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Prevalence of Rubella Virus and Cytomegalovirus Infections in Suspected Cases of Congenital Infections

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Although rubella virus and cytomegalovirus (CMV) are important causes of congenital infections, information on their prevalence in our country is scarce. We studied a total of 249 infants suspected of having congenital infections from January 1988 to September 1989. Serum samples of these infants were tested for rubella and cytomegalovirus specific IgM antibodies by mucapture ELISA. Thirty (12%) infants were positive for rubella IgM antibody, and 50 (20%) had CMV specific IgM antibody. In the group presenting with hepatosplenomegaly (n = 56) rubella and CMV specific IgM antibodies were detected in 1 (1.7%) and 25 (44.6%) infants respectively. In the group presenting with congenital malformations (n = 90), 23 (25.5%) were positive for rubella, and only 9 (10%) had CMV IgM antibodies. Of the infants presenting with mental retardation (n = 39), only CMV infection was detected in 3 (7.7%) infants, whereas amongst the group showing intrauterine growth retardation (n = 16), 5 (31.25%) had CMV specific IgM antibodies and 2 (12.5%) had rubella specific IgM antibodies. In the miscellaneous group (n = 48), 4 (8.3%) and 8 (16.6%) infants had rubella and CMV IgM antibodies respectively. CMV infection was prevalent in a significantly higher number of children with hepatosplenomegaly than rubella while in infants with congenital malformations a significantly higher number had rubella infection. It is concluded that rubella and CMV infections are commonly seen in children with intrauterine infections in our population.

Key Words : *Rubella; Cytomegalovirus (CMV); Congenital infection.*

Rubella virus and cytomegalovirus (CMV) account for majority of intrauterine infections.[1] There are only a few serological studies from India on congenital rubella infection.[2,3] Further these studies suffer from the drawback that diagnosis of congenital rubella infection was not made by demonstrating virus specific IgM

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antibodies which is a more reliable and accurate method for the diagnosis of intra uterine infections. Cytomegalovirus infection is endemic in India as demonstrated by the prevalence of CMV antibody in 98%-100% of adult population.[5] Although primary CMV infection in pregnant women in our country may be rare but reactivation of virus during pregnancy can also result in congenital infection.[6] The incidence of active maternal and congenital infection with CMV in India is not known. In western countries, the incidence of congenital CMV infection varies from 0.5%-3% of all live births.[6] The present study was carried out to find out the prevalence of rubella and CMV infection in suspected cases of congenital infections by detection of virus specific IgM antibodies by enzyme immunoassay (EIA).

MATERIAL AND METHODS

Infants of 0-1 year age group with suspected intrauterine infections who were referred to virology laboratory of All India Institute of Medical Sciences, New Delhi from January 1988 to September 1989 were included in the study.

CMV and Rubella specific IgM antibodies

Serum samples were examined by u capture ELISA (Northrumbia Biologicals Ltd. U.K.). The sea were tested for the presence of CMV and rubella specific antibodies at a dilution of 1 : 50. Sera yielding corrected absorbance values of more than 70% of that obtained with the positive control serum were considered as positive.

RESULTS

A total of 249 infants with suspected congenital infections were included in the study. According to the clinical presentation the infants could be divided into 5 groups : Group A (n = 56) hepatosplenomegaly with or without jaundice, Group B (n = 90) congenital malformations, Group C (n = 39) mental retardation with or without microcephaly, Group D (n = 16) intrauterine growth retardation (IUGR), Group E (n = 48) miscellaneous group which included infants who presented with varied features like seizures, rashes, pneumonia etc.

CMV specific IgM antibodies were present in 50 (20%) of the 249 infants whereas rubella specific IgM antibodies were present in 30 (12%) infants. The prevalence of CMV and rubella specific IgM antibodies in different groups with different clinical presentations is shown in Figure 1. Of 56 infants in group A, CMV IgM antibodies were detected in 25 (44.6%), and rubella IgM antibody in 1 (1.7%) patient respectively. In group B of 90 infants, 23 (25.5%) had rubella IgM antibody, and only 9 (10%) had CMV IgM antibody. Thus in group A significantly ($p < 0.05$) higher percentage of infants showed evidence of CMV infection, whereas in group B rubella infection was encountered more frequently ($p < 0.05$). In the other three groups no significant difference was found between the prevalence of CMV and rubella infection (Figure 1).

DISCUSSION

Demonstration of virus specific IgM antibody in infancy is considered a definitive evidence of intrauterine viral infection.[4] Of the 249 infants in the present study congenital rubella infection was detected in 30 (12%) and CMV infection in 50 (20%) infants by demonstrating virus specific IgM antibodies. In earlier studies on congenital rubella infection from India,

