

ORIGINAL ARTICLE

Clinical Characteristics of Measles in Infancy: A Hospital Based Study

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Abstract

Background: There is a global resurgence of measles among children in recent years and a number of infants are being affected.

Objectives: The aim of the study was to determine the frequency of measles in infancy and to describe their clinical characteristics in a tertiary care children hospital.

Methods: A prospective observational study was conducted in Dr. MR Khan Shishu Hospital and Institute of Child Health from March, 2019 to February, 2020. The children who came with signs and symptoms of measles, like fever with maculopapular rash associated with cough, runny nose and conjunctivitis were recorded and frequency of measles in infants among hospitalized measles patients was noted. Infants with measles were enrolled for the study and their clinical characteristics, complications and outcome were determined. Data were analyzed by SPSS version 23.

Results: A total of 64 infants were studied. The frequency of measles in infants among hospitalized measles patients was 43%. Forty seven percent infants were between 9 to 10 months. Clinical features were typical and all had fever and maculopapular rash. Pneumonia was the main complication and occurred in 50(78%) cases which was followed by oral ulcer 42(66%), diarrhea 26(41%), febrile seizure 9(14%) and croup 5(8%). Thirty four (53%) infant had normal nutritional status. Only 19.51% infant received first dose of measles vaccine. The mortality rate was 2(3%).

Conclusion: A number of children are being affected by measles before completing first year of life and they develop complications which are related to morbidity and mortality. So, control and prevention of measles in infancy should give more importance.

Keywords: Measles, infancy, vaccination.

Introduction

Before the introduction of vaccines, measles virus infected 95%-98% of children by the age 18 years and was responsible for more than 2 million deaths worldwide annually.¹⁻³ After almost thirty years of effective vaccination program in Bangladesh, measles continues to cause a serious disease in

children. It is still responsible for more than 100,000 deaths globally every year.¹ According to World Health Organization (WHO) during the year 2015, globally 367 deaths/ day occurred due to measles in children of below five years.⁴ Worldwide measles cases dropped from 850,000 to 132,000 between 2000 and 2016, but cases surged to 360,000 in 2018. In

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2019, about 430,000 measles cases have been reported with 142,000 deaths, mostly children under the age of 5 year.^{4,5} So, measles remains an important cause of morbidity and mortality in young children, especially in developing countries.⁶ Acute measles infection below one year of age is associated with more complications and increased mortality.⁷

Measles is a highly contagious acute viral illness that includes a characteristic rash.² This is transmitted by respiratory secretions during prodromal phase and early stage of rash. The disease starts with fever, cough, coryza and often conjunctivitis. Three to four days later a generalized maculopapular skin rash appears. After exposure up to 90% of susceptible individual develop measles.⁸ The disease is self limited but some patients especially younger ones and immunocompromised persons develop complications which may require hospitalization.⁸ The most important complications are bronchopneumonia, otitis media, croup, diarrhea and encephalitis.^{9,10} Pneumonia is the commonest complication and accounts for 60% of measles related death.^{8, 11}

Measles is mainly a childhood disease though it can affect people of any age.¹¹ This is a vaccine preventable disease. In Bangladesh, first dose of MR (measles, rubella) vaccine is given at 9 months and the second dose at 15 months. It has been assumed that maternal antibody gives protection against measles and other infectious diseases throughout infancy.¹² If vaccination is given earlier natural antibody can hamper humoral antibody response.¹³ So, centre for disease control and prevention recommends the first dose of measles vaccine not to be given before one year of age.¹⁴ In recent years it is observed that a number of children below one year of age have been infected with measles, particularly in outbreak settings.^{13,15} Recent studies also showed that maternal antibody wanes much sooner, before 6 months.¹⁵ Measles in younger children is associated with severe complications due to their immunocompromised status, a number of deaths occur in this age group.^{16,17}

Aim of the study was to determine the frequency of measles occurring in infancy in a tertiary care children hospital and to describe the clinical features, complications, vaccination and nutritional status of children with measles below one year of age.

