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Measles antibodies in the breast milk of nursing mothers

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Summary

A total of 216 breast milk samples collected from nursing mothers and corresponding numbers of finger prick sera from their suckling babies were tested for measles antibodies. Fifty (22.1%) of the nursing mothers had antibody while 38 (16.8%) of the sera were positive for measles haemagglutinating (HI) antibodies. Forty-one ·(18.9%) breast milk samples were found to contain measles complement fixing (CF) antibody while none of the serum samples from the suckling babies had CF antibody. Only 12 of the positive sera were from HI positive mothers.

Our result suggests that very little level of measles anitbody is passed through the breast milk.

Résumé

Un mombre de 216 echantillons de lait matemel releves des nourrices du meme nombre. Ont ete testes pour determiner L'anti rougeole cinquante (22.1%) des nourrices avai.ent l'anti crops pendand que 38 (16.8%). Etaient positifs pour La rougeole HI anticorps. Quarante-un (18.9%) d'echantillons de lait matemel etaient trouves contenant des anticorps de rougeole — Seulement 12 des positifs etaient des nourrices positives. Notre resultat suggere que tres peu on indetectable anticorps de rougeole est probablement passe par le lait matemel.

Introduction

Various studies have shown that the sources of maternally transmitted antibodies in the children is the antibody transferred *in utero* through the placenta and the antibody obtained from the breast milk during suckling [1]. The ability of the various antibodies to be transferred from mother to offspring however depends on the class of the antibodies. In a recent collaborative study conducted between the Federal Ministry of Health, Department of Virology and Institute of Child Health, University College Hospital, Ibadan, a relationship was observed between the level of measles antibodies in children brought for measles vaccination and the duration of breast feeding of the children. It was observed that the level of maternal measles antibody was higher in children with longer breast feeding than children with shorter breast feeding. In an attempt to explain the relationship between the level of measles antibody in the offspring and period of breast feeding, the present study involving children and mothers attending the Expanded Programme on Immunization (EPI) vaccination clinic at the Institute of Child Health, University College Hospital, Ibadan and the Adeoyo Maternity Hospital, Ibadan, was carried out.

Subjects and methods

This study was carried out in the Institute of Child Health (ICH), University College Hospital, Ibadan and the Adeoyo Maternity Hospital (AMH), Ibadan, Nigeria. Children brought for EPI vaccination and their lactating mothers were the subjects of the study. Mothers' informed consents were obtained after the aim and purpose of the study were explained to them. They were requested to complete a questionnaire asking about the date of parturition, age of the child, vaccination history of both mother and child and history of any clinical measles. The test samples were breast milk from the nursing mothers and sera from their suckling children. A total of 226 breast milk samples made up of equal number from AMH and

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ICH were obtained from the breast- feeding mothers. Corresponding numbers of finger prick sera were collected from their suckling babies. Between 2-5ml of breast milk were collected from each mother in sterile Bijou bottles while the finger prick blood was collected in Ropacco filter paper (Rochester, USA). Breast milk samples were spun at 3000 rpm for 10 minutes. The pelleted bottom layer and the upper fat layer were discarded while the middle layer was collected and stored at —20°C till tested. Sera from the suckling babies were extracted with 0.5ml PES to give 1:10 final dilution[2]. Both the breast milk and sera were treated with 50% monkey red blood cell (rbc) to remove non-specific agglutinin.

Measles Antigen

The measles HI antigen was prepared in our laboratory by Tween 80 and Ether extraction as described by Norby[3], while the CF antigen was obtained from the Sigma(R) Chemical Co.

Serology

For the HI test, 0.025ml of 1:10 dilution of sera or milk was mixed with 0.025ml of the 4 HA unit of the measles HI antigen and incubated at 37°C for 1hr. Added to this was 0.5ml of 1% washed green monkey red blood cells (mrbc). All dilutions were made in Phosphate buffered saline (PBS) pH 7.4. Results were read after the rbc in the control wells had settled. Sera or milk samples that inhibited agglutionation were considered positive for measles antibody.

