

## **Evaluation of Rubella IgG Antibodies among High School Girls in Uremia City**

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### **Abstract**

Rubella or German measles is a mild contagious disease in non-pregnant women, but in pregnant affected mother's possibility of fetus infection in the first twelve weeks of gestation is 80%. Between 13-14 weeks of gestation is 54% and by the end of the second trimester is 25%. If fetus gets infected severe anomalies will progress. At present no vaccination against rubella is begin envisaged by the National Immunization Program in Iran. Because of serious complications of the rubella in pregnancy, it's very important to determine the immune status of young girls at their pre-marriage age. Five hundred eighty nine high school girls were selected at random from different high schools and then a questionnaire was filled up. Blood samples were obtained and anti-rubella IgG titre was detected in each sera by using American Diaplus Diagnostics ELISA kits. From 589 samples 500 students (89.4%) showed positive and 89 students (15.1%) revealed negative results for anti-rubella IgG. Of all 63 students (10.69%) had previously been vaccinated against rubella. The results indicated that 15.1% of all students and 20.7% of precollege girls would be mothers, are seronegative. Comparison of these results with the conclusions obtained in other cities of Iran shows that it would be necessary to screen rubella IgG antibodies in premarriage young girls on other regions of country and vaccination against rubella could be considered as a part of National Immunization Program.

**Keywords:** *Rubella, Immunity, ELISA, High school girls*

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### **Introduction**

Rubella is a mild and contagious disease which appears with mild symptoms of catarrhal, lymphadenitis and macula popular rashes. In the absence of pregnancy, it is considered a mild suffering which poses no serious threats. If infection prevails during pregnancy, probability of fetal infection is estimated to be 80% in the first twelve week, 54% between 13-14 weeks and 25% by the end of second trimester (1). Therefore the primary medical significance of disease comes from its teratogenic effects of fetuses. According to studies conducted by the World Health Organization in developing countries sensitivity rate of women in fertility age against rubella has been reported as follows: Less than 10 percent in 13 countries,

about 10-24 percent in 20 countries and more than 25 percent in 12 countries. The rate of suffering from congenital rubella syndrome has also been reported to be about 0.6-2.2 per 1000 live births (2). Assessment of immunity level against rubella in pregnant women referred to prenatalogy clinics of Shariati hospital in Tehran has indicated 72% rate of immunity among study group. The least rate of immunity was found to be 10-15% among the age group of 21-25 years old (3). A study of women in age group of 19-34 years in Saopaulo, Brazil showed probability of suffering to be 18.6% for the study group (4). This outcome also presented high rate of suffering in fertility age. According to the studies which were carried out on girls at the pre-marriage age, in the city of

Zanjan and on female high school students of Yazd 7.25% and 9.93% of cases lacked immunity against rubella, respectively (5,6). Rubella disease more often observed and reported by gynecologist among the pregnant women referring to maternity hospitals in Iran. The probability of severe anomalies following the fetal infection is common. The aim of this study was to evaluate of immunity against rubella among high school girls before getting married. According to the Iran's commitment national vaccination among age group 6-24 years must be done for elimination of measles and congenital rubella (7).

**Materials and Methods**

This research was descriptive study, designed in cross-sectional method using blood samples of 589 female high school students selected at random from 22233 girls dispersed in 50 high schools who were studying in grades 1 to 4. Blood samples were taken and a questionnaire was also designed and completed for each selected girl. Cluster sampling method was used to choose sample population. After centrifuging blood samples in the lab, sera without hemolysis were incubated at -20° C. Anti – rubella IgG was detected by ELISA method using American Diaplus ELISA kits.