Materials and Methods

It was a prospective observational study conducted in Dr. MR Khan Shishu Hospital and Institute of Child Health from March, 2019 to February, 2020. The study population was children of 4 months to 12 years admitted in hospital having signs and symptoms of measles. Measles was diagnosed clinically according to case definition criteria by World Health Organization like high fever (>38°C) associated with cough, coryza (runny nose), conjunctivitis (red eye, watering).¹⁸

After taking informed written consent from parents; history was taken regarding age, sex, socio-economic condition, gestational age, breast feeding and vaccination. Then thorough physical examination was done, their weight and height were recorded and different complications were noted. Investigations like CBC, CRP and CXR were done in all cases.

For data collection structured questionnaire were fulfilled. Data were processed and analyzed by SPSS version 23 and results were given in tabulated form.

Results

A total of 148 children suffering from measles with different complications were admitted during the study period. Among them 64 (43.24%) were below one year of age. Age range was from 4 months to 12 years. So, the frequency of measles in infancy among hospitalized measles children was 43.24%. Among them 30(46.87%) were in age group 9 to 10 months (Table I).

Age group	No of patients	Percentage
<6 months	2	3.13
6 to 8 months	21	32.81
9 to 10 months	30	46.87
11 to 12 months	11	17.19
Total	64	100

Among the study population male were 41 and female were 23. Male to female ratio was 1.8:1. All infants were presented with fever and maculopapular rash. Cough and coryza were the frequent clinical features and were present in 58(90.62%) and 53(82.81%) cases respectively. Conjunctivitis was present in 35(54.68%) and Koplik spot in 23(35.93%) cases (Table II).

Table II*Clinical features of the study population (N=64)*

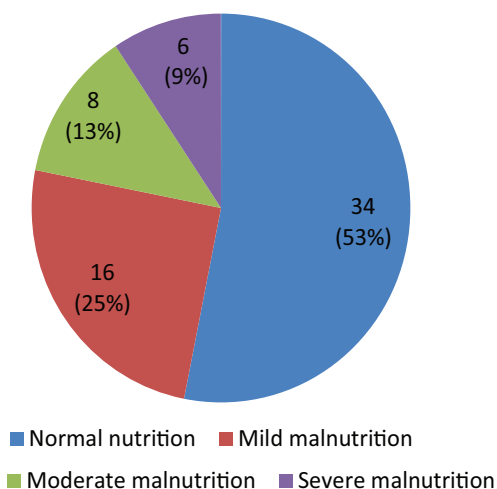
Clinical features	Number	Percentage
Fever	64	100
Maculopapular rash	64	100
Cough	58	90.62
Coryza	53	82.81
Conjunctivitis	35	54.68
Koplik Spot	23	35.93

Pneumonia was the most common complications and developed in 50(78.13%) cases. This was followed by oral ulcer 42(65.62%), diarrhea 26(40.63%), febrile seizure 9(14.06%) and croup 5(7.8%). Oral ulcers were not extensive. Some patients developed both pneumonia and diarrhea (Table III).

Table III*Complications of measles in infants (N=64)*

Complications	Number	Percentage
Pneumonia	50	78.13
Oral ulcer	42	65.62
Diarrhea	26	40.63
Febrile seizure	9	14.06
Croup	5	7.81

Regarding nutritional status, 34(53.12%) infant had normal nutrition; whereas 6((9.37%) had severe malnutrition (Fig. 1).

**Fig 1** Nutritional status of the study children

Among the study children 57(89.06%) born at term, 47(73.44%) were exclusively breast fed upto 6 months. The number of infants from 9 month to 1 year was 41. Among them only 8 (19.51%) received first dose of measles-rubella vaccine and 33(80.48%) did not. Two children died due to pneumonia as complication and they were severely malnourished (Table IV).

