

## Short Communication

# Age Specific Rubella Seroprevalence of an Unvaccinated Population of Adolescents in Ankara, Turkey

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**SUMMARY:** This study was designed to detect the age-specific rubella seroprevalence of an unvaccinated population of adolescents in Ankara, Turkey. Four hundred and forty adolescents (227 females, 213 males), aged 9-16 years, who were admitted to the Adolescent Unit from July to August 2000 were included in this study. For each participant, a questionnaire was completed and rubella-specific IgG antibodies were screened quantitatively by enzyme-linked fluorescent assay. Of the 440 patients screened for rubella antibodies, 32 (7.3%) were seronegative. Rubella seronegativity values according to sex and age groups were as follows: 15.3, 6.6, and 1.3% in females, and 12.0, 6.1, and 6.2% in males, in the age groups of 9-10, 11-13, and 14-16 years, respectively. The routine health supervision visit recommended between the age of 11 and 12 is an ideal time to immunize unvaccinated adolescents.

Rubella infection carries little morbidity and apparently only minor complications (1,2), but when it is contracted in the first trimester of pregnancy, it can infect the fetus and cause the devastating condition of congenital rubella syndrome (CRS) (3). Thus, the primary objective of a rubella immunization program is prevention of CRS (1). Vaccination programs have eliminated or greatly decreased rubella incidence and that of CRS in some developed countries (4-6). In developing countries, rubella outbreaks can occur without clinical recognition, even in a community in which health is being monitored. Thus, the prevalence of rubella cannot be assessed without serological evidence (2).

Rubella vaccine has not yet been incorporated into the national immunization program in Turkey, but since 1989, a measles, mumps and rubella vaccine has been available on a physician's recommendation or at the request of parents. The aim of the present study was to determine the age-specific rubella seroprevalence of a population of unvaccinated adolescents between the ages of 9 and 16.

Four hundred and forty unvaccinated adolescents (227 females, 213 males), aged 9-16 years, who were admitted to the Adolescent Outpatient Clinic of Hacettepe University in Ankara, Turkey, were included in the study. The study was planned as part of a measles and mumps seroprevalence study, and was conducted from July to August 2000. Information regarding the study was provided to the adolescents and their parents and to the healthy volunteers participating in this study. Each participant completed a questionnaire providing information such as sociodemographic characteristics and previous history of any exanthematous illness. Rubella-specific IgG antibodies were screened quantitatively with the use of enzyme-linked fluorescent assay kits (VIDAS RUB IgG II, bio Merieux, Lyon, France). Rubella IgG titers of 15 IU/ml or greater were considered positive, those of 10 to 15 IU/ml

equivocal, and those of less than 10 IU/ml negative. Statistical analysis was performed with the SPSS 9.0 program. Kruskal-Wallis variance analysis was used to test the significance of the difference between results for various ages and sexes. Testing for statistical significance for univariate analysis was performed by chi square test.

Of the 440 adolescents screened for rubella antibodies, 32 (7.3%) were seronegative. Rubella seronegativity was 7% for girls and 7.5% for boys. The rubella seronegativity rates did not differ significantly between the sexes. Rubella immunity according to age status of the participants is shown in Table 1. Rubella seronegativity rates did not differ significantly among age groups. Adolescents of both sexes were divided into the following three age groups: 9-10, 11-13, and 14-16 years. Rubella seronegativity rates differed significantly among age groups in girls ( $P = 0.007$ ), but not in boys (Table 1). The adolescents were further divided into two groups in relation to their area of origin; Ankara (urban area,  $n = 361$ ) or outside Ankara (rural area,  $n = 79$ ). The rubella seronegativity rates were 7.5% and 6.3%, respectively, in adolescents from urban and rural areas, and these rates did not differ significantly. Of the 408 rubella seropositive adolescents, 271 had a past medical history of exanthematous illness. The remaining 137 subjects (34%) had no history of exanthematous illness.

