The African Journal of MEDICINE and Medical Sciences

Volume 11
1982

BLACKWELL SCIENTIFIC PUBLICATIONS
Oxford London Edinburgh Boston Melbourne

Patients and methods

Patients

Healthy, full-term newborn babies and children attending a Well-Baby Clinic were studied. None gave a history of measles infection or immunization. Venus blood was collected from newborn babies within 24 h of delivery, and from children aged 3, 6 and 9 months respectively.

Methods

Sera, stored at −20°C until tested, were absorbed with monkey red blood cells to remove heterophile antibodies and assayed for measles antibody using a standard haem-agglutination inhibition (HAI) technique, with Tween ether treated measles haemagglutinin (Behringweke).

Results

The distribution of measles HAI titres according to age is shown in Fig. 1. Thirty-four out of thirty-five newborns tested had HAI titre of 1:4 or greater, with 57% of them having titre of 1:32 and above. However, at 3 months of age, eight out of the twenty-four children (33%) tested had HAI titre of less than 1:4, and at 6 months the percentage had increased to 78.6%.

The histogram in Fig. 2 shows the age distribution of cases of measles seen in children's Outpatients Department in 1978. Seventy per cent of the cases occurred under 2 years of age, and twenty-one out of the 794 (2.6%) cases occurred in children 3 to 5 months old.

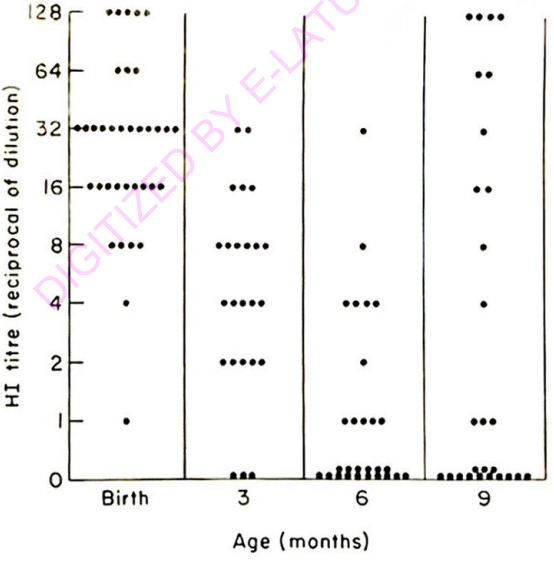

FIG. 1. Age distribution of measles antibody titres.

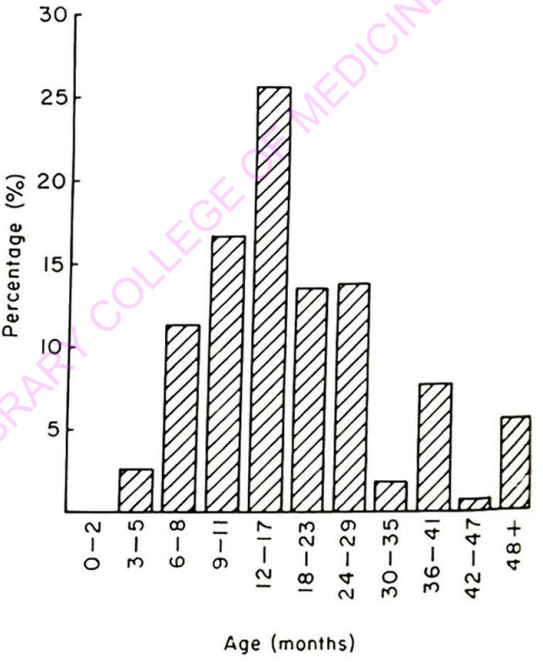

FIG. 2. Age distribution of 794 cases of measles.

Discussion

In North America there is clinical and serological evidence of an increased risk of measles vaccine failure among those immunized at 1 year of age or younger (Shelton *et al.*, 1978; Shasby *et al.*, 1977). Transplacentally acquired maternal measles antibody is still detectable in 12-month-old children, and this is put forward as the probable mechanism for vaccine failure in such children (Albrecht *et al.*, 1977).

