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Original Research Article

Clinical profile and distribution of potential risk factors of adult measles patients in a tertiary care hospital: a cross-sectional study

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ABSTRACT

Background: Measles remains a significant public health concern due to incomplete vaccination, waning immunity, and increased adult susceptibility. Adult cases may present with severe manifestations and complications, influenced by vaccination status, immune condition, and exposure risks. This study evaluated the clinical characteristics, complications, and risk factors associated with adult measles patients in a tertiary care setting.
Methods: A hospital-based cross-sectional study was conducted at Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh, from January 2026 to June 2026. A total of 200 adults with laboratory-confirmed measles were enrolled. Sociodemographic, clinical, and risk factor data were collected using a structured questionnaire and medical records. Data were analyzed using SPSS version 26.0. Logistic regression was performed to identify factors associated with prolonged hospitalization (>7 days), with $p<0.05$ considered statistically significant.
Results: Among 200 adult measles patients, most were young adults (mean age 28.8±8.0 years), with female predominance. Immunity gaps were observed due to unknown vaccination status (37.0%), no childhood vaccination (19.5%), and low adult MMR booster uptake (4.5%). Fever, rash, cough, and coryza were the main clinical features, while pneumonia was the most common complication. Prolonged hospitalization was independently associated with pneumonia, lack of vaccination, and immunocompromising conditions.
Conclusions: Adult measles remains associated with immunity gaps and severe outcomes, especially among unvaccinated and immunocompromised individuals. Improving vaccination coverage, awareness, surveillance, and early management of complications is essential to reduce disease burden.

Keywords: Adult measles, Clinical profile, Distribution, Potential risk factors

INTRODUCTION

Measles is an extremely contagious airborne acute febrile illness caused by a Morbillivirus (Paramyxoviridae) and continues to be a worldwide health issue due to considerable morbidity and mortality.[1,2] Adult measles is increasingly recognized due to incomplete vaccination, waning immunity, and susceptibility among high-risk groups. In older individuals, it may present with atypical features, increased severity, and more complications.[3,4]

Measles advances through incubation, prodromal, and eruptive stages, exhibiting fever, cough, coryza, conjunctivitis, and a maculopapular rash. Koplik spots aid in diagnosis but might not be present in adults. Adult cases frequently exhibit extended illness, elevated fever, and a rise in complications affected by age, immunity, nutrition,

vaccination history, pregnancy, and comorbid conditions.[5,6]

Measles continues to be a public health issue in low- and middle-income nations because of vaccination deficiencies, healthcare obstacles, and population movement. Despite advancements in Bangladesh's EPI, outbreaks continue within vulnerable populations, as insufficient adult awareness and incomplete vaccination histories hinder timely diagnosis and increase transmission.[7,8]

Risk factors for adult measles comprise lack of measles vaccination, uncertain or incomplete vaccination history, waning immunity, proximity to infected persons, exposure through healthcare or occupation, travel to areas where measles is common, living in congested environments, immunosuppression, pregnancy, malnutrition, ongoing illnesses, vaccine reluctance, and restricted access to vaccination services. These elements heighten vulnerability to infection and could lead to severe illness and complications.[9,10]

A worldwide analysis of hospitalized adult measles cases revealed that patients often exhibited severe clinical symptoms necessitating hospital treatment, with complications playing a major role in the disease's impact. A different worldwide study assessing adult measles cases revealed that serological profiles differed based on the occurrence of complications, indicating that immune response patterns could affect disease severity and clinical results.[2,11]

Research from Bangladesh indicated that the resurgence of measles was linked to gaps in vaccination, incomplete immunizations, and a buildup of vulnerable populations. Delayed recognition, insufficient protection, and transmission within at-risk populations influenced the clinical burden, while modelling data highlighted that achieving high two-dose vaccine coverage and employing targeted immunization strategies are crucial to lowering outbreak risk and preventing severe illness.[12,13] Adult measles in Bangladesh is still inadequately understood, with scant information on its clinical characteristics, complications, and risk factors. This research intended to assess the clinical characteristics and possible risk factors in adult measles patients at a tertiary care facility.

METHODS

This hospital-based cross-sectional study was conducted in the department of internal medicine, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh, from January 2026 to June 2026. The study aimed to describe the clinical profile and distribution of potential risk factors among adult patients with measles and to identify factors associated with prolonged hospitalization.