Table IV*Clinical characteristics of study children (N=64)*

Clinical characteristics	Number	Percentage
Birth History		
Term	57	89.06
Preterm	7	10.94
Breast feeding up to 6 months		
Yes	47	73.44
No	17	26.56
Measles vaccination after 9 month N=41 (9 mo to 1 year)		
Yes	8	19.51
No	33	80.49
Outcome		
Recovery	62	96.88
Death	2	3.12

Discussion

Out of total 148 measles cases of 4 months to 12 years, 64(43.24%) were below 1 year of age. These infants were our study cohort. The frequency of measles in infancy among hospitalized measles patient was also 43% in Ahsan et al¹⁹ study and 30% in Khan et al⁷ study. Aktaruzzaman et al²⁰ found 23% of measles cases below 9 month of Bangladeshi hospitalized children.

Male to female ratio in this study was 1.8:1. A male preponderance was observed which was consistent with Ahsan et al¹⁹(2.5:1) and Khan et al⁷ study (1.5:1). In our study lowest age of infant was 4 month, which was 4.5 month in Khan et al⁷ and only 27 days in Wu et al¹⁴ study.

The clinical manifestations were typical. Fever and maculopapular rash were present in all cases. Fever was present from beginning and koplik's spot was present in 35.93% cases. Perry et al¹ found koplik's spot in 60-70% cases. Cough was present in 90.62% of our study children and pneumonia was the most common complication (78.13%), followed by oral ulcer (65.62%) and diarrhea (40.63%). In the study done

by Wu et al¹⁴ pneumonia was present in 63% of infants and in Khan et al⁷ study pneumonia and diarrhea were present in 56% and 17% cases respectively. Croup was present in 7.8% of our study children which was consistent with Khan et al⁷ study (10%). Different study showed otitis media as an important complication of measles but we found only few cases of otitis media.^{1, 7}

Most of the infant of our study was term by gestation (89%) and also on exclusive breast feeding up to 6 months (73%). Out of total 64, the number of children from 9 month to 12 month was 41(64%). Among them only 8(19.51%) received first dose of measles-rubella vaccine and rest 33(80.48%) did not. Many of them were suffering from minor illnesses and vaccination was deferred. In some cases parents were not aware of timely vaccination. These could be the reason of poor vaccination status of our study. Ahsan et al¹⁸ showed 82% patient received first dose of measles vaccine and most of the measles children came before they complete the second dose at 15 months. A good number of children 34(53%) had normal nutritional status and 24(38%) had mild to moderate malnutrition. Six (9%) children had severe malnutrition; two of them died.

In this study 23(36%) infant had measles before 8 month of age. In Wu et al¹⁴ study among 220 infants, 80.46% of measles children were below 8 months of age. Other studies also suggested that measles tends to affect those of younger age worldwide particularly in outbreak settings.^{17, 21}

In Bangladesh first dose of measles vaccine is given at 9 month with an intention to maternal antibody will not interfere with acquired immunity and to provide immunity to the maximum number of infant. But in recent studies it has been revealed that protection from maternal antibody is short lived.¹³ The reason may be that mothers' immunity against measles is due to vaccination rather than natural protection. It is suggested that antibody formed by disease occurrence is longer duration than antibody formed by vaccination.¹⁴ In Leuridian et al¹⁵ study positive measles antibodies in the body was only 7.14% at 8 months of age. It has been reported that, if a mother receives measles vaccine again before pregnancy, the measles antibody levels of the cord blood of her baby will be significantly higher than those of babies whose mother were not revaccinated.²² So, some country recommends that

women at child bearing age should receive revaccination against measles before pregnancy.¹⁴ In endemic areas more than 95% vaccine coverage is required to interrupt transmission of measles.¹³ So, routine immunization with maintenance of proper cold chain and timely instituted outbreak immunization response can halt measles progression.

Conclusion

A number of children are being affected by measles before completing first year of life and they develop complications which are related to morbidity and mortality. So, control and prevention of measles in infancy should give more importance.

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