However, the experience in Africa is different from that in the U.S.A. As part of their trial of measles immunization with reduced vaccine dosage, Hendrickse and Montefiore (1968) measured pre-vaccination measles antibody level in some children. They

Afr. J. Med. med. Sci. (1982) 11, 113–115.

MEASLES ANTIBODY LEVELS FROM BIRTH TO 9 MONTHS OF AGE IN NIGERIAN INFANTS

M. B. ABDURRAHMAN,* B. M. GREENWOOD,† O. OLAFIMIHAN* AND H. C. WHITLE†

Department of Paediatrics and †Department of Medicine Ahmadu Bello University, Zaria, Nigeria

Summary

Measles antibody (HAI) titres were measured in healthy Nigerian infants at birth and at 3, 6 and 9 months of age. At birth only one baby out of thirty-five had HAI titre of less than 1:4, but at 3 months of age titres had fallen to this level in 33% of children. The percentage increased further to 78.6% at 6 months of age. At 9 months, nine out of twenty-seven (33%) infants had HAI titre of 1:16 and above, suggesting recent measles infection or immunization. The rapid fall in HAI titres up to 6 months could explain the occurrence of measles in early age in tropical countries. We recommend that children in Nigeria be immunized at 7–8 months of age.

Résumé

Les taux de HAI de rougeole ont été mesurés chez des enfants nigériens en bonne santé dès la naissance, puis à trois, six et neuf mois. A la naissance, seul un bébé sur trente-cinq avait un taux de HAI inférieur à 1:4, mais à 3 mois, c'est 33% des enfants qui se trouvaient ramenés à ce niveau. A 6 mois, le pourcentage de'enfants à ce niveau de HAI s'élève à 78.6%. Mais à 9 mois, neuf enfants sur vingt-sept (soit 33%) avaient un taux de HAI égal ou supérieur a 1:16 ce qui fait penser à une récente infection de rougeole ou à une immunisation. La chute rapide des taux de HAI jusqu'à 6 mois pourrait expliquer les attaques de rougeole pendant la tendre enfance dan les pays tropicaux. Nous recommandous l'immunisation des enfants au Nigérie à l'âge de 7–8 mois.

Correspondence: Dr M. B. Abdurrahman, Department of Pediatrics, College of Medicine, King Saud University, P.O. Box 2925, Riyadh, Saudi Arabia.

0309-3913/82/0900-0113 $02.00

Introduction

Measles is endemic in Nigeria, and is a major cause of morbidity and mortality in young children (Gans, 1961; Grigsby & Adetosoye, 1973; Abdurrahman, 1979). Measles occurs at a younger age in developing countries than in industrialized countries (Editorial, 1976). In some developing countries 20 to 30% of cases of measles occur under 1 year of age, and a few cases occur under 6 months of age (Grigsby & Adetosoye, 1973; Ministry of Health of Kenya and WHO, 1977). It is essential, therefore, to immunize children in developing countries against measles as early in life as possible.

However, there is evidence that in developed countries children under 1 year of age immunized against measles have a lower sero-conversion rate and poorer protection than children immunized after 1 year of age (Krugman, 1977), due to persistence of transplacentally acquired maternal antibodies. In Africa, there are few studies of the rate of disappearance of maternally derived measles antibody. We have therefore studied the pattern of measles antibody levels from birth to 9 months in Nigerian infants and related these levels to the pattern of measles seen in the children's Outpatients Department of Ahmadu Bello University Hospital, Zaria, Nigeria.

found that fourteen out of twenty-nine (48.3%) infants aged between 3 and 7 months had measles neutralizing antibody titre of less than 1:10. In Rhodesia, Burrowes and Cruickshank (1976) found residual maternal antibody in 65% of children at 4 months of age, but this decreased sharply to less than 20% between 6 and 9 months. These figures are similar to our own. Among children immunized with measles vaccine, Burrowes and Cruickshank found 59% sero-conversion at 9 months of age. In Kenya, 90% of children no longer had maternal antibodies at 7 to 8 months, and almost all children sero-converted when vaccinated at 7½ months or later, even if a low level of maternal antibody was still present when the vaccine was given (Ministry of Health of Kenya and WHO, 1977).