A total of 200 consecutive adult patients aged 18 years or older with clinically suspected and laboratory-confirmed measles were enrolled using consecutive sampling. Measles diagnosis was established based on the presence of fever, generalized maculopapular rash, and one or more of cough, coryza, or conjunctivitis, together with laboratory confirmation by measles-specific IgM antibody and/or real-time reverse transcriptase polymerase chain reaction (RT-PCR) according to national diagnostic guidelines. Patients with incomplete clinical records, uncertain diagnosis, or those unwilling to participate were excluded.

After obtaining written informed consent, data were collected using a pretested structured questionnaire and a standardized case record form. Information regarding sociodemographic characteristics, childhood measles vaccination history, adult MMR booster vaccination, immunization status, exposure history, travel history, household crowding, immunocompromising conditions, recent illnesses causing temporary immune suppression, vitamin A deficiency, preventive practices, and knowledge regarding measles was obtained through patient interviews and review of medical records. Clinical data including presenting symptoms, physical examination findings, laboratory investigations, complications, hospitalization status, and duration of hospital stay were recorded. Hospitalization lasting more than 7 days was defined as prolonged hospitalization.

Data were entered, cleaned, and analyzed using Statistical Package for the Social Sciences (SPSS) version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables were summarized as mean±standard deviation (SD), while categorical variables were expressed as frequencies and percentages. Comparisons between patients with hospital stay of ≤7 days and >7 days were performed using the Chi-square test or Fisher's exact test, as appropriate. Variables showing a p value <0.20 in bivariate analysis, along with clinically relevant variables, were entered into a multivariable logistic regression model to identify independent factors associated with prolonged hospitalization. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were calculated. A two-tailed p-value <0.05 was considered statistically significant.

Ethical approval for the study was obtained from the Institutional Review Board/Ethical Review Committee of Holy Family Red Crescent Medical College, and written informed consent was obtained from all participants before enrolment. Confidentiality and anonymity of participant information were maintained throughout the study.

RESULTS

A total of 200 adult patients with clinically and laboratory-confirmed measles were enrolled during the study period. Their sociodemographic characteristics, vaccination history, potential epidemiological risk factors, clinical manifestations, complications, preventive practices, and factors associated with prolonged hospitalization are presented below.

Table 1: Sociodemographic characteristics of the study participants (n=200).

Variables	Frequency	Percentage
Age group (years)		
18-29	135	67.5
30-39	47	23.5
40-49	15	7.5
≥50	3	1.5
Mean age (years), Mean±SD		28.8±8.0
Sex		
Male	77	38.5
Female	123	61.5
Educational level		
No formal education	14	7.0
Primary	42	21.0
Secondary	68	34.0
Higher secondary	45	22.5
Graduate or above	31	15.5
Residence		
Urban	100	50.0
Semi-urban	40	20.0
Rural	60	30.0

Table 1 summarizes the sociodemographic characteristics of the study participants. The mean age was 28.8±8.0 years, with more than two-thirds (67.5%) belonging to the 18-29-year age group. Females constituted 61.5% of the study population. Secondary education was the most common educational level (34.0%), and half of the participants resided in urban areas.

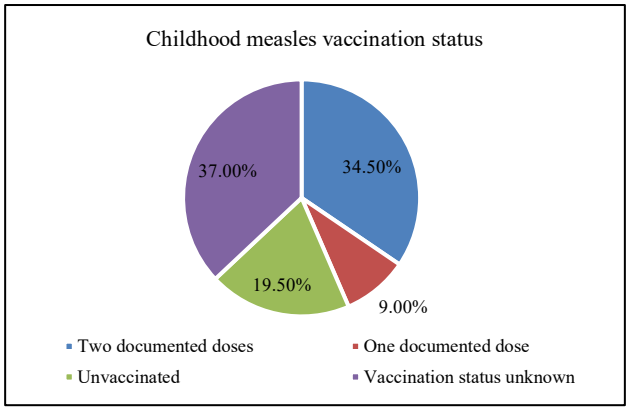


Figure 1: Childhood measles vaccination status among adult measles patients (n=200).

Figure 1 illustrate the reported childhood measles vaccination status. More than one-third (37.0%) were unable to recall or document their childhood vaccination history, while 34.5% reported receiving two doses of a measles-containing vaccine. Nearly one-fifth (19.5%) had never received childhood measles vaccination.

