

Clinical Profiles and Outcome of Children Admitted with Measles in District Level Hospital, Nilphamari, Bangladesh

Dr. Dilip Kumar Roy^{1*}, Dr. Mohammad Enamul Haque², Dr. Kaushik Roy³

¹Assistant Professor, Department of Paediatrics, Nilphamari Medical College, Nilphamari, Bangladesh

²Associate Professor, Department of Paediatrics, M Abdur Rahim Medical College Hospital, Dinajpur, Bangladesh

³Child Health Physician (Child Development Centre), 250 Bedded General Hospital, Nilphamari, Bangladesh

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*Corresponding author: Dr. Dilip Kumar Roy

Abstract

Original Research Article

Introduction: Measles is a highly contagious acute viral infection. It is a common cause of morbidity and mortality constituting half of vaccine preventable diseases. **Aim of the study:** The study was designed to describe the demographic, vaccination status, clinical profiles, and outcome of children admitted with measles during study time. **Method:** This was a retrospective observational study conducted in the department of Pediatrics at Adhunik Sadar Hospital, Nilphamari, Bangladesh. The diagnosis of measles based on clinical features. Demographic characteristics of patients and occurrence of measles from the time of vaccination was recorded. Patients below the age of 2 years who were clinically diagnosed as cases of measles were treated and followed. Data were analyzed by using SPSS version 22. **Results:** The most frequent age group of children admitted with measles during the study time 10-14 months was which constitute 35(54.69%) of cases. The youngest age group was 4-9 months constitute 24(37.50%) and the oldest was 15-18 months constitute 5(7.81%). This study showed that 36(56.25%) patients were males and 28(43.75%) were females with a male/female ratio of 1.14:1.21(32.81%) cases where from urban areas and 43(67.19%) were from rural area. 39 (60.94%) cases were malnourished in 10-14 months age group, in 4-9 months age group 20(30.25%) and in 15-18 months age group was 5(7.81%). 39(60.94%) children had history of contact with a case of measles in the preceding 3 weeks. 20(31.25%) children had no history of contact and 5(7.81%) children had unknown history of contact. The total death ratio of the participants was 4(6.25%) where vaccinated patients was 1(1.56%), not vaccinated was 2(3.13%) which was significant and unknown cases was 1(1.56%). **Conclusion:** One third of measles infections occurred before the age of 9 months. Half of measles cases were not vaccinated. The majority of the complicated cases had occurred in the unvaccinated children. Pneumonia was found to be the most frequent complication of measles that necessitated admission. Young age, pneumonia, malnutrition, immune deficiency and non-vaccination status were significant factors related to mortality.

Key words: Measles, complications, Vaccination.

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INTRODUCTION

In developing countries, measles is most common in infants 1 to 2 years of age and is often seen in those less than 9 months old [1]. Measles is extremely rare under the age of 3-4 months, because of protective maternal antibody. In large cities and towns, measles is most likely to occur in infants and preschool children, but in rural and less crowded urban areas the principal incidence is between the ages of 5 and 10 years [2]. In temperate areas, measles disease occurs primarily in late winter and spring [3]. Measles transmission is primarily person to person via large respiratory droplets, following contact with large droplets or by direct transfer of infectious secretions,

such as saliva on hands or toys. Face-to-face contact is not necessary because viable virus may be suspended in air up to 1 hour after a source case leaves a room [4]. Measles may be transmitted from 4 days before to 4 days after rash onset. Risk factors for measles infection include; children with immunodeficiency, infants who lose passive antibody prior to the age of routine immunization, people who are not naturally immune or adequately immunized. Risk factors of severe complications and death include overcrowding, children younger than 5 years of age, malnutrition, underlying immunodeficiency, vitamin A deficiency. Sites of involvement of complications of measles include the middle ear, the respiratory tract, the

gastrointestinal tract, and the central nervous system, eyes and skin [5]. Measles-related mortality occurs in 0.1-0.3% of reported and most often due to respiratory and neurologic complications [1]. WHO and UNICEF are collaborating to reduce global measles death by 90% by 2010. The strategy includes; strong routine immunization for children by their first birthday, a second opportunity for measles immunization through mass vaccination campaigns, to ensure that all children receive at least one dose, effective surveillance in all countries to quickly recognize and respond to measles outbreaks, better treatment of measles cases to include vitamin A supplements, antibiotics if needed, and supportive care that prevents complications [5].

