

Antibody Response to Measles Immunization at Seven Months Old in Rural Ghanaian Infants

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SUMMARY

A serological study was carried out in three rural communities in southern Ghana in order to determine the optimal age for measles immunization. The live hyperattenuated measles vaccine (Schwarz strain) was inoculated subcutaneously into infants aged three to eleven months. The maternal measles antibodies in the infants started decreasing after 7 months, while the seroconversion rate after the immunization was increasing after 6 months. Forty seven infants were given the measles vaccines at the age of 7 months. The seroconversion rate was 91.5%. There were no side effects. These results indicate that measles immunization can be administered effectively at the age of 7 months.

INTRODUCTION

Measles can be considered to be one of the most important childhood diseases in tropical areas. An estimated two million children die annually from measles and its complication(s)¹. The World Health Organization recommends immunization against measles as soon as a child has reached the age of nine months². However, incidence of measles in children below the age of nine months in developing countries continues to be a problem¹.

One such problem is the blocking effect of maternal antibody. A serological study was carried out in three rural communities in southern Ghana in order to determine the optimal age for measles immunization.

MATERIALS AND METHODS

The study was conducted in three villages in the central region of Ghana, which are about 70 km from Accra, the capital of Ghana. These villages are field stations for Noguchi Memorial Institute for Medical Research. The Institute offers primary health care services including immunization in addition to research activities in these villages. The live hyperattenuated measles vaccine (Schwarz strain, not less than 1,000 TCID₅₀) was inoculated subcutaneously into infants aged three to eleven months.

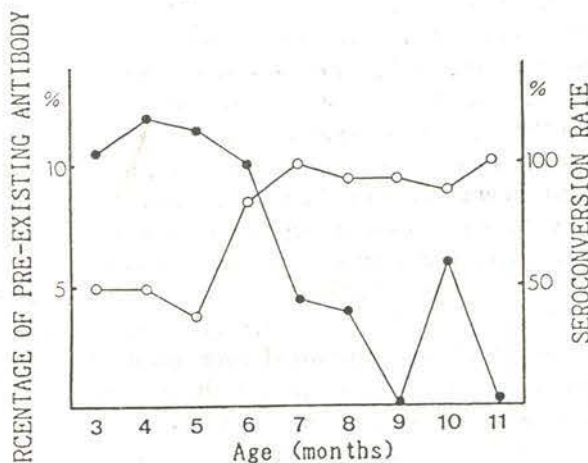


FIG. ACQUIRED PASSIVE ANTIBODIES OF MEASLES AND THE SEROCONVERSION RATE AFTER IMMUNIZATION BY AGE

Venous blood specimens (3 ml) were obtained from the infants before and four weeks after immunization. The pre- and post-immunization samples from the children were paired and these were tested for measles antibodies using

the hemagglutination-inhibition test (HI test). One hundred and eighty seven pre-immunization samples and 112 post immunization samples were collected from infants aged 3 months to 11 months and tested. Forty seven paired samples were also collected from 7 months old infants and tested. The HI antibody titre which showed more than 1:8 was defined as seropositive. Seroconversion was defined as the development of a HI titre (1:16 or more) in infants who were initially seronegative.

RESULTS

The seropositive rate before vaccination which was 10 to 12 percent remained relatively high below 6 months old infants. On the other hand, those of 7 months to 11 months old were 4.3, 4.0, 0.0, 5.9 and 0.0%, respectively. The

The table shows the results of 47 paired samples from 7 months old infants. The seroconversion rate was 91.5%. The geometric mean HI measles antibody titre of seroconverted samples was 1:56.

DISCUSSION

In spite of the efficacy of measles vaccine, measles remains an important childhood health problem in the developing countries. The fatal cases are especially common among young infants, therefore it would be highly desirable to immunize as early in life as possible. However, the measles passive immunity through the placenta interferes with the efficacy of measles vaccination early in life. Two major factors take part in determining the optimal age for routine vaccination programme. One is the seroresponse after the immunization in relation to the disappearance of the passively acquired antibody in the infant. The other is the risk factor of measles exposure in life. The recommendation of measles vaccination at the age of 9 months in developing countries by WHO is based on these factors.² However, the incidence of measles infection in children under 9 months remains high in the developing countries, especially in rural communities. A case study in Malawi³ suggested 36% of infants suffered from measles before they got into the vaccine schedule recommended by WHO.

In our study, while passive immunity was disappearing by the end of 6 months, the seroconversion rate was increasing after 5 months. The relationship got closer between 6 months and 7 months. Forty three infants out of 47 (91.5%) seroconverted after immunization. This very high rate is sufficient enough to suggest 7 months as the optimal age for measles immunization in our research stations. There were no side effects. We have since 1987 administered measles vaccines to 7 months old infants as a result of the study. The study could be conducted in other regions with a larger sample size and if the results are similar to ours then, measles vaccination in Ghana could be

TABLE THE SEROCONVERSION RATE OF MEASLES IMMUNIZATION IN SEVEN MONTHS OLD INFANTS IN THE THREE RURAL COMMUNITIES IN SOUTHERN GHANA 1987/1988

	No. of Immunization	Rate (%)
Seroconversion	43	91.5
Seronegative	4	8.5

Vaccine: Live Hyper Attenuated Measles Vaccine

(Schwarz Strain)

Seroconversion: Development of HI titre 1:6 or more

seroconversion rate before 5 months was less than 50%. Thirteen out of 15 six months old infants seroconverted. This was 86.7%. The rate after 7 months was more than 90%. The figure shows the relationship between the percentage of pre-existing maternal measles antibodies and the seroconversion rate after the immunization. The relationship was closer between 6 months and 7 months

reduced from 9 months to 7 months. This will reduce the incidence and attendant mortality of measles in infants before they are immunized at the age of 9 months.

REFERENCES

1. WHO. Expanded programme on Immunization. Weekly Epidemiological Record, 1988; 63: 9-16.
2. WHO. Expanded Programme on Immunization. Weekly Epidemiological Record, 1981; 30-31 : 234-237.
3. WHO. Expanded programme on Immunization. Weekly Epidemiological Record, 1986; 25: 191-193.

Chairman's Closing Remarks: Measles, I know causes a lot of ill health in various communities, and I also know that a lot of effort has been made to find a more suitable and more appropriate time for vaccination.

I will like to thank the audience for being so attentive throughout the programme. Thank you