USEFULNESS OF EVALUATION OF ANTIMEASLES ANTIBODIES IN PRETERM BABIES

Lt Col GS CHOPRA*, Brig PK SARKAR+,
Dr ANJALI DHULIA#

ABSTRACT

As per WHO recommendations, measles vaccine is administered at the age of 9 months which is based on studies demonstrating seroconversion (from positive to negative) at this age. However this contention may not hold good in preterm babies since they may have lower initial levels of passively transferred IgG antimeasles antibodies of maternal origin. To explore this possibility, 50 preterm babies (gestational age less than 37 weeks) were studied for antimeasles antibodies. Serum samples were collected at birth and then at 3 months and 5 months of age in all the cases. Antimeasles antibody assay was done in all the serum samples using ELISA kits. At birth 32% of infants were positive for antimeasles antibodies whereas 60% were weakly positive and 8% were negative. At 3 months of age 50% were sero negative, 2% positive and 40% weakly positive. The sero negativity was found to be 98% at 5 months with only 2% remaining positive. Since seroconversion is seen to occur in this vast majority of preterm infants at the age of 5 months, antimeasles vaccine should be administered at this age to this subset of more vulnerable babies.

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KEY WORDS : Antimeasles antibodies; Preterm babies; Seroconversion.

Introduction

Measles is the most common vaccine preventable cause of death in the world and WHO estimates that 45 million cases of measles and 1.19 million measles associated deaths occur each year [1]. Since 1976, WHO has recommended that measles vaccine be integrated into routine health services and be administered at 9 months of age in developing countries. This recommendation is based on studies demonstrating sero-conversion rates of over 90% in children 9 months or older in developing countries [2]. Transplacental antibody transfer occurs mainly in the last few weeks before birth and so preterm infants are likely to be having lower antibody titres at birth and become sero negative at an earlier chronological age than full term infants. Keeping this in mind a prospective study was carried out in a large research and referral hospital to evaluate the antimeasles antibodies in preterm babies.

Material and Methods

In this study 50 randomly selected preterm infants whose gestational age was less than 37 weeks were studied. 10 ml of cord blood was collected in each case, serum separated and kept at -20°C for future immunological tests. Each baby was followed up every month in the well baby clinic. 5 ml of venous blood was collected from each baby in the 3rd and 5th month of post-natal life. The separated serum was again stored at -20°C.

Immune Profile Assay

Serum immunoglobulin (IgG, IgA & IgM) were determined in

cord blood using immunoturbiditory method (kits from Bayer's Diagnostic India). This was carried out to rule out any immunodeficiency state in the new born babies.

Antimeasles Antibody Assay

Assay was performed in all the samples by ELISA method using VIRO Immunlabor diagnostica GmbH kits. Based on the controls, optical density readings of < 700 were interpreted as negative, 700-1400 as weakly positive and > 1400 as positive.

Result

50 preterm infants were studied, out of which 28 were males and 22 females. The mean gestational age was 32.78 ± 2.06 weeks, 23 neonates were in the gestational age group of 29-32 weeks and rest in 33-36 weeks age group.

Immunoglobulin profile at birth showed that none of the neonates were immunodeficient. Mean OD levels of antimeasles antibodies (IgG) at birth, 3 months and 5 months are shown in Table 1.

The difference between mean IgG levels at birth was significantly higher (< 0.05) compared to 3 months of age. Similarly the levels were found to be higher at 3 months compared to 5 months of age.

At birth 32% of infants were positive for antimeasles antibodies, 60% were weakly positive and only 8% found to be negative. However at 3 months of age, 58% of infants were found to be seronegative with only 2% positive and 40% weakly positive. Serum negativity increased significantly at 5 months, when 98% of the babies were sero negative and only 2% remained seropositive.

