The Turkish Journal of Pediatrics 33:217-220, 1991

ELIMINATION OF MATERNAL ANTIBODIES AGAINST MEASLES

(Is the Policy of Vaccinating Children Younger than Nine Months of Age Suitable for Turkey?)*

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SUMMARY: Kanra G, Ceyhan M. (Department of Pediatrics, Hacettepe University Faculty of Medicine, Ankara, Turkey). Elimination of maternal antibodies against measles (Is the policy of vaccinating children younger than nine months of age suitable for Turkey?). Turk J Pediatr 33: 217-220, 1991.

Maternal antibodies against measles in 223 healthy children aged 22 to 31 weeks were studied. The ratio of children with detectable antibodies declined from 61.4 percent at 22-23 weeks of age to 20 percent at 26-27 weeks of age. Since the minimum proportion of antibody-positive children (15.6% at 26-27 weeks of age) is still higher than the optimum proportion (5%), the Schwarz vaccine which is used mostly in measles immunization seems not to be effective to obtain a high seroconversion rate in our infants. We suggest that the Edmonston-Zagreb strain of measles vaccine be used for infants under 9 months of age in Turkey. *Key words: maternal antibodies against measles, measles vaccination.*

Despite the advent of the measles vaccine in 1959, the illness remains one of the most severe and important infectious diseases in the developing world. The virus is responsible for the death of millions of children and precipitates diarrhea, malnutrition and blindness in a substantial proportion of victims[1-4]. Measles is a serious public health problem especially in those areas where the disease mostly occurs during the latter part of the first year of life[2].

National public health recommendations for measles vaccination differ from country to country. The World Health Organization (WHO) recommends that immunization with a live attenuated measles vaccine should be carried out when the child is around the age of nine months, at which time the transplacentally acquired immunity is waning[5]. At this age, the administration of one standard dose of the Schwarz strain measles vaccine successfully immunizes at least 90 percent of the vaccinees. However, despite the vaccination, measles has become hyperendemic in many of the crowded, urban areas of developing countries, probably because of the high influx of susceptible children from the surrounding rural areas who have insufficient vaccination coverage[6]. As a consequence, many fatal cases have been observed before the age of nine months. Reports from The Gambia[7] and South Africa[8] indicate that 18 to 45 percent of all measles cases

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occur in infants under the age of nine months. With the aim of decreasing the incidence of measles in this age group, many studies are being performed regarding the vaccination of infants aged between 4-6 months[9]. In that age group, unfortunately, the effectiveness of the measles vaccine is reduced to a great degree by the virus neutralizing activity of the transplacentally acquired maternal measles antibodies[10,11]. Therefore, the most important factor affecting the success of measles immunization is the disappearance of maternal anti-measles antibody. In order to determine the optimum age for measles vaccination, we studied the rate of disappearance of anti-measles antibodies in a group of children aged between 22 and 31 weeks.

Material and Methods

The study population consisted of 223 healthy infants who were 22 to 31 weeks of age. They were registered in the Hacettepe University Rural Hospital at Etimesgut, a district 16 km from Ankara, were they had received comprehensive medical care since birth. The age distribution was: 57 were 22 to 23 weeks, 29 were 24 to 25 weeks, 32 were 26 to 27 weeks, 65 were 28 to 29 weeks, and 40 were 30 to 31 weeks. The children had no history of measles nor signs of immunological deficiency.

Separated serum samples were stored at –20°C until titration could be performed in the laboratory. Measles specific antibodies were determined by an enzyme-linked immunosorbent assay (ELISA; Behring diagnostic kit)[12]. Titres were expressed as the last dilution yielding an optic density of 0.2. Seropositivity was defined as the appearance of a detectable level of antibodies (1:32).

Results

Seropositivity, which is the result of the presence of maternal anti-measles antibodies, was 73/223 (32.7%) in all children in the study. The proportion of children with detectable antibodies declined progressively with increasing age (Fig. 1). The distribution of maternal antibody levels in relation to age shows a progressive reduction with increasing age from 22 weeks to 27 weeks. Thus the proportion of antibody positive children declined from 61.4 percent at 22-23 weeks to 15.8 percent at 26-27 weeks. While an evident decrease occurred during those weeks, thereafter no decline was observed up to 31 weeks of age.