Table 2 demonstrates that only 4.5% of participants had received an adult MMR booster vaccination. Approximately one-quarter (22.5%) reported incomplete childhood immunization, while 10.5% had a known immunocompromising condition. Recent illness associated with temporary immune suppression was reported by 16.0%, and vitamin A deficiency was documented in 13.5% of participants.

Table 2: Vaccination history and immunity-related characteristics (n=200).

Variables	N (%)
Received adult MMR booster vaccination	9 (4.5)
Missed routine childhood immunization	45 (22.5)
Known immunocompromising condition	21 (10.5)
Recent illness causing temporary immune suppression	32 (16.0)
Vitamin A deficiency	27 (13.5)

Table 3: Exposure history and potential epidemiological risk factors (n=200).

Variables	N	%
Close contact with confirmed measles case	80	40.0
Household contact with febrile rash illness	72	36.0
Recent travel within previous month	66	33.0
Living in a crowded household	58	29.0
Healthcare worker	11	5.5
School/college staff or student	39	19.5

Table 3 shows that 40.0% of patients reported close contact with a confirmed measles case before illness onset. Household exposure to a person with fever and rash was reported by 36.0%, while one-third (33.0%) had travelled during the preceding month. Nearly three in ten participants (29.0%) lived in crowded households.

Table 4 summarizes the clinical profile of adult measles patients. The mean interval between exposure and symptom onset was 10.4±2.5 days. Fever (100.0%) and maculopapular rash (97.5%) were the predominant presenting manifestations, followed by cough (89.5%), coryza (84.0%), generalized weakness (80.5%), conjunctivitis (67.5%), sore throat (58.5%), and Koplik spots (30.0%). Pneumonia (33.5%) was the most frequent complication, followed by acute diarrhea (24.0%), whereas hepatitis (4.5%) and encephalitis (3.0%) occurred less commonly. Overall, 186 patients (93.0%) required hospitalization, with a mean hospital stay of 5.8±2.4 days. Among admitted patients, 65.1% were discharged within 7 days, while 34.9% had prolonged hospitalization exceeding 7 days.

Table 4: Clinical profile and outcomes of adult measles patients (n=200).

Variables	N	%
Duration from exposure to symptom onset (days), Mean±SD	10.4±2.5	
Clinical manifestations		
Fever	200	100.0
Maculopapular rash	195	97.5
Cough	179	89.5
Coryza	168	84.0
Conjunctivitis	135	67.5
Koplik spots	60	30.0
Sore throat	117	58.5
Generalized weakness	161	80.5
Complications		
Pneumonia	67	33.5
Acute diarrhea	48	24.0
Otitis media	15	7.5
Hepatitis	9	4.5
Encephalitis	6	3.0
Clinical outcomes		
Hospital admission	186	93.0
Hospitalization ≤7 days (n=186)	121	65.1
Hospitalization >7 days (n=186)	65	34.9
Hospital stay (days), Mean ± SD	5.8±2.4	

Table 5 demonstrates that 65.5% of participants practiced regular hand hygiene, whereas only 36.5% consistently used masks in crowded settings. Good household ventilation was reported by 58.5%. Nearly half of the participants (47.5%) demonstrated poor knowledge regarding measles. Although 77.0% recognized that adults can develop measles, only 43.0% believed that complete measles vaccination provides long-term protection.

Table 5: Preventive practices and knowledge regarding measles (n=200).

Variables	Frequency	Percentage
Regular hand hygiene	131	65.5
Consistent mask use in crowded places	73	36.5
Good household ventilation	117	58.5
Awareness regarding measles		
Good	39	19.5
Moderate	66	33.0
Poor	95	47.5
Believed adults can develop measles	154	77.0
Believed complete measles vaccination provides long-term protection	86	43.0

Table 6 shows among hospitalized patients, prolonged hospital stay (>7 days) was significantly associated with lack of childhood measles vaccination, unknown vaccination status, previous close contact with a confirmed measles case, pneumonia, vitamin A deficiency, and underlying immunocompromising conditions.

Table 7 shows after adjustment for potential confounding variables, pneumonia remained the strongest independent predictor of prolonged hospitalization (adjusted OR 3.18, 95% CI 1.61-6.28, p=0.001). Patients who had not received childhood measles vaccination had more than twice the odds of prolonged hospital stay (adjusted OR 2.42, 95% CI 1.19-4.93, p=0.014). An underlying immunocompromising condition was also independently associated with prolonged hospitalization (adjusted OR 2.08, 95% CI 1.01-4.32, p=0.047), whereas vitamin A deficiency showed a positive but non-significant association after multivariable adjustment (p=0.071).

