Original Article

Evaluation of Rubella Immunity in Women before Marriage and Pregnancy in Isfahan During 1997 – 2000

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ABSTRACT

Background: Congenital Rubella syndrome is a public health problem in many developing countries which has not yet been sufficiently put into account. There is an urgent need for collecting appropriate data to estimate the cost-effectiveness of a potential global Rubella control program. This study was conducted to determine susceptibility to Rubella in women who are going to marry or consult for pregnancy.

Methods: This study began in 1997 and ended in 2000. The study was analytic descriptive and prospective. Eight hundred and thirty eight women who referred for premarriage tests or counselling for conception were included. According to antibody levels, test results were reported as immune and non-immune (susceptible) for every individual.

Results: Among 838 cases, 253 women (30.1%) were non-immune (susceptible) and 585 women (69.9%) were immune. The educational status of the two groups were recorded. Analysis of data showed that the higher the educational level (62.2% for University degree holder), the lower the immunity against Rubella would be (75.2% for unfinished high school individuals). Furthermore, immunity in the younger group was higher (73.9% in <20 years) than in the older group(61% in >30 years).

Conclusion: More than one third of pre marriage and pre conceptional women were non-immune (susceptible) to Rubella, so health providers should be aware of Rubella prevention and control in childbearing age via screening and vaccination. Immunity against Rubella can vary over time and the socioeconomic status is believed to play an important role in the level of immunity.

Key words: Congenital Rubella Syndrome, Rubella immunity, Rubella non-immunity.

The most common manifestations of Congenital Rubella Syndrome (CRS) are hearing loss, developmental delay, growth retardation and cardiac and ophthalmic defects[1]. In an epidemiological study, it was shown that CRS in the Perm region of the Russian federation, accounted for 15% of birth defects and for about 3.5 cases of CRS per 1000 live births per year (from 1979 – 1997)[2]. In Australia many pregnancies are terminated due to fetal anomalies which means that preventive programs are not completely protective. In fact twelve out of 85 cases of fetal anomalies were confirmed to be maternal Rubella infection during pregnancy[3]. Prevention of CRS as a complication of Rubella infection during pregnancy is the main aim of Rubella vaccination programs[4]. The massive Rubella epidemic from 1962 to 1965 stimulated the development of Rubella vaccine. When vaccines were developed, the vaccination programs initially focused on infants and children, reducing both Rubella and congenital Rubella. However, later extension of vaccination to certain older age groups achieved significantly a better control[5]. In south Asia, it was shown that 60% of women at childbearing age could be susceptible to

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Rubella[6]. Susceptibility rate to Rubella among Russian pregnant women (1979 – 1997) was 16.5 %[2]. In Canada, susceptibility to Rubella was 6.7% in women who delivered during 1997 – 1998[3]. A study reported from Poland showed that among 1280 women (ranged 15-30 years old), 135 cases (10.5%) were non-immune to Rubella[7]. In addition, a report from Tunisia in 2002[8] indicated that among 369 subjects, 21.7% were non-immune to Rubella. Among 385 sera from Nigerian hospital personnel aged 15-39 years, 25% were non-immune to Rubella, compared to 10% non-immunity to Rubella in Swedish women of the same age group[9]. CRS is an under-recognized public health problem in many developing countries[10]. There is an urgent need to study the cost-effectiveness of a potential global Rubella control program. This study was conducted to determine susceptibility to Rubella in women who were going to marry or counsel for pregnancy. The results of this study would help to know how to screen and how to do vaccination in susceptible women.

Materials and Methods

This study began in 1997 and ended in 2000. The study was analytic descriptive and prospective. Eight hundred and thirty eight women who referred to University health centers and three private clinics for pre marriage tests and consultation were prospectively included in the study. The age range of women in this study was 15-45 years.

Blood samples were taken and the sera were stored in -70° C until the test for Rubella antibody would be performed via commercial ELISA kits. Subjects were divided into immune and non-immune (susceptible) groups according to the serum level of antibody as suggested by the kit manufacturers' guide.

Women were asked questions on different demographic subjects to depict a clear view of their social status. Education levels for individuals were rated as: not finished high school, holding diploma and University degree holder. Quantitative data were compared among immune, and non-immune groups using chi-square test. The SPSS package was used for analysis and a P value < 0.05 was considered as statistically significant for all analyses.