Discussion

Since measles occurs at earlier ages in developing countries, WHO has lowered the optimum age for measles vaccination in children to nine months or younger[5]. The usual vaccine is the Schwarz vaccine, a higly attenuated strain of a chick-cell adapted measles virus. At this age, seroconversion after vaccination is about 90

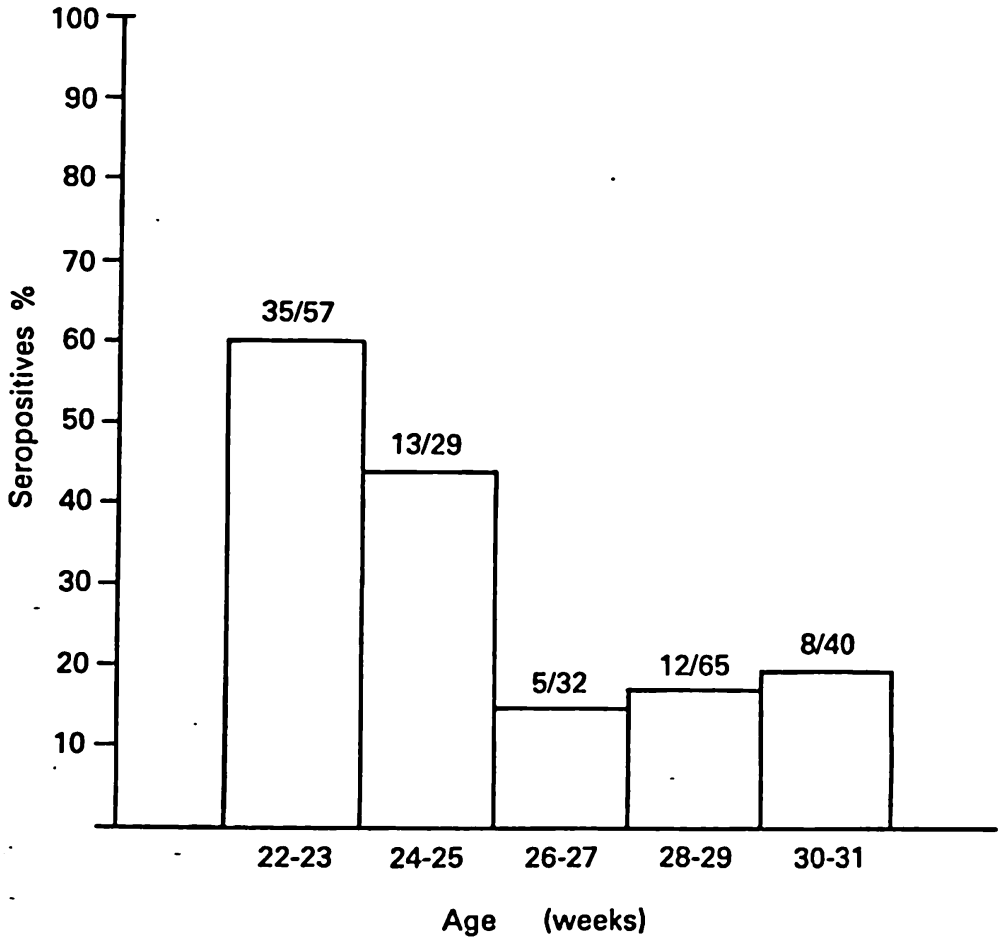

Fig. 1: Proportion of seropositive children according to age.

percent[9]. Although vaccination during the said period results in better protection than at 15 months of age, measles has still not been eradicated in the world. Recently, the median age of the onset of measles has dropped since the disease has become hyperendemic in developing countries, owing to the constant influx of susceptible children from poorly immunized rural areas[6]. The target of investigators studying measles immunization is to vaccinate infants aged between four and six months. However, if children are immunized at this age, the vaccine failure rate rises strikingly because maternal antibody, the level of which is inversely related to the age of the child, neutralizes the virus[9]. Thus the key point of measles vaccination is the level of maternal antibodies.

In our study, we found anti-measles antibody to be present in 15.6 to 61.4 percent of children aged 22 to 31 weeks. Since the maximum antibody positivity rate in children of a community must be lower than 5 percent innoculation to obtain optimal seroconversion after innoculation with the Schwarz vaccine[13], it is not possible to obtain sufficient protection in this age group.

The cause for the slow elimination of maternal antibodies against measles in Turkish children is unknown. However, this occurrence is also evidenced in

infants aged between 7-10 months in many other developing areas of the world[14]. The reason for this is unclear. Since our infants cannot be seroconverted at the age of 22 to 31 weeks with Schwarz vaccine, because of their maternal anti-measles antibodies, we must consider using a different strain of measles virus, called the Edmonston-Zagreb virus which has been used in many studies[15,16]. The results of these studies show the effectiveness of the Edmonston-Zagreb vaccine strain given to children under the age of nine months. Another study is being carried out to determine the efficacy of the Edmonston-Zagreb measles vaccine given to Turkish children under the age of nine months.

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