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Original Article

Measles in Young Children: A Study of Clinical Features and Immunization Status at a Tertiary Facility

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Abstract

Background: *Measles remains to be a significant contributor to morbidity among young children all over the world, with the existence of effective vaccines. Improving vaccination strategies requires an understanding of the clinical and demographic characteristics of vulnerable children. This study aimed to assess the socio demographic patterns, clinical features and vaccination status of children under 5 years with measles in Chattogram, Bangladesh.*

Materials and methods: *A descriptive cross-sectional study was conducted at the Department of Paediatrics, Chattogram Maa-Shishu O General Hospital from October 2020 to April 2021. Children aged 5 years and below with a history of measles were included based on WHO diagnostic criteria. A semi-structured questionnaire was used to collect data on age, sex, socioeconomic status and vaccination history. Data were analysed using SPSS version 22.*

Results: *A total of 100 children were studied, with a mean age of 12.2 months with standard deviation (±5.7) months. The findings consisted of 67% boys and 33% girls. Most respondents lived in rural areas (58%) and had mothers with low education levels. All children presented with fever and rash, while 56% exhibited Koplik's spots. Vaccination data showed that 69% had incomplete or no vaccination, with only 31% having completed two doses.*

Conclusion: *The study emphasizes notable differences in children's measles vaccination, especially in rural environments. Protecting these vulnerable groups and preventing future outbreaks depend on improving vaccination awareness and education.*

Key words: Children; Immunization; Measles.

INTRODUCTION

Measles is a highly contagious and severe airborne illness caused by the Morbillivirus, part of the Paramyxoviridae family. It disseminates readily when an infected individual exhales, coughs, or sneezes.[1] It may result in significant illness, complications, and potentially fatal outcomes. The disease can impact individuals of any age, though it is predominantly observed in children. Symptoms include elevated temperature, cough, nasal discharge and a rash.[2] It continues to be a significant cause of mortality among young children worldwide, despite the existence of a safe and effective vaccine. Immunizations save 57 million lives from 2000 to 2022, yet measles still fatalities 136,000 people in impoverished countries, especially in Africa and Asia, with 95% of deaths due to inadequate health facilities.[3] Since the 1960s, measles immunization has proven safe, effective, and affordable. The World Health Organization recommends measles vaccination for all vulnerable children and adults.[4] The standard for all national immunization programs should be to administer

two doses of the measles vaccine to every child, either on its own or in combination with other vaccines such as Measles-Rubella (MR) Measles-Mumps-Rubella (MMR) or Measles-Mumps-Rubella-Varicella (MMRV).[5] As a result of the measles vaccine, the epidemiology has undergone an enormous shift, and the annual number of cases of measles has significantly decreased.[6]

In Bangladesh, the initial dose of the MR (Measles, rubella) vaccine is administered at 9 months, followed by a second dose at 15 months. Maternal antibodies have been thought to give immunity to measles and other infectious diseases during infancy.[2] Early vaccination can impair humoral antibody response due to natural antibody production. Therefore, the Centers for Disease Control and Prevention advise against administering the measles vaccine's first dose to children younger than one year of age.[7] In recent years, a significant percentage of children under one year of age developed measles, especially in outbreak scenarios. Recent research has demonstrated that maternal antibodies diminish significantly before six months of age.[8] In younger children, measles leads to severe consequences due to their compromised immune systems, resulting in a significant number of fatalities in this population.[9]

Outbreaks of measles have the potential to be used as a tracer indicator of health disparities and can assist in determining where deficiencies exist in immunization programs and primary healthcare delivery systems.[10] Measles outbreaks have taken place following years in which countries have not attained and sustained 95% coverage with two doses of the measles vaccine at both national and regional scales.[11] Additional information is required to figure out which demographic groups are impacted and the underlying reasons for their insufficient vaccination rates. More studies are required to identify deficiencies in program barriers to attain Measles elimination. In 2019, there was a significant increase in the number of Measles cases among hospitalized young children.[12] Considering the whole situation, this study was performed to observe the socio-demographic profile, as well as the clinical characteristics and vaccination status of children who were diagnosed with measles and were up to five years old in a children's hospital that provides tertiary care.