The prevalence of rubella and the incidence of rubella infection in pregnancy- and thus the risk of CRS-cannot be assessed without serological evidence. Serological studies have been undertaken in many developing countries to assess the proportion of the population susceptible to rubella by age, and thus to define the degree of risk to women of childbearing age. Results vary widely between countries, between different parts of the same country, and, over time, with in a particular region of one country (2).

Serological studies in children in the last 20 years in Jordan (7), Nigeria (8), Yemen (9), Saudi Arabia (10), Libya (11), and Taiwan (12) have all shown an increase in seropositivity with age. These studies demonstrated that in many developing countries rubella infects children at different ages, and that

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Table 1. Rubella immunity status of the participants according to age

Age	Female (n = 227)		Male (n = 213)	
	Seropositive (%)	Seronegative (%)	Seropositive (%)	Seronegative (%)
9	18 ( 85.7)	3 (14.3)	15 ( 93.7)	1 ( 6.3)
10	32 ( 84.2)	6 (15.8)	29 ( 85.3)	5 (14.7)
11	26 ( 86.7)	4 (13.3)	27 ( 96.4)	1 ( 3.6)
12	34 ( 97.1)	1 ( 2.9)	38 ( 90.5)	4 ( 9.5)
13	25 ( 96.2)	1 ( 3.8)	27 ( 96.4)	1 ( 3.6)
14	32 (100.0)	–	30 ( 90.9)	3 ( 9.1)
15	36 ( 97.3)	1 ( 2.7)	20 (100.0)	–
16	8 (100.0)	–	11 ( 91.7)	1 ( 8.3)
Total	211 ( 93.0)	16 ( 7.0)	197 ( 92.5)	16 ( 7.5)

\*  $P = 0.007$ 

varying proportions of women have not acquired the antibody when they reach childbearing age (2). Our study showed that 7.3% of the adolescents (9-16 years of age) admitted to the Adolescent Outpatient Clinic were rubella-seronegative; that is, susceptible to rubella infection. Akşit et al. reported that seronegativity rates were 8% and 5% in females and 4% and 5% in males between the ages 10-14 years and 15-19 years, respectively, in the Turkish population living in İzmir (13). A nationwide seroepidemiologic survey is warranted to determine age-specific rubella immunity in Turkey. However given that the results of the two studies of Turkish populations are not remarkably different, it can be said that the rubella seronegativity rate of 7.3% of adolescents confirms the high risk of infection during the childbearing years in Turkey.

In countries where routine rubella vaccination has not yet been introduced, most cases of rubella occur in children 5 to 15 years of age (13). Akşit et al. reported that 71% of the Turkish population living in İzmir acquire rubella infection before 10 years of age, and in the 10-14 age group. They found a rubella seropositivity of 87.6 %, meaning that seronegativity rates rapidly decreased in this 4-year interval (13). In our study, rubella seronegativity rates did not differ significantly among age groups, but did show a rapid decrease from age 9-10 to age 11-13. The data concerning the age of acquirement of rubella infection in Turkey are consistent between studies. In the present study, seronegativity rates did not differ significantly between female and male adolescents. Similarly, Akşit et al. found that seronegativity rates did not differ significantly between men and women younger under 20 (13).

We did not find any significant difference in seronegativity rate between urban and rural patients. We think that this reflects the limited number of rural participants in this study. It is reported that 25-50% of rubella infections are subclinical (1). Based on past medical history, at least 34% of our seropositive study population had subclinical rubella infection. These findings indicate the importance of serologic tests for evaluating rubella prevalence in a population.

In developing countries the extent of rubella infection remains unknown. However, the indiscriminate introduction of rubella vaccine without epidemiological data and an adequate monitoring program is not recommended due to the danger of increasing the incidence of CRS (2,14). To avoid that outcome, vaccination of prepubertal girls, and of women before or after pregnancy, must precede or accompany the vaccination of infants; further, vaccine uptake in the target age-groups must be recorded. The routine health supervision visit recommended between the age of 11 and 12 is an ideal time to immunize unvaccinated adolescents (15). Pregnant

adolescents and adolescents who anticipate becoming pregnant within 3 months should not be immunized.

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