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SERO PREVALENCE OF RUBELLA AMONG UNVACCINATED CHILDREN

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ABSTRACT

To estimate the sero prevalence of rubella among children attending a tertiary care hospital, in the age group of 1 to 14 years who have not received MMR vaccine.This was a hospital based prospective descriptive study. Blood samples were collected from 50 children aged 1-14 years and analyzed for IgG antibody titres for rubella infection by a quantitative enzyme-linked immunosorbent assay. Data on the socio epidemiological factors was obtained from the parents. The overall rubella sero positivity rate was 58%. The sero positivity increased with age; which was 33% among 1 to 5 years, 55% among 6 to 10 years and 89% among 10 to 14 years. (P=0.01). The study provides information on the increasing sero prevalence of rubella with increasing age among unimmunized children. Since there is an overall sero positivity of only 58% among children, rubella containing vaccine should be included in the National Immunization Schedule to reduce the rubella burden.

KEY WORDS: **Rubella, Seroprevalence children, Vaccine, National Immunization Schedule.**

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INTRODUCTION

Rubella infection during early pregnancy may result in Congenital Rubella Syndrome (CRS) which is characterized by the constellation of abnormalities like an intrauterine growth restriction, eye defects, deafness, cardiac defects, microcephaly and psychomotor retardation[1]. The chances of developing these deformities are very high (90%) if the maternal infection occurs before 11 weeks of gestation[2, 3]. WHO estimates that, worldwide more than one lakh children are born with CRS each year and most of them are in the developing countries[4]. This study was conducted to estimate the seroprevalence of rubella, among children to assess the epidemiologic burden of Rubella in the community.

MATERIALS AND METHODS

Fifty children in the age group of 1 to14 years who have not received the MMR vaccine were recruited for the study during the period January to December 2012. The study was approved by the Institutional Ethics Committee.Children who received MMR vaccination were not enrolled by verifying their immunization records. Children who were on immunosuppressive therapy or with immunocompromised status were excluded from the study. A standard structured questionnaire containing data on the socio epidemiological factors like age, gender, dietary pattern, place of residence and per capita income was prepared and the information was obtained from the parents. Blood samples were collected with prior consent after explaining the social importance of the study. The blood samples were analyzed for IgG antibody titers for rubella infection. A quantitative enzyme-linked immunosorbent assay (ELISA - BEIA Rubella IgG Quant kit, 22294) was used for the detection of specific IgG antibodies[5]. Two mL of venous blood was collected, serum separated and stored at a temperature of less than -20^{o} C. The sample was considered positive for IgG anti-rubella antibodies if the titre was >15 IU/mL, negative if <8 IU/L and borderline if 8 to 15 IU/mL. Statistical analysis was performed using SPSS version 16 and EpiInfo 3.51. The categorical data were analyzed using Chi Square test. P value of < 0.05 is considered significant. All statistical tests are two tailed tests.

RESULTS

A total of 50 children aged 1 to 14 years were enrolled in the study. The association between the demographic variables and Rubella IgG levels are shown in Table 1. The study population was categorized into three age groups. Children from 1- 5 years (n=21), 6-10 years (n=11) and 10-14 years (n=18). The male: female ratio was 1.6:0.9. The overall rubella sero positivity rate was 58%. The Rubella IgG levels were in the borderline range in 8% of the children and 34% of the study population was sero negative.The sero positivity increased with age, from 33% among 1 to 5 years, to 55% among 6 to 10 years and to 89% among 10 to 14 years. This was found to be statistically significant (P=0.01).Urban population constituted 66% of the study group. The sero positivity was higher among the children residing in the rural areas 82%, compared to 45.5% among the children residing in the urban areas. This was found to be statistically significant (P=0.04). The gender of the child, the dietary pattern and the socio-economic status of the family were not significantly associated with Rubella seropositivity.