OBJECTIVES

a) General objective

- To describe the demographic characteristics, clinical presentations, complications and outcome of children admitted with measles.

b) Specific objectives

- To evaluation the impact of measles vaccine on susceptibility and outcome of measles and the possible risk factors associated with mortality in measles

MATERIALS & METHODS

A retrospective observational study conducted in the department of Pediatrics at Adhunik Sadar Hospital, Nilphamari, Bangladesh. Patients below the age of 2 years who were clinically diagnosed as cases of measles were treated and followed. Children with underlying diseases were excluded. Case definition was children presenting with fever and a generalized erythematous maculopapular rash spreading from the head down to the extremities, preceded by a prodromal cough, rhinorrhea and conjunctivitis [7]. Information regarding age, sex, residence, date of onset of fever, symptoms at time of admission, complications, vaccination status and number of measles vaccines received, maternal history of measles and vaccination, history of contact with a case of measles within 3 weeks, duration of hospitalization and outcome were reviewed. Children were clinically examined during their stay in the hospital and were closely observed for complications. Weight for age measurements were plotted on National Center for Health Statistics charts. Chest radiographs were taken as indicated. Pneumonia was diagnosed according to WHO criteria "child has pneumonia if he has fast breathing (50 or more breath/minute if the child 2-12months age; 40 or more breath/minute if the child 12months-5 years age) or had chest indrawing" and the presence of pulmonary infiltrate on chest radiograph [7]. The diagnosis of encephalitis was based on the presence of altered degree of consciousness, convulsions, irritability, lethargy,

other neurological deficit and lymphocytic pleocytosis in cerebrospinal fluid. Cerebrospinal fluid analysis was done when indicated (suspicion of encephalitis). Liver function test was done to all patients presented with measles and hepatomegaly. Vitamin A was given orally to all children in a dose of 100,000 IU/day for children 6 months to 1 year old and a dose of 200,000 IU/day for children older than 1 year. Duration of stay and outcome were recorded.

RESULTS

The most frequent age group of children admitted with measles during the study time 10-14 months was which constitute 35(54.69%) of cases. The youngest age group was 4-9 months constitute 24(37.50%) and the oldest was 15-18 months constitute 5(7.81%) as seen in Figure-1. In table-1 we showed that 36(56.25%) patients were males and 28(43.75%) were females with a male/female ratio of 1.14:1.21(32.81%) cases where from urban areas and 43(67.19%) were from rural area. 39 (60.94%) cases were malnourished in 10-14 months age group, in 4-9months age group 20(30.25%) and in 15-18 months age group was 5(7.81%). 39(60.94%) children had history of contact with a case of measles in the preceding 3 weeks. 20(31.25%) children had no history of contact and 5(7.81%) children had unknown history of contact. In 4-9 months age group 16(25.00%) was vaccinated where one dosage was taken and 8(12.50%) was unvaccinated, In 10-14 months age group 20(31.25%) was vaccinated where two dosages were taken and 9(14.06%) was unvaccinated and unknown cases was 6(9.38%) and also in 15-18 months age group 4(6.25%) was vaccinated where two dosages were taken and unknown cases was 1(1.56%) as seen in table -2. All cases had fever, cough and conjunctivitis and maculopapular rash and other signs and symptoms came in decreasing frequency Tachypnea 33(51.56%), Diarrhea and vomiting 17(26.56%), Koplik's spots was seen in 4(6.25%), stridor in 3(4.69%), Convulsions 2(3.13%), hepatomegaly 2(3.13%) of patients but jaundice was not detected, splenomegaly 2(3.13%), and lymphadenopathy in 1(1.56%) as seen in table -3. The most frequent complication was pneumonia which was encountered in 29(45.31%) cases. Gastroenteritis was recorded in 18(28.13%) of patients, Laryngotracheo bronchitis was 4(6.25%), Febrile convulsion 3(4.69%), Epistaxis 2(3.13%) and while the remaining 7(10.94%) children had no complication and they were admitted because of poor oral intake. Encephalitis was recorded in 1(1.56%) cases as seen in table-4. In Table-5 the total death ratio of the participants was 4(6.25%) where vaccinated patients was 1(1.56%), not vaccinated was 2(3.13%) which was significant and unknown cases was 1(1.56%).