In the present study a large proportion of children had high measles antibody level at birth, but the level waned rapidly after birth. These findings correlate with the age incidence of measles as seen in our Outpatients Department. At 9 months of age the decrease in the percentage of children with HAI titre of less than 1:4 and the increased frequency of children with high antibody titres suggest recent measles infection or immunization, even though the parents denied such a history. An outbreak of measles in Ilesha, Nigeria, afforded Fabiyi *et al.* (1974) an opportunity to study measles immunity in children with clinically confirmed measles and who were previously immunized against measles about a year before the outbreak. They studied twenty-nine of such immunized children, twenty-eight of whom were immunized at 6–9 months of age: acute and convalescent sera were assayed for measles antibody by complement fixation method. Only eight children had measles antibody titre of 1:4 or greater, and no antibody was detected in the remaining twenty-one children. More disturbing was the fact that only two of the twenty-nine children showed significant sero-conversion.

On the basis of our preliminary epidemiological and serological studies and data from other parts of Africa, we suggest that children in Nigeria, as elsewhere in Africa, should be immunized against measles at 7 to 8 months of age. The immunization can be given simultaneously with DPT, since such a combination does not result in decreased immunogenicity of either vaccine (McBean *et al.*, 1978). Whether or not the children need to be re-immunized against measles 6 months or more later should be determined from controlled epidemiological and serological studies.

References

Abdurrahman, M.B. (1979) Why our children die: A study of mortality pattern in an emergency paediatric unit in Kaduna, Nigeria. *J. Trop. Med. Hyg.* (In press)

Albrecht, P., Ennis, F.A., Saltzman, E.J. & Krugman, S. (1977) Persistence of maternal antibody in infants beyond 12 months: mechanism of measles vaccine failure. *J. Pediat.* 91, 715–718.

Burrowes, J. & Cruickshank, J.E. (1976) At what age should measles vaccination be given? Report of a small trial in Bulawayo. *Central Afr. J. med. J.* 22, 45–47.

Editorial (1976) Measles in the tropics. *Br. med. J.* ii, 1339–1340.

Fabiyi, A., Tomori, O., Thwaites, M. & McGucken, R.B. (1974) Outbreak of measles disease in vaccinated children – In: *The Use and Abuse of Drugs and Chemicals in Tropical Africa: Proceedings of the 1973 Annual Scientific Conference of the East African Medical Research Council, Nairobi* (eds A. F. Bagshawe, G. Maina and E. N. Mngola), pp. 423–426. East African Literature Bureau, Nairobi.

Gans, B. (1961) Paediatric problems in Lagos. *W. Afr. med. J.* 10, 33–46.

Grigsby, M.E. & Adetosoye, J.I.A. (1973) Measles epidemiology and control in Western Nigeria. *J. Nat. med Ass.* 65, 378–385.

Hendrickse, R.G. & Montefiore, D. (1968) Measles vaccination with reduced dosage. *Br. med. J.* iv, 28–30.

Krugman, S. (1977) Present status of measles and rubbella immunization in the United States: a medical progress report. *J. Pediatr.* 90, 1–12.

Krugman, S. (1977) Measles immunization: new recommendations (editorial). *J. Am. med. Ass.* 237, 366.

McBean, A.M., Geteff, C., Manclark, C.R. & Foster, S.O. (1978) Simultaneous administration of live attenuated measles vaccine with DPT vaccine. *Pediatrics*, 62, 288–293.

Ministry of Health of Kenya & the WHO (1977) Measles immunity in the first year of life after birth and the optimum age for vaccination in Kenya children. *Bull. W.H.O.* 55, 21–30.

Shasby, D.M., Shope, T.C., Downs, H., Hermann, K.L. & Polkowski, J. (1977) Epidemic measles in a highly vaccinated population. *New Eng. J. med.* 296, 585–589.

Shelton., J.D., Jacobson, J.E., Orenstein, W.A., Schulz, K.F. & Donell, H.D. Jr (1978) Measles vaccine efficacy: influence of age at vaccination. *Pediatrics*, 62, 961–964.

(*Received* 3 *October* 1979; *accepted* 18 *December* 1979)