Table 6: Factors associated with prolonged hospitalization among admitted patients (n=186).

Variables	≤7 days (n=121)	>7 days (n=65)	P value
Unvaccinated	16	20	0.006
Unknown vaccination status	43	28	0.041
Close contact with confirmed case	45	33	0.032
Pneumonia	27	40	<0.001
Vitamin A deficiency	11	14	0.021
Immunocompromising condition	7	12	0.018

Table 7: Multivariable logistic regression analysis of factors associated with prolonged hospitalization (>7 days) among admitted patients (n=186).

Variables	Adjusted OR	95% CI	P value
Pneumonia	3.18	1.61-6.28	0.001
Unvaccinated	2.42	1.19-4.93	0.014
Immunocompromising condition	2.08	1.01-4.32	0.047
Vitamin A deficiency	1.89	0.95-3.76	0.071

DISCUSSION

In the present study, most participants were young adults, with females predominating, secondary education being the most common, and half of the participants residing in urban areas. A Bangladesh-based study on the economic burden of measles reported that the majority of cases occurred among younger age groups, with variations in sex distribution, and highlighted substantial economic costs associated with measles management, including healthcare expenses and productivity losses. The findings emphasized the need for effective measles prevention strategies and improved vaccination coverage to reduce disease burden.[14]

The high proportion of unknown and unvaccinated individuals indicates gaps in childhood measles immunization coverage. Similar immunization challenges have been reported in Bangladesh, where incomplete vaccination is linked to access barriers and poor vaccination tracking. Strengthening routine immunization services and record-keeping is essential to improve measles vaccine coverage.[15]

Low adult MMR booster uptake and incomplete childhood immunization suggest persistent immunity gaps among participants. Previous evidence indicates that reported vaccination history may not always reflect true measles immunity, highlighting the need for improved immunization tracking, accurate assessment of immunity status, and targeted catch-up vaccination strategies.[16]

Close contact with confirmed measles cases and household exposure to febrile rash illness were common among participants, indicating the importance of person-to-person transmission in measles spread. Previous global evidence has shown that low vaccination coverage, population susceptibility, and epidemiological risk factors contribute to persistent measles transmission. Strengthening surveillance, vaccination coverage, and rapid identification of exposed individuals is essential for measles control.[17]

The clinical presentation of adult measles in this study was characterized by fever, maculopapular rash, cough, and coryza, with pneumonia being the most frequent complication. Similar findings have been reported among hospitalized adult measles patients, where disease severity and complications contribute to prolonged hospital stays. The high hospitalization rate and duration of admission observed highlight the need for early recognition, supportive management, and close monitoring of adults at risk of severe measles outcomes.[18]

Limited measles-related knowledge and inconsistent preventive practices were observed among participants, with nearly half demonstrating poor awareness and only 43.0% recognizing the long-term protection provided by complete vaccination. Similar concerns have been reported regarding gaps in vaccine knowledge, confidence, and preventive behaviors that can hinder measles elimination efforts. Strengthening public education, promoting vaccination awareness, and improving preventive practices are essential to reduce measles transmission.[19]

Prolonged hospitalization was associated with absent or unknown vaccination status, close contact exposure, pneumonia, vitamin A deficiency, and immunocompromising conditions. Similar evidence shows that complications and impaired immunity contribute to severe measles outcomes and longer hospital stays, emphasizing the need for vaccination and early risk-based management.[18,20]

Pneumonia was the strongest independent predictor of prolonged hospitalization, followed by lack of childhood vaccination and immunocompromising conditions. Similar findings indicate that severe measles complications, particularly pneumonia, and host vulnerability factors contribute to prolonged illness and hospital care. These results emphasize the importance of vaccination, early recognition of complications, and close monitoring of high-risk patients to reduce severe outcomes.[20,21]

In conclusion, strengthening measles vaccination coverage, improving immunity assessment, and ensuring early management of high-risk patients are essential to reduce severe disease and prolonged hospitalization among adults.

CONCLUSION

Adult measles remains associated with substantial immunity gaps and significant clinical complications, particularly among unvaccinated and immunocompromised individuals. Strengthening routine and catch-up vaccination, improving public awareness, enhancing surveillance, and ensuring early identification and management of complications are essential to reduce disease severity, hospitalization burden, and ongoing measles transmission.

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