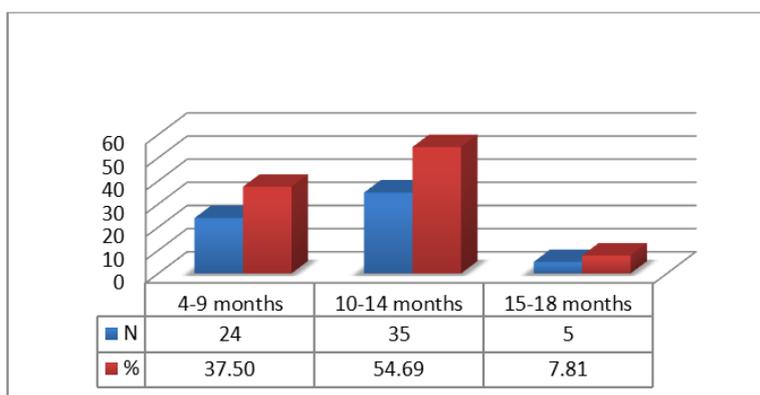


Fig-1: Distribution patients with measles according to age group (N=64)

Table-1: Socio-demographic characteristics of the participants (N=64)

Status	N(64)	%
Sex		
Male	36	56.25
Female	28	43.75
Location		
Urban	21	32.81
Rural	43	67.19
Malnourished		
4-9 months	20	31.25
10-14 months	39	60.94
15-18 months	5	7.81
Contact history		
Contact	39	60.94
Non-contact	20	31.25
Unknown	5	7.81

Table-2: State of vaccination children with measles according to their age group (N=64)

Age group	Vaccinated		Unvaccinated		Unknown		Total	
	N	%	N	%	N	%	N	%
4-9 months(One dosage)	16	25.00	8	12.50	0	0	24	37.50
10-14 months(Two dosage)	20	31.25	9	14.06	6	9.38	35	54.69
15-18 months(Two dosage)	4	6.25	0	0.00	1	1.56	5	7.81
Total	40	62.5	17	26.56	8	10.94	65	100.00

Table-3: Distribution of children with measles according to clinical features. (N=64)

Clinical features	(N=64)	%
Tachypnea	33	51.56
Diarrhea and vomiting	17	26.56
Koplik's spots	4	6.25
Stridor	3	4.69
Convulsions	2	3.13
Hepatomegaly	1	1.56
Splenomegaly	2	3.13
Cervical lymphadenopathy	1	1.56
Disturbance in level of con	1	1.56

Table-4: Distribution of in children with measles according to complications (N=64)

Complications of measles	(N=64)	%
Pneumonia	29	45.31
Gastroenteritis	18	28.13
Laryngotracheobronchitis	4	6.25
Febrile convulsion	3	4.69
Epistaxis	2	3.13
Encephalitis	1	1.56
No complication	7	10.94

Table-5: Deaths in relation to vaccination status in children with measles (N=64)

Vaccination status	No.	Death	%
Vaccinated	40	1	1.56
Not vaccinated	16	2	3.13
Unknown	8	1	1.56
Total	64	4	6.25

DISCUSSION

This study revealed that males acquired measles infection more frequently than females with M/F ratio 1.14:1, Hirfanoglu [8] had reported a male predominance of 2:1. The most frequent age group of children admitted with measles during the study time 10-14 months was which constitute 35(54.69%) of cases. The youngest age group was 4-9 months constitute 24(37.50%) and the oldest was 15-18 months constitute 5(7.81%). This result is in agreement with Abdul Hakeem [9] while the peak occurred in March and July in Turkey in Hirfanoglu [8]. The median age of measles in current study was found to be 17 months while the median age in Hirfanoglu et al. study [8] was 36 months. 27.74% cases of measles in < 9 months age. Since measles may occur at any age if there is no previous immunity; therefore this finding is not unusual and the most probable explanation for measles in this early age could be the waning of transplacental acquired maternal antibodies even before 9 months of age to such low levels that they are unable to afford protection against measles. This is in agreement with Oydeel [10] who stated that 58% of infants lose these protective antibodies against measles by 4 months and 97% between 6 and 9 months. In this study a small percentage 2.92% of the patients had maternal history of measles infection and also only 8(5.84%) mothers were vaccinated against measles. These facts may explain the younger age at presentation and youngest age of patients was three months. In the present study 39 (60.94%) cases were malnourished in 10-14 months age group, in 4-9months age group 20(30.25%) and in 15-18months age group was 5(7.81%). This is in agreement with Ur- Rehman (12) who reported 40% as malnourished. Only 53.28 % patients gave a positive history of contact with a case of measles within 3 weeks from presentation. This is in agreement with Hirfanoglu [8] who recorded 57% had similar history. The occurrence of measles in patients with no history of exposure may be explained by the fact that an