The CF test was performed as previously described[4] and sera or milk samples were considered positive for measles complement fixing anitbody if there was complete absence of haemolysis at the dilution.

Result

Out of the 113 breast milk samples from the AMH, 40 (35.4%) were positive for measles HI antibodies, whereas 31 (27.4%) out of the 113 serum samples from the suckling babies were positive. At the ICH, 10 (8.8%) out of 113 breast milk samples were positive while 7 (6.1%) of the suckling babies sera were positive. Out of the 31 positive serum samples from the suckling babies at Adeoyo, only 10 (32%) were from mothers with HI positive breast milk while at the ICH only 2 (28.6%) of the 7 HI positive babies were from breast milk positive mothers. The remaining HI positive children were from HI negative mothers.

Thirty five (30.9%) out of the 113 breast milk samples from Adeoyo were positive for measles complement fixing antibodies, while 6 (5.3%) from the 113 samples from ICH were positive. At both centres, none of the suckling children demonstrated CF antibodies to measles.

Table 1: Result of haemagglutination-inhibition test on the break milk of nursing mothers and sera of their suckling babies

Type of sample	Source	Location	No tested	No +ve	% +ve	No of child +ve from +ve mother
Breast milk	Nursing mother	Adeoyo	113	40	35.4	—
Breast milk	Nursing mother	ICH	113	10	8.8	—
Serum	Suckling babies	Adeoyo	113	31	27.4	6
Serum	Suckling babies	ICH	113	7	6.1	1

Table 2: Result of complement fixation test on the break milk of nursing mothers and sera of their suckling babies

Type of sample	Source	Location	No tested	No +ve	% +ve	No of child +ve from +ve mother
Breast milk	Nursing mother	Adeoyo	113	35	30.9	—
Breast milk	Nursing mother	ICH	113	6	5.3	—
Serum	Suckling babies	Adeoyo	113	0	0	0
Serum	Suckling babies	ICH	113	0	0	0

— Not applicable

Discussion

The sources of maternally transmitted antibodies in the children is the antibody transferred *in utero* through the placenta and the breast milk or colostrum antibody. However, the ability of the various antibodies to be transferred from mother to offspring depends on the class of antibodies.

In this study, out of a total of 226 breast milk from nursing mothers, only 50 were positive for measles HI antibodies, while 38 of the corresponding children from these mothers were positive for measles HI antibody. However, only 7 of these children are from HI positive mothers. The rest were from HI negative mothers. In like manner, out of the 41 mothers positive for measles CF antibody none of the children was found to have CF antibody. This suggests that very little level of measles antibody is passed through the breast milk. This is consistent with the findings of Ogra *et al* [6] who observed that in humans, little antibody is generally passed through the milk. This is quite in contrast with our observation in an earlier study[7] where we observed that the level of measles antibody was higher in children with longer breast-feeding. This difference in observation is not unusual. It is possible that substances that were not antibodies and are present in colostrum and breast milk may also have contributed to the neutralization of the measles virus, and this must have been responsible for the result observed in the earlier study. Lawton and Shortridge [8] observed in an earlier study that breast milk and colostrum contain significant amount of cells, humoral factors and non-specific antiviral substances, some exhibiting virus neutralizing activity.

Since specific antibody's presence in breast milk of mothers depends on the mothers previous contact with the micro-organism or vaccination antigen, the result obtained in this study indicate that measles virus is widespread in the local population since all the mothers had no history of previous measles vaccination. This is also reflected in the number of children positive for measles HI antibodies that were not from positive mothers.

Although there can be no question that breast milk protects infants against many infections [9] and is of unquestionable benefit especially in developing country like-Nigeria, our findings in this study suggest that non-specific antiviral factors other than the specific antibodies might have been responsible for our earlier observation [7]. This result further supports our earlier suggestion that mothers should be encouraged to breast-feed their babies as this is not likely to have a blocking effect on immunization.

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