MATERIALS AND METHODS

This descriptive cross-sectional study was conducted at the Department of Paediatrics, Chattagram Maa Shishu-O-General Hospital, Chittagong from October 2020 to April 2021. A total of 100 children aged 5 years and below who attended the hospital with a history of measles were included in the study. Measles was clinically diagnosed based on the World Health Organization's case definition criteria, which include high fever (>38°C) accompanied by evident generalized maculopapular rash, cough, coryza (runny nose), and conjunctivitis (red eye, watering).[13] Cases of fever accompanied by rashes, as well as patients with chronic conditions such as congenital heart disease and haemolytic anaemia, and parents who didn't give consent were excluded from the study. Upon obtaining informed written consent from parents, a history was recorded concerning the age, sex, socioeconomic status and vaccination status of respondents as well as the mother. A structured questionnaire was filled out to gather data. We used SPSS version 22 to process and analyse the data and the results are presented in tabular and chart form.

RESULTS

During the study period, a total of 100 children with measles were attended to the hospital. The socio demographic information about the children is summed up in Table I. The ages ranged from 1 month to 5 years and were divided into six groups in months where most of the subjects (43%) belonged to ages 9 to 14 months. The mean age of the children was 12.28 months with standard deviation (±5.7) months. In a sample of 100 cases, 67% were boys and 33% were girls. The boy-to-girl ratio in this study is 2.0:1. Large numbers of respondents came from rural areas (58%) followed by urban areas (31%). The study revealed that most respondents' mothers (42%) were at the primary level of education and 26% of mothers were Illiterate. Maximum patients had nuclear family (73%). Socioeconomically subjects were categorised into three classes. Among the patients, the poor class comprised the major percentage (43%) and 19% were from the upper class.(Table I). All children reported fever with generalised rash and other clinical features were red eyes (56. %) runny nose (71. %), cough (48. %) koplik's spot (56%) (Table II).

Table III shows the vaccination history of children. Maximum cases (69%) had a history of incomplete vaccination where (14%) had no vaccination and 55% had incomplete/no vaccination. A total of 31%of subjects completed the two doses of vaccination. Regarding maternal immunization status, it was found that 56% of mothers were vaccinated (Figure 1).

Table I Socio-demographic Characteristics of Respondents

Variables	Respondents (n=100)	Percentage (%)
Age (Months)		
<9	7	7
9-14	43	43
15-24	35	35
25-36	8	8
37-48	5	5
49-60	2	2
Mean Age with SD	12.2±5.7	
Gender		
Boys	67	67
Girls	33	33

Variables	Respondents (n=100)	Percentage (%)
Residence		
Rural	58	58
Urban	31	31
Suburban/slum	11	11
Mothers' education		
Illiterate	26	26
Primary	42	42
Secondary	19	19
Higher Secondary	8	8
Graduate	5	5
Family type		
Nuclear	73	73
Joint	27	27
Socioeconomic status		
Poor class	43	43
Middle class	38	38
High Class	19	19

Table II Clinical manifestation of the Respondents (n=100)

Clinical features	Respondents (n=100)	Percentage (%)
Fever	100	100
Generalised rash	100	100
Red eyes	56	56
Runny nose	71	71
Cough	48	48
koplik's spot	56	56

Table III Vaccination history of the children (n=100)

Vaccination history of the child	Respondents (n=100)	Percentage (%)
Yes (Completed two doses)	31	31
No or incomplete schedule	69	69
Not vaccinated	14	14
Incomplete or one-dosevaccine	55	55

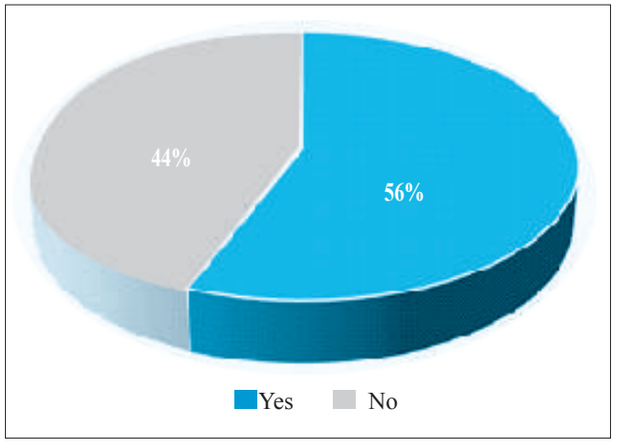

Figure I Maternal history of vaccination (n=100)