accidental exposure had happened with patients other than family members before the appearance of rash which is an important sign that brings the attention of the family. In spite of the routine administration of measles live attenuated vaccine at the age of 9 months and 15 months according to National Vaccination Schedule, it is unfortunate to notice that the percentage of unvaccinated children recorded in this study was high approximately 50%. Ur- Rehman [11] recorded that 42.7% were not vaccinated. 27% of children were not vaccinated because they were under the age of vaccination (<9 months) and developed measles infection, this goes with Olusola [7] who reported (27.6%). 23.36% of children received only one dose of vaccine and developed measles while in Jahanet [12] 32.1% received one dose. The occurrence of measles in patients receiving only single dose may happen because it had been shown that seroconversion to measles vaccine is between 70%-90% for a single dose vaccine and 97% with 2 doses. It had been shown that children vaccinated with measles vaccine at 6 and 9 months had a better outcome, compared to single dose of vaccine at 9 months [13] 8% of children among total admissions had received two doses of measles vaccine this is nearly the same as in Mazin study, (7.65%) [14]. the occurrence of measles in a previously fully vaccinated child may be due to either primary vaccine failure (no immunological stimulation following vaccination) or persistence of maternal measles antibodies beyond 9 months of age must have interfered with seroconversion, improper storage or handling of the vaccine, and administrative procedures. Diversification in measles strains has also being reported to account for the early presentation of measles and occurrence of measles in vaccinated children [15, 16]. It has been associated with the potential risk of an epidemic [17]. In addition, mostly the vaccination status was recorded from case history, so it is difficult to be confident about robustness of evidence for vaccination (recall bias). Secondary vaccine failure might contribute to the occurrence of measles in an epidemic. Lack of complete diagnostic testing limits the ability to confirm this. The occurrence of the majority of complicated cases in age group ≥ 15 months might be due to the facts that the majority of measles cases admitted in this study were in this age group and the majority of them were malnourished as 59.09% of malnourished cases were in the >15 months age group. This might be attributed to the fact that malnourished children experience more severe measles infection at a greater frequency due to their altered immune response [18]. Out of 137 children admitted for measles, 6(4.38%) patients died which was approximate to that reported in Hirfanoglu [8] (3.8%).The case fatality (CF) of admitted children with measles was (1.2%) by Mishra [19] Half of those who died were >15 months age group, and one was younger than 9 months while in Hirfanoglu [8] 66.67% occurred at age of 6 months. One third of patients who died were malnourished and the same finding was noted by Hirfanoglu [8] Two

thirds of those patients who died were not vaccinated and the non-vaccination related case fatality was (5.88%) while it was (1.35%) in Mishra *et al.* [19]. One case (16.67%) was under the age of vaccination. One of those patients who died received only one dose of measles vaccine and vaccination related case fatality was (2.32%), meanwhile it was (0.45%) in Mishra [19] and one patient with unknown status of vaccination regarding measles vaccine. Maternal history for 4 (66.67%) of patients who died was negative for measles vaccination and two (33.34%) was unknown. The majority of death was due to respiratory failure as a complication of pneumonia which occurred in 5 (83.33%) patients who died. This was also noted by Hirfanoglu [8] where (100%) of the death cases had pneumonia with respiratory failure. One of them had also bloody diarrhea in addition to pneumonia. One patient (16.67%) died due to encephalitis. One death in this study had history of ALL with bone marrow relapse. The cause of death was due to complicated pneumonia after 28 days from admission. In Hirfanoglu [8] also the same was recorded one of the death had ALL complicated by giant cell pneumonia.

Limitations of the Study

This was a retrospective study with a small sample size. So the findings of this study may not reflect the exact scenarios of whole country.

CONCLUSION AND RECOMMENDATIONS

The most common age group affected during this study was 10-14 months age group. One third of infection occurred before the age of 9 months. Large proportion of measles cases occurred among unvaccinated population in rural area. Measles is still attacking vaccinated children in our locality. The majority of the complicated cases had occurred in the unvaccinated children and in the age >15 months; the majority of them were malnourished. Pneumonia was found to be the most frequent complication of measles that necessitated admission and it is the most feared complication. Higher mortality is associated with 10-14 months age group followed by >15 months and then 4-9 months age group, malnutrition, non- vaccination and pneumonia. Respiratory failure as a complication of pneumonia is the leading cause of mortality.

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