To see the effect of gestational age on transplacental antibody transfer, the neonates were grouped in two groups of gestational age, 29-32 weeks and 33-36 weeks. The mean OD at birth in 29-32 weeks group was 1.144 (SD 0.356) and 1.237 (SD 0.369) in 33-36 weeks groups (Table 2)

*Classified Specialist (Pathology and Immunology), Command Hospital(Eastern Command), Calcutta-27, +Commandant, Military Hospital, Meerut, # PG Trainee Paediatrics.

TABLE 1
Mean OD levels at different periods (n=50)

	Birth	3 Months	5 Months
Mean	1.194	0.646	0.408
SD	0.362	0.206	0.144

Birth vs 3 months $P < 0.05$

TABLE 2
Mean IgG levels as per gestational age at birth

	29-32 Weeks (n=23)	33-36 Weeks (n=27)
Mean	1.144	1.237
SD	0.356	0.369

Group I vs Group II $P > 0.05$

Similar comparison was made at 3 months and 5 months of age in the two groups and is shown in Tables 3 and 4.

TABLE 3
Mean IgG, OD levels at 3 months

	29-32 Weeks (n=23)	33-36 Weeks (n=27)
Mean	0.650	0.641
SD	0.227	0.190

Group I vs Group II $P > 0.05$

TABLE 4
Mean IgG, OD levels at 5 months

	29-32 Weeks (n=23)	33-36 weeks (n=27)
Mean	0.434	0.385
SD	0.148	0.139

Group I vs Group II $P > 0.05$

Similar comparison was made at 3 months and 5 months of age in the two groups and is shown in Table 3 and 4.

Discussion

The samples in the present study comprised 50 preterm babies who were tested for antimeasles antibody (IgG) at birth, 3 months & 5 months. M Kameth [3] investigated a total of 130 preterm babies from birth to 6 months of age. In their study not all the babies were tested at subsequent periods. All the babies tested subsequently were also not the same who were tested at birth. In their study the percentage seronegativity at birth, 3 months and 5 months was 3.4%, 26% and 78% respectively as compared to 8%, 58% and 98% in our study. The higher level of sero conversion in the study by Kameth et al [3] is probably due to slower rate of waning of maternal antibody in a developed country where a lot of other factors are involved in-

cluding nutrition of the mother and the baby. Waning occurs due to normal catabolism of antibody with passage of time [4]. As maximum amount of antibody is passed across the placenta just before term, the early interruption of intrauterine life in preterm infants results in a smaller aliquot of transferred antibody as compared to his term counterpart. The time taken for decrease of these antibodies is directly proportional to the initial titres at birth. So preterm babies having lower titres at birth become seronegative at an earlier time as compared to full term babies. Another explanation for early decay of maternal IgG in preterm infants can be that premature infants are often sick and repeated blood sampling for diagnostic tests in them results in the removal of antibody containing plasma and replacement by packed by RBC transfusion does not replace antibody loss [5]. A possible higher incidence of septicemia may also be the reason for faster catabolism of protective antibodies in preterm babies. Presently vaccination failure rate at 9 months in developing countries is found to be above 5-10% [6] thus requiring a thought for change in vaccination schedule.

To conclude, preterm babies are found to develop earlier seronegativity against antimeasles antibodies. Almost all preterm babies are seronegative at 5 months of age and thus are at higher risk of contracting measles. Thus all preterm babies should be immunised against measles at 5 month of age. For successful uptake of immunization, two conditions should be fulfilled. Firstly maternal antibodies should be absent and not interfere with uptake. Secondly immune system of the infant should be capable of mounting an adequate response. In our study all premature infants had lost their maternal anti measles antibodies by 5th month of age. In another study [7] it has been demonstrated that by 4th month of age the response of preterm infants was comparable to term infants who were capable of mounting an adequate immune response. Thus it is recommended that all the preterm babies should be immunized against measles at 5 months of age. In the event of measles epidemic or house hold exposure to measles, 58% of 3 months old preterm babies would be at a risk of acquiring measles. So these infants need to be protected. In these cases passive immunoprophylaxis with immunoglobulin should be considered. Similar recommendations have also been made by Subba Rao et al [8].

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