**Results**

With regard to the ELISA test measures, of 589

samples 500 cases revealed positive antibody titers (84.9%) (95%CI: 84.85 – 84.95) and 89 cases were negative for antibody (15.1%) (95%CI: 15.05-15.5). At the age group of 16 years or less 85% showed positive results. These results for age groups of 16-18 years and 18-20 years were respectively 84.7% and 85% (table –1). But with regarding the grade of studying, pre-college students had the least positive results (%79.3) for anti-rubella IgG (20.7% negative). Among all of the samples 63 cases (10.69%) had vaccination history against rubella at their childhood period. 92.1% of them showed positive results of antibody, this result for unvaccinated group was 83.9% (95%CI: 83.85 – 83.95). 82.5% of vaccinated students had literate mothers and 95.2% had literate fathers. These results for unvaccinated group respectively were 75.6% and 87.8%. Results of positive anti-rubella IgG in students with considering their numbers of family individuals (3, 4) were 82.3% (95%CI: 82.11– 82.49) and in students with more than these were 86.05% (95%CI: 86-86.1). Considering economic factors positive serologic results obtained in high schools with 400 or more students were 86.9% (95%CI: 86.84-86.96) and with 250 or less students were 71.9% (95%CI: 71.24 – 72.56). Finally in students of state high schools positive anti-rubella IgG obtained about 87.5% (95%CI: 87.44 – 87.56), this result for private schools was 71.3% (95%CI: 70.59- 72.01).

**Table1:** Frequency distribution of rubella serologic test results regarding students age

Serologic response result age group	Positive		Negative		Total	
	Absolute	Relative	Absolute	Relative	Absolute	Relative
< 16	266	85%	47	15%	313	100%
16<<18	200	84.7%	36	15.3%	236	100%
>18	34	85%	6	15%	40	100%
Total	500	84.9%	89	15.1%	589	100%

**Table2:** Frequency distribution of rubella serologic test results regarding kinds of schools

Serologic response Result kinds of schools	Positive		Negative		Total	
	Absolute	Relative	Absolute	Relative	Absolute	Relative
State	433	87.5%	62	12.5%	495	100%
Private	67	71.3%	27	28.7%	94	100%
Total	500	84.9%	89	15.1%	589	100%

## Discussion

Assessment of antibody level against rubella in collected samples showed 84.9% and 15.1% positive and negative serologic response, respectively. Confidence Interval for negative results in the sample was 15.05-15.5. These findings compared with those of other studies conducted in the cities of Hamadan and Zanjan yielded lower ratios (8, 5). Positive IgG for these cities were 90.07%, 89.9% and 92.7% respectively. The sample groups selected in that cities were 22-24 years old which could explain the higher rate of immunity, age group in our sample was 14-20 years old. An important study at Shariati hospital of Tehran showed 28% seronegativity among young women (3). On the other hand the rate of seronegativity among precollege students of our study, who stand a chance of early marriage, was 21.7%. These findings reveal a considerable ratio of high-risk group. At 1999 a survey carried out in Turkey indicated that incidence of rubella sensitivity between 18-20 years old girls was 13.94%. Authors suggested screening and vaccination of the young girls before marriage. They recommended that preventing seronegativity would reduce the rate of fetal morbidity and mortality caused by rubella virus (9). Another study among Egyptian girls between 20-25 years old confirmed the findings of the Turkish study (10). In France vaccination of mid school teenagers raised the rate of immunity from 78% to 98% (11). Also in Singapore a major study on congenital rubella syndromes that progressed along 16 years revealed a total decrease in CRS rates after vaccination from 93 cases to 26 cases (2). Considering the results of our study and the pre-marital status of these age groups "would be mothers" 15.1% negative response could be an indicator of the potential disorders during pregnancy for fetuses. Experts of WHO have been recommended on doing national vaccination with as principal objective to eliminate measles and congenital rubella

syndrome (CRS) among age group of 6-24 years. Even on the behalf of the immunization committee rubella immunity among women of child bearing age >24 years has been emphasized (12). At present Iran's National Health policy is based on the former studies which indicate immunity rate above 90% (13). So efforts need to be made to achieve very high coverage of at least 95% (14). However based on the findings of this study and others that mentioned above we believe that there is a need for further studies to be carried out among girls and young females. Mean while it's necessary to make congenital rubella surveillance system and establish a center for referral and serologic survey for determining the exact rate of risk in country (15). We also suggest that at the meantime vaccination against rubella could be considered as a part of National Immunization program.

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