DISCUSSION

In the current rise of measles cases, this research assessed the age pattern, clinical features, and vaccination status of measles-affected children and their mothers. Among 100 children 43% were from the 9-14 months of age group, and 35% were of 15-24 months of age group. Rahat et al. found most of the children (59%) were from the 6-month to year age group but in another study, 35% of measles cases occurred between 9 months and 1 year and 48% occurred between 13 and 14 months.[14,15] A masculine majority is noted in this research. Other studies also observed that boys are more affected than girls.[12,14,16] In this study, the male-to-female ratio was 2.0:1. Which is more similar to the study done by Rahat et al where they found this ratio to be 1.8:1.[14] Whereas some participants hailed from urban or suburban locations over 58% of the study's participants lived in rural regions. This portrays that rural areas are more at risk than other areas. Considering mother's education, it was determined that only 5% were graduates, 8% had completed higher secondary education, and the remainder possessed lower levels of education. Similarly, mothers with less education were also linked to an increased risk of measles cases in another study.[17] In contrast to a study conducted in Turkey, which discovered that most measles cases were from extended families, most patients in this study were from nuclear families.[18] The majority (43%) of children in this study came from low socioeconomic backgrounds, which is consistent with other research that found that the majority of cases were from families with lower socioeconomic status.[18,19] Standard clinical signs were observed in this study. Every single case had a fever and a maculopapular rash. In 56% of cases, koplik's spot was visible, and fever was present from the start. In 60–70% of cases, Perry et al. discovered Koplik's spot.[20] While 48% of the kids in our study reported having a cough, other studies found that 23% and 90.62% of the kids had the same condition.[14,21]

This study of 100 measles patients found that 14% had not received the vaccine, 55% had received one dose and 19.51% had received it in another study.[14] Many were experiencing minor medical conditions, resulting in the postponement of vaccinations. In certain instances, parents were uninformed about the necessity of timely vaccinations. These may account for the inadequate vaccination status observed in our study. The overall complete (2 doses) vaccination status from 9 months to 5 years was 31% in our study, which was 8.7% in Ahsan et al.'s study.[15]

After one dose, reported main vaccine failure ranges from 5% to 10%, after a second dose, it ranges from 1%.[22] The reasons might be insufficient viral dosage, cold chain failure, and host immune factors including persistence of passively acquired mother immunity.[23] Reported in 5% of children aged 10 to 15 years, secondary vaccine failure can arise following an initial but insufficient immune response to vaccination.[22] WHO

suggests waiting to get vaccinated against measles until the mother's antibodies have gone down. Vaccine studies in the USA have shown that when children were 6 months old, their cell-mediated responses to the measles vaccine were similar to those of children who were 9 or 12 months old. However, antibody responses were weakened by maternal antibodies. On the other hand, 6 months after a boost at 12 months old, 86% of the youngest children had protective levels of antibodies. T-cell proliferative responses didn't change much across any age group.[24]

According to the national EPI schedule, most of the mothers in our study would have get the vaccine. Current study has demonstrated that maternal antibody protection is transient and diminishes significantly before the age of six months. At eight months of age, only 7.14% of infants exhibit positive antibody levels.[8] However, other studies have also indicated that maternal antibodies produced by maternal infection remain in the infant for a longer period than those produced by maternal vaccination.[11]

The current policy for immunizing against measles was based on children born to mothers who already had the disease. These kids might not lose the protection of their moms' antibodies until they are 7 to 9 months old.[25]

CONCLUSION

Important information about the characteristics and immunization status of measles-affected children in Chattogram is provided by this study. All children exhibited fever and a generalized rash, with many additionally displaying symptoms such as conjunctival injection, cough, and Koplik's spots. Significant gaps in immunization coverage and parental awareness were revealed by the unexpectedly high percentage of people who had either no vaccinations or only partial ones. To address these challenges, public health initiatives must prioritize enhancing vaccination accessibility in rural areas and improving education regarding the significance of timely immunization. These measures are essential to prevent future measles outbreaks and protect populations in danger effectively. Improving vaccination programs is essential for protecting children's health in the region.

DISCLOSURE

All the authors declared no competing interest.

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