

## Abstract

Information on epidemiological aspects of rubella provides useful background information for developing appropriate immunisation programmes for prevention of rubella in the community. This study was carried out to determine the seroprevalence of rubella antibodies in children 1-11 years of age and pregnant females, and factors associated with rubella seroprevalence in the Kalutara District of Sri Lanka. The proportion of women in the child bearing age group and the community susceptible to rubella infection in selected years for different immunisation strategies was estimated.

A community-based seroepidemiological study was carried out to ascertain some epidemiological characteristics of rubella infection in a representative sample of 1250 children aged 1-11 years selected by a multistage stratified cluster sampling technique from the Kalutara District of Sri Lanka. A clinic-based serological study was also carried out to determine the epidemiological characteristics with regard to rubella in pregnant females. A group of 620 pregnant females from the Kalutara District was selected from ante-natal clinics of urban and rural communities.

All relevant information except the serological findings was obtained using an interviewer-administered questionnaire. Rubella IgG antibody levels were determined by a third generation ELISA test. Rubella specific IgG concentrations were expressed as International Units of IgG rubella antibodies and a cut-off point of 15 IU/ml was taken to distinguish seropositives from seronegatives.

Univariate and bivariate analyses were performed to describe and determine associations between variables using the chi-square test. Age and socio-economic factors affecting seropositivity of children were modelled using logistic regression. The risk of natural infection was estimated using the seroprevalence of children, and the median age of infection calculated. The proportion of females of the child bearing age group susceptible to rubella in selected years was estimated for different immunisation strategies using a probabilistic approach.

The average percentage of children protected against rubella was 13% (range 6%-25%) whereas 76% (range 71% - 82%) of the pregnant females were found to be protected against rubella. The findings of the community survey indicated that the susceptibility to rubella infection among children was significantly associated with age, ethnicity, schooling (where school children were less likely to be susceptible to rubella than children not attending school), year in school, birth order of the child, number of children in the family, father's education and number of persons in the family. However, in the multivariate model only age, father's education and number of persons in the household were significant predictors of seroprevalence.

The average annual risk of natural infection was estimated to be 2-3 infections per 100 susceptibles in the population based on seroprevalence data of children. The median age of natural rubella infection estimated from the average annual risk of infection was 25 years.

The impact of different vaccination strategies on the proportion of susceptibles among women in the childbearing ages and the community were simulated. Selective immunisation

of females at 12 years of age will take at least 20 years to have an impact on women between 15-35 years of age. The impact on the community will be minimal with this immunisation strategy.

Immunisation of all children at 1½ years of age will take at least 30 years to have an impact on women between 15-35 years of age. This strategy will reduce the percentage of the community susceptible to rubella to about 11% in 20 years with 90% coverage.

Immunisation of all children at 1½ years of age and selective immunisation of females at 12 years of age for 10 years will in 20 years have an impact on women between 15-35 years of age. With 90% coverage, the population susceptible to rubella can be reduced to less than 10% in 20 years.

Based on the results of the simulation studies, it is recommended that the strategy of selective immunisation of females at 12 years of age for 10 years and immunisation of all children at 1½ years be adopted. This strategy may be supplemented or modified depending on the feasibility of implementing such a strategy and the objectives and needs of the programme.