screened samples for IgG antibodies to rubella virus were found positive. Seroprevalence of 83.47% noted in 1999, gradually reduced to 74.24% in 2002 but observed to gradually increased to 85.51% in 2004 year (Table 1). Distribution according to age groups also studied with no significant difference in immunity (Table 2).

Rubella or German Measles was once ubiquitous in human populations because of acting as a teratogen, inducing CRS. In 1964 and 1965, rubella exploded. There were 12.5 million infections which gave rise to 20,000 cases of the congenital syndrome, about 6,200 stillbirths and at least 5,000 abortions. These epidemics, in cycles of six to nine years in the United States, gave a great push to Stanley Plotkin, a research physician at the Wistar Institute in Philadelphia, to work on a rubella vaccine (live but too weak rubella virus, by genetic changes in repeated rounds of growth in harsh conditions in tissue culture, to cause illness yet still capable of stimulating immunity) which was proved unusually effective and safe since 1969. A single dose conferred life-long immunity in nearly all children and women who got the vaccine over the years, turned out to be pregnant, none has ever had a baby with congenital rubella and now no rubella virus has circulated in the United States because of non availability

Table 1: Annual incidence of presence or absence of IgG antibodies

Year	No. of samples	Positive	(%)	Negative	(%)
1998	242	202	83.47	40	16.92
2000	230	196	82.21	36	18.91
2001	193	157	81.34	36	18.65
2002	229	170	74.24	59	25.76
2003	186	150	80.64	36	19.36
2004	145	124	85.51	21	14.48
Cumulative	1225	999	81.42	28	18.06

(%)=Percentage

Table 2: Cumulative age prevalence of Rubella antibody

Age groups	Samples	Size	Positive %
14-17	18	14	77
18-21	156	144	86.8
22-25	391	327	84.9
26-29	308	249	80.8
30++	290	258	85.5

of enough susceptible hosts I-e rubella's disappearance from the United states, announced by Julie L. Gerberding, director of the Centers for disease control and Prevention (Anonymous, 2005a,b).

But because of lack of awareness about existence and impact of Rubella virus infection (7.7% showed an evidence of acquisition of rubella by being positive for test, anti-rubella IgM (Tariq *et al.*, 2002) antibodies in Pakistan, congenital rubella (2.4%) (Tariq *et al.*, 2002), is a major medical and social problem because of insufficient vaccination of children and women before marriages resulting in mild or often entirely unnoticed infection yielding natural immunity, indicated by high occurrence of rubella antibodies (Results of Study), rendering susceptible group on high risks (foetal infection with Rubella virus, preventable cause of congenital malformations and mental retardation) to give birth of CRS and other anomalies of rubella so elimination of rubella infection and prevention of its birth defects (CRS and others) should be our goal, which can be achieved by breaking the invisible 'chain of transmission of rubella virus by three programmes of vaccination activities, as conducted in nine countries by European Region, WHO, 1990-2004 (Anonymous, 2005c) that's why Rumania controlled large rubella outbreak in 2002-2003 by WHO methodology by giving 93% vaccination coverage in 1998 (De la Mata and P. De Walls, 1988).

- Vaccination of all children (unless medical reason) in order to prevent transmission of infection to pregnant women. The first vaccine dose is routinely given at 12 to 15 months of age, as MMR. The child should not receive the first dose of MMR before 12 months of age. Before that, the baby still has some of its mother's antibodies, which can interfere with the vaccine and keep it from working. A second dose of MMR is given at either age 4 to 6 years.

- Vaccination of all immune negative girls (8th grade students) to give individual protection against rubella during pregnancy. Vaccination of teenage or adult groups in colleges, workplaces, hospitals (staff and volunteers) or military bases helps prevent outbreaks in those areas. People working in newborn nurseries should be vaccinated, since infants born with rubella can spread it to those around them for a while after birth. Susceptible women of childbearing age also should consider being vaccinated before traveling abroad, as rubella is widespread in many countries (Robertson *et al.*, 1997).
- Prevention programme. A pregnant woman is found to be non immune as routinely tested during an early prenatal visit, should avoid anyone who has this illness (difficult to practice). Also should consider being vaccinated after delivery (no contraindication during breast feeding), so that they will be immune during any future pregnancies.

Data on CRS is not available here but need to be require to assess the usefulness of vaccine in preventing congenital disease programme. Use of PCR can also help in the early prenatal and postnatal diagnosis of congenital rubella. As vaccine contain live virus, not recommended during pregnancy and avoidance of pregnancy at least four weeks after vaccination.

The incidence of rubella annually according the Table 1 shows that seroprevalence was 83.47% in 1999 but reduced to 74.24% in 2002 then gradually again increased to 85.51% in 2004 signify that rubella in epidemics (clinical or subclinical) occur after every few years cycles and confers lifelong natural immunity but reduction cycles time taken for enough susceptible people to accumulate in the population to permit sustained person-to-person transmission. To eliminate it from our region, have to work on susceptible host to make them immune by vaccination programme to break the invisible chain of transmission of rubella virus (Anonymous, 2003).

Very high incidence of rubella IgG antibodies in pregnant women indicate epidemic of rubella infection either mild or unnoticed, but leaving minor susceptible women during 1st trimester of pregnancy as ideal host for rubella virus to increase congenital anomalies, be fought only by proper vaccination program in order to support elimination programme of Director of Centers for Disease Control and Prevention (CDCP) from Western Hemisphere (Advisory Committee on Immunization Practices, Centers for Disease Control and Prevention, 2001). A local NGO promised to support the vaccination programme of community after getting funding.

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