

Rubella Seroprevalence among Indian Female Medical and Nursing Students at a Tertiary Care Teaching Institute and its Correlation with Socioeconomic Status

Sir,

Rubella occurs worldwide and being a mild self-limiting disease; it is of little concern as such. However, consequences are dreadful if women become infected during the early months of their pregnancy. Rubella virus is highly teratogenic and may lead to abortion or intrauterine fetal death. The surviving fetuses may develop congenital rubella syndrome (CRS) which includes mental retardation, deafness, cataract, congenital heart defects, microcephaly, and hepatitis. According to the World Health Organization, every year 100,000 children are born with CRS globally.^[1] CRS rates are highest in the African and South-East Asian regions where vaccine coverage is lowest. According to a statistical model-based estimate, 46,621 infants with CRS are born annually in South East Asian Region alone.^[2] Susceptible health personnel caring for these children such as doctors and nurses can become infected and may pass it on to other susceptible patients especially pregnant women and can also lead to hospital-borne outbreaks of rubella.

Many countries have implemented successful rubella vaccination programs, and few have eliminated rubella.^[3] However, CRS is a challenge in developing countries such as India, where rubella vaccination was not part of the national immunization schedule till recently. Lack of a nationwide surveillance program worsens the situation further. As health-care providers are at maximum risk of both acquiring and spreading infectious diseases like rubella and adding to the burden of CRS, it becomes important to find out rubella seroimmunity status in them.

We conducted this cross-sectional study among female medical and nursing students to delineate the prevalence of susceptibility for rubella infection among them. A total of 188 female medical and nursing students of our tertiary care hospital between July 2014 and June 2015 were recruited. The study protocol was approved by the institutional ethics committee and was funded by a grant from the institute. Written consent was taken. Participants were categorized into high and low socioeconomic (SE) status according to the modified Kuppuswamy scale. A standard questionnaire about rubella infection, its immunization and their sociodemographic characteristics were asked to fill in the pamphlet. Following this, 5 ml of venous blood was withdrawn aseptically from each participant. The specific IgG antibody titer was evaluated by commercially available ELISA. Serum IgG levels ≥ 10 IU/ml were considered seropositive or immune and those with values lesser than 10 IU/ml were

considered seronegative. Those considered seronegative were counseled for active immunization. Data were entered into SPSS version 23.0 (SPSS Inc., Chicago, IL, USA). The Chi-square was used to compare variables with and $P < 0.05$ was considered as statistically significant.

The mean age of the participants was 18.4 ± 3.5 years. None of the participants gave a history of immunization with measles/mumps/rubella in childhood or rubella vaccination in adolescence. Of 188 samples, 27 (14.36%) were seronegative and 161 (85.6%) were seropositive. There were 23 seronegative samples (16.4%) in the high SE group and 4 seronegative samples in the lower SE group (9.2%) and the difference was not statistically significant.

Rustgi *et al.*, in a community-based study, assessed rubella serology of 230 adolescent unmarried girls aged 15–18 years. Overall, 17.8% of girls were seronegative for rubella.^[4] In a hospital personnel-based study in 2004–2005, Rajasundari *et al.* found a seronegativity rate of 11.8%.^[5] Singla *et al.*, in 2004, in a district of Amritsar Punjab India, did a community-based and health personnel-based seroepidemiological study. A total of 580 women participated and 80 of them were health personnel.^[6] They found an overall seropositivity rate of 68.8% whereas in health personnel, it was 80% which is comparable to our study. The comparatively higher seropositivity rate in health personnel in this study can be explained by the higher rate of occupational exposure in health personnel. In the present study, we failed to find any association between SE status and rubella seroprevalence. This finding is at odds with most of the previous studies. There might be a lack of power in our study as we did a convenient sampling of all the students enrolled in the Institute at the time of the study. It is also possible that any existing substantial difference in the seronegativity due to SE status might have been mitigated in these students due to occupational exposure after joining the medical college. The students in our institute are selected by a Pan India entrance test and they are truly representative of every region of India, albeit not in sufficient number. Importantly, they are both, a health personnel with a potential to cause a hospital-based epidemic and future mothers who can produce offspring with CRS if not immunized to rubella.

Rubella vaccination was not a routine practice in India when this study was carried out. In 2017 Rubella Vaccine was introduced in the National Immunization Programme of India, with two doses of Measles/Rubella vaccine recommended at 1 and 2 years of age. Mathematical models have suggested that

when a vaccine is introduced with inadequate coverage in the childhood, the CRS rates may increase paradoxically because the average age of infection will rise, to give an increased risk to the women of childbearing age^[7-9] We have learned from our experiences that additional catch-up immunization activities are essential to contain rubella and CRS.^[10] To determine the optimal age range for additional immunization activities, understanding the rubella seroimmunity among women of child-bearing age is critical. There is an argument against serosurveillance in the context of a populous and poor country such as India.^[10] However, it is equally true that, currently, immunization studies against contagious diseases have the highest cost-benefit ratio among preventive medicine services.

After mass preschool vaccination, the most important step to prevent CRS is to determine the susceptibility in women of child-bearing age to rubella. In order to extend these services nationwide, accurate and reliable epidemiological data are required. In addition, countries should ensure that susceptible women of child-bearing age and health-care workers are offered a rubella-containing vaccine. Rubella vaccination is important for nurses, midwives, obstetricians, pediatricians, neurologists, cardiac surgeons, ear, nose and throat surgeons, and other specialists who see children with congenital rubella. It is incumbent upon the hospital administration to provide free vaccination to both nursing and medical students at the time of admission to help prevent hospital-based outbreaks and to protect female health personnel before their first pregnancies.

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Conflicts of interest

There are no conflicts of interest.

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