Results

Among the 838 women, a total of 253 (30.1%) cases were non-immune and 585 (69.9%) cases were considered to be immune. Mean age of the subjects was 21.6 ± 5.5 years old. There were no significant differences between mean ages of the susceptible and the immune group (table 1). The two groups were significantly different regarding the level of education. We also considered the level of immunity from the stand point of the subjects' education as it could imply the role of socioeconomic status in this regard. Higher level of education was associated with lower Rubella immunity (table 1). The proportion of immunity in the groups with younger ages showed more immunity than in older ages. 73.9% of the women under 20 years of age, 63.6% in the age range of 20-30 years and 61% with more than 30 years were immune against Rubella respectively (figure 1).

Discussion

The result of this study showed that more than 30% of pre marriage and pre conceptional women are non-immune to Rubella. A similar study in USA showed that, about 10% of post pubertal women were non-immune to Rubella[11]. Reports showed that in Kuwait, non-immunity to Rubella was 7.7% in pregnant women [12]. The same rate was 16.5% in Russia [2]. However, In Bangladesh, it was estimated that up to 60% of women at childbearing ages were susceptible to Rubella virus[6]. In our neighboring country, Turkey, 10.3% of pregnant women were susceptible to Rubella infection[13]. In Iran a published document from Ahwaz (1987) by Moatari and Pakzad showed, Rubella immunity in women in reproductive ages was 89.9%[14]. A recent review by Azizi et al[15] expressed that about 20% of Iranian girls in Tehran and Kermanshah were non-immune to Rubella.

It can be considered that non-immunity to Rubella in Isfahan (a city in central Iran) is lower than in developing countries and higher than in developed countries. In this study, more than one thirds (1/3) of post pubertal women were non-immune(susceptible) to Rubella. There is a considerable rate of Rubella infection in this non-immune group with subsequent CRS for their fetuses. It may necessitate the development of a

program to detect the susceptible subjects and refer them for vaccination or make a national plan for public vaccination.

A study done in Turkey indicated that a small increase in seropositivity was seen as the age of women increased, though the differences among the age groups were not statistically significant[13]. Modarress in 1985 in Iran showed that immunity to Rubella increases as age rises up[15]. The frequency of immunity to Rubella did not change with age among Nigerians compared to a decrease in immunity with increasing age in Swedish individuals[9]. A study in Tehran showed that immunity to Rubella was more in southern part compared to the northern part of the city[15]. It simply conforms with the socioeconomic difference of people in the two parts of Tehran.

In our study, there was a significant negative relationship between degrees of education and immunity to Rubella that could imply the socioeconomic differences of people in the society.

However reports from Canada showed, no significant relationship between Rubella immunity in one side and parity, age, and gestational age on the other side[3]. In a study in Australia data obtained from primary and secondary school students were analyzed and results did not show significant differences in Rubella immunity between them[16].

In summary, since more than one third of pre marriage and pre conceptional women were non-immune to Rubella, we recommend that health providers should be aware of prevention and control of Rubella during childbearing ages. Considering Rubella outbreak in spite of MMR vaccination in infancy, screening should be done (in the school girls or in pre marriage women or at least in pre conception).Vaccination could be performed in non-immune cases. According to some reports urine sample can be alternatively assayed for Rubella antibody, which has a sensitivity and specificity of 96% and 99% respectively with a urine serum concordance rate of 97%[17].

Table 1. Comparison of the educational status between Rubella immune and Rubella-susceptible women. Data are mean ± SD or n (%).

	Non-immune	Immune	Total
Mean ages of groups	22 ± 6	21.3 ± 7	21.6 ± 5.5
Educational status*			
Not finished high school	68 (25)	207 (75)	275 (100)
Diploma Holder	115 (30)	263 (70)	378 (100)
University Degree Holder	70 (38)†	115 (62)	185 (100)
Total	253 (30)	585 (70)	838 (100)

*P = 0.011

†P = 0.007 compared to other groups (Fisher exact test)
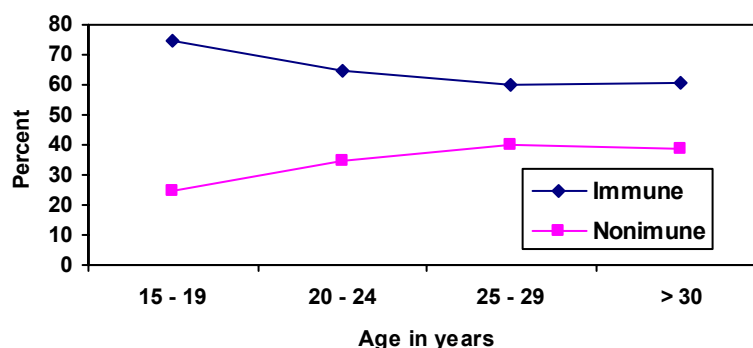
Figure 1. Frequency of immunity and non-immunity against Rubella based on the age groups of women

in this study.

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