Table 1
Association between Demographic variables & Rubella IgG levels

		IgG LEVEL							
		Negative		Borderline		Positive			
		n	%	n	%	N	%	Total	Chi square test
Age	<5 yrs	12	57.1%	2	9.5%	7	33.3%	21	
	6 -10 yrs	4	36.4%	1	9.1%	6	54.5%	11	**χ2=13.1 P=0.01****
	>10 yrs	1	5.6%	1	5.6%	16	88.8%	18	
Sex	Male	10	31.3%	2	6.3%	20	62.5%	32	χ2=0.84P=0.65
	Female	7	38.9%	2	11.1%	9	50.0%	18	
Place	Urban	15	45.5%	3	9.1%	15	45.5%	33	**χ2=6.52P=0.04***
	Rural	2	11.8%	1	5.9%	14	82.4%	17	
vegetarian or non-vegetarian	Vegetarian	4	44.4%	1	11.1%	4	44.4%	9	χ2=0.83 P=0.65
	Non vegetarian	13	31.7%	3	7.3%	25	61.0%	41	
Income	<5000/-	14	46.6%	3	10%	13	43.3%	30	χ2=0.06 P=0.97
	>5000/-	10	50%	2	10%	8	40%	20	

**** Significant at P≤0.05 ** highly significant at P≤0.01 *** very high significant***

DISCUSSION

The rubella infections are subclinical or mild and the real impact of the disease remains undiagnosed. Presence of rubella specific IgG in an unimmunized group of children is a sentinel marker of the rubella pool, which helps to assess the susceptibility of the population.Rubella antibody titers level >15 IU/mL is considered to be the protective level against Rubella infection. The overall rubella sero positivity rate was 58%, increasing with age and 89% among 10 to 14 years. This is indicative of the widespread viral transmission with increasing age. A similar study was done by Yadav, *et al*. who evaluated the rubella seroprevalence in 240 children, aged 9-18 months, who had not received the MMR vaccine and found 24% seropositivity[6]. Though the overall seroprevalence is 58%, it was only 45.5% of the urban population. Similar observations were made in a hospital based study from Delhi, where women from urban areas were more susceptible compared to women from rural areas[1].In our study, 34% of the study population was sero negative and this group was vulnerable not only to rubella infection and form the pool from which unimmunized adolescent girls and pregnant mothers can be infected at any time. This can be compared with a study conducted at Jammu among unvaccinated school girls aged 11-18 years, which revealed that 32.7% were found to be seronegative[7]. Studies conducted in India show sero negativity to rubella, among adolescent girls[8] vary from 10% to 36 %. The sero negative group forms a pool from which susceptible individuals are infected and the vicious cycle continues in the propagation of CRS. In India, it is estimated that about 50,000 children are born blind with congenital cataract each year, of which at least 25% are due to maternal rubella[9]. During the rubella outbreaks, rates of CRS per 1,000 live births were at least 1.7 in Israel, 1.7 in Jamaica, 0.7 in Oman, 2.2 in Panama, 1.5 in Singapore, 0.9 in Sri Lanka, and 0.6 in Trinidad and Tobago[10]. These rates are similar to those reported from industrialized countries during the pre-vaccine era. The rate of confirmed or probable CRS among infants in the United States in the vaccine era, has been reported to range from 0.01 to 0.08 per 10 000 live births[11]. So it is imperative that Rubella containing vaccine, namely the MMR vaccine need to be included in the National Immunization Schedule in all the states of India so as to prevent cross infection from an unimmunized population to a susceptible group. The WHO strongly supports the use of MMR vaccine on the grounds of its convincing safety record and efficacy to protect women of childbearing age.

CONCLUSION

The study provides important information on the increasing sero prevalence of rubella with age in children. When most of the Western world has eliminated congenital rubella syndrome, India, at this juncture with its acclaimed progress in economy and biomedical science, should not further delay the inclusion of MMR vaccine in the National Immunization Schedule[12]. Vaccine against Rubella offers long-term protection. Incorporation of Rubella containing vaccine (RCV) in National childhood immunization schedules is both cost-beneficial and cost-effective[13]. Immunization policy should also include catching up RCV for adolescent girls and women of childbearing age before conception to control CRS[14, 15]. Since, there is no specific treatment for either maternal or congenital rubella infection, vaccine as the primary means of prevention by immunization of all the susceptible persons is mandatory.

CONFLICT OF INTEREST

Conflict of interest declared none.

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