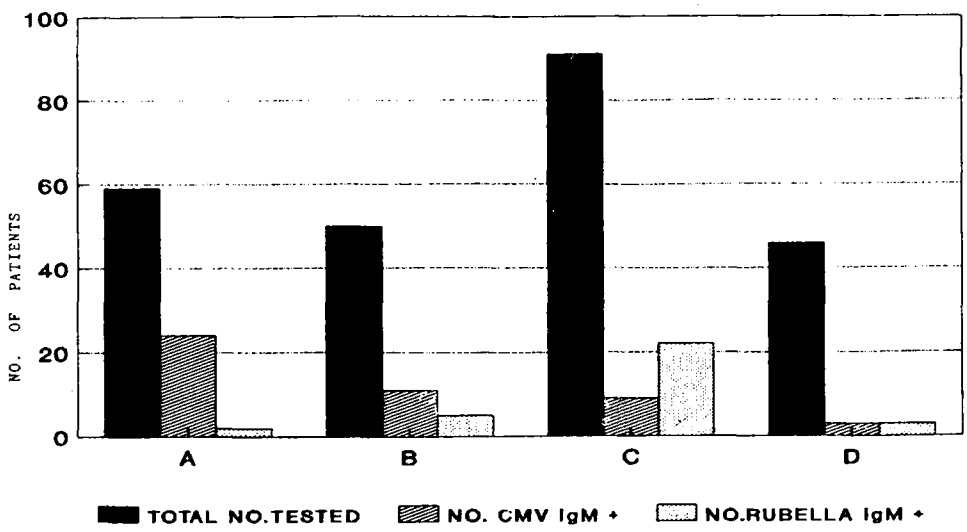

Fig. 1. Distribution of cytomegalovirus and rubella virus specific IgM antibodies in infants with different clinical presentations. Group A (n = 56) hepatosplenomegaly, Group B (n = 90) Congenital malformations, Group C (n = 39) Mental retardation, Group D (n = 16) Intrauterine growth retardation, Group E (n = 48) Miscellaneous. CMV specific IgM antibodies were detected in significantly higher number of infants as compared to rubella antibodies in group A ($p < 0.05$). Rubella specific IgM antibodies were detected in significantly higher number of infants as compared to CMV antibodies in group B ($p < 0.05$).

the diagnosis was based either on the demonstration of higher titres of rubella antibodies in infants with congenital malformations as compared to healthy controls or on the presence of higher titres of rubella antibody in infants as compared with their mothers.[2,3] In a study from Delhi 5.6% of 272 infants with congenital malformations were shown to have higher rubella HAI antibody titres as compared to their mothers. In addition rubella IgM antibody was detected in 7 out of 16 children.[2] The present study is the first report from India in which rubella IgM antibody has been studied in a larger number of infants with suspected intrauterine infections.

Similarly information on the role of CMV in causing intrauterine infections is not well studied in India. In an earlier study from Delhi CMV specific IgM antibody was detected in 25 children with congenital infections by Indirect Immunoflouresent Assay (IFA).[7] Enzyme immunoassay (EIA) for demonstration of IgM antibody is more sensitive than IFA. This is the first report from India in which prevalence of congenital CMV infection has been studied by demonstrating the presence of CMV IgM antibodies by EIA.

The present study showed that of the infants who presented with hepatosplenomegaly with or without jaundice a significantly higher number had evidence of

CMV infection whereas in infants who presented with congenital malformations rubella infection was more common. In infants presenting with other clinical manifestations no significant difference was noted in the relative prevalence of CMV and rubella infections. Children born alive with congenital CMV infections commonly present with hepatosplenomegaly with or without jaundice, low birth weight, chorioretinitis and anemia.[6] On the other hand congenital rubella infection usually causes permanent developmental defects resulting in cataract, sensory neural deafness, cardiac defects and bony lesions.[8] The findings of the present study are thus in agreement with the earlier observation. Since only symptomatic infants were included in our study this does not therefore represent the true incidence of congenital CMV or rubella infection. It is well known that only 5% of babies congenitally infected with CMV have symptomatic disease at birth and another 5% become symptomatic during the first year of life.[6] Similarly in rubella infection all babies are not born with congenital malformations. Therefore to examine the full extent of the problem of congenital infections with rubella and CMV a long term prospective study should be carried out.

References

1. White DO, Fenner F. *Congenital and perinatal viral infections in Medical Virology* 3rd Ed. London : Academic Press, Inc, 1986 : 630-631.
2. Manjunath N, Balaya S. Serological study on congenital rubella in Delhi. *Indian J Med Res* 1984; 74 : 716-721.
3. Chaturvedi UC, Tripathi BN, Mathur A et al. Role of rubella in congenital malformations in India. *J Hyg (Camb)* 1973; 76 : 33-40.
4. Banatvala JE, Best JM. Rubella. In : Brown and Wilson, Ed. *Principles of Bacteriology, Virology and Immunity.* 7th Ed. London : Edward Arnold, 1984 : 271-302.
5. Pal SR, Chitkara NL, Krech V. Seroepidemiology of CMV infection in and around Chandigarh (Northern India) *Indian J Med Res* 1972; 60 : 973-978.
6. Onorato IM, Morens DM, Martone WJ, Stansfield SK. Epidemiology of CMV infections : Recommendations for prevention and control. *Rev Infect Dis* 1985; 7(a) : 479-497.
7. Satapathy G, Balaya S. Diagnosis of intrauterine cytomegalovirus infection by IgM antibody test. *Indian J Med Res* 1985; 82 : 421-426.
8. Peckham C. Congenital rubella in the United Kingdom before 1970 : The prevaccine era. *Rev Infect Dis* 1985; 7 (Suppl) : S-11-S-16.