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**ORIGINAL RESEARCH**

# Clinico-demographic Profile And Factors Associated With Measles In Children At A Tertiary Care Hospital In Northern India - An Observational Study

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## ABSTRACT

**Background**: Measles, a vaccine-preventable viral illness, continues to remain an important cause of mortality and morbidity worldwide. However, the last few years have seen a surge in cases of measles all over the world. This has been largely attributed to reduced vaccination coverage due to COVID 19 lockdowns, overcrowded neighbourhoods, unhygienic living conditions and other factors. **Methods**: An observational prospective study was carried out at a tertiary care hospital in northern India to study the clinico-demographic profile of patients with measles and to observe the factors associated with the disease.79 patients with measles were included in the study after taking consent from their parents. Detailed history was taken and assessment for nutritional status was done. The data was analyzed and descriptive statistics were presented using percentages. **Results**: During the study, a prevalence of 1.34% was reported for measles, with maximum cases in March (36.7%). The most common age group affected was ≤5years with male preponderance in all age groups.Also majority of measles cases belonged to lower middle (30.3%) socioeconomic class households and affected children were mostly malnourished. Majority of the patients were unimmunised (60.7%) against measles. The most common reason cited for not vaccinating the child was lockdown due to COVID 19 (56.7%). **Conclusion**: Unimmunisation, malnutrition and low socioeconomic status were found to be associated with measles. Higher incidence of measles in children who were not adequately immunised or unimmunised because of COVID 19 pandemic points towards an urgent need to boost immunization coverage for an efficient control of measles.

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## INTRODUCTION

Measles, also called rubeola, is an acute viral infectious disease characterised by fever and rash. Measles is highly contagious but preventable by an available safe and effective vaccine. Measles continues to remain an important cause of mortality and morbidity worldwide, especially in the African and Southeast Asian regions [1]. About 20 million people per year are affected by measles, primarily in the developing areas of Africa and Asia [2]. In 2018, according to the World Health Organisation (WHO), measles accounted for more than 140,000 deaths globally, largely in children less than five years of age [3].

Measles though highly contagious, is a vaccine-preventable disease. Availability of an effective vaccine and much-emphasised vaccination programs have led to a significant reduction in the global measles burden. A community vaccination coverage between 90 to 96% is needed to establish herd immunity to eliminate measles [4]. A target of 95% vaccination with two doses of measles containing vaccine is recommended by the WHO for all countries [5,6].

However the last few years have seen a surge in the cases of measles worldwide and despite robust vaccination program and continued campaigning, the disease seems to be re-emerging [3]. According to the Centre for Disease Control and Prevention, United States (US), from April to September 2022, globally the largest numbers of measles cases were recorded in India [7]. There were 12,773 cases of measles in India in 2022 with at least 40 fatalities. In India, largest number of cases ie3075 cases and 13 deaths were



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recorded in Maharashtra alone. This was followed by 2683 cases in Jharkhand and 1650 cases in Gujarat [8]. This was largely attributed to missed scheduled vaccinations because of the novel corona virus disease 2019 (COVID-19) lockdowns which led to a large-scale disruption of the health care system and reduced vaccination coverage in 2020 [9].

As per National Immunisation Schedule, 2 doses of the measles containing vaccine were to be administered at 9 months and 16-24 months of age in all children. However, only 56% of Indian newborns received both the doses, between 2019 and 2021 while 2.6 million infants were found to miss the first dose. Other reasons like overcrowded neighbourhoods and unhygienic living conditions have also been postulated as contributing factors to re-emergence of this highly contagious disease [8].

This study was planned to study the clinico-demographic profile of patients confirmed to have measles in a tertiary care hospital and to observe the factors associated with the disease.

## MATERIALS AND METHODS

An observational prospective study was carried out on the children admitted to paediatrics ward at Shri Maharaja Gulab Singh Hospital (SMGS), Government Medical College, Jammu, India. This study was carried out from January 2023 to May 2023 after obtaining ethical clearance from the Institutional Ethics Committee (no. IEC/GMCJ/2023/1420).

A total of 5872 pediatric patients were admitted during the study period out of which 159 patients were suspected to have measles based on clinical findings of fever with rash and coryza. Blood samples were sent for confirmation of measles by detection of measles-specific IgM antibody in serum by Elisa. Out of 159 suspected cases, 79 patients were confirmed to have measles. All these confirmed cases were included in the study after taking consent from their parents.

Inclusion criteria: All Patients in the age group ≤ 18 years admitted with history of fever with rash with laboratory confirmed measles (n=79)were included in the study after obtaining consent.

Exclusion criteria: Suspected cases of measles without laboratory evidence of measles and children of parents who refused to give consent to participate in the study (n=80) were excluded from the study.

Detailed history was taken which included onset of fever & rash and other associated signs and symptoms, age, gender, residence, vaccination status and nutritional history. The social economic status of these children was determined using modified Kuppuswamy scale [10]. The immunization status of children was assessed using the immunization cards available with the children. In rare cases, where immunization card was not available, the immunization status was assessed by detailed questioning of the respondent. The nutritional status of the child was assessed using Indian Academy of Paediatrics (IAP) classification with grades of I, II, III and IV malnutrition with specific cut off points. The data was analyzed using Epiinfo version 7.0 for windows and descriptive statistics were presented using percentages.

## RESULTS

During the study from January 2023 to May 2023,it was observed that a total of 5872 pediatric patients were admitted , out of which 159 cases were suspected to have measles. On confirmatory testing, 79 out of these 159 suspected cases were confirmed to have measles reporting a prevalence of 1.34%.

Between January to May 2023, maximum cases were reported during the month of March (36.7%) followed by April (29.4%). [Table-1]

The most common age group affected was ≤5years in which 42 (53.1%) patients were reported followed by 5-12 years (30.3%). 13 out of 79 patients (16.4%) were reported from 12-18 years age group. Male children were found to be more affected than female children in all age groups [Table- 2].

During the study it was found that maximum numbers of measles cases were reported in lower middle (30.3%) and lower (39.2%) socioeconomic class households [Table-3].

Majority of the affected children were found to be malnourished with 37.6% patients having grade III malnutrition [Table-4].

Out of total cases, majority of the patients were unimmunised (60.7%) against measles while 24.2% cases were partiallly immunised. 15.1% cases were found to be completely immunised against measles [Table-5]. The most common reason cited for not vaccinating the child was lockdown due to COVID 19 (56.7%) [Table -6].

**Table 1: Monthwise distribution of cases.**

| Month | No of cases |
|---|---|
| January | 6 (7.6%) |
| February | 12 (14.7%) |
| March | 29 (36.7%) |
| April | 23 (29.4%) |
| May | 9 (11.4%) |

**Table 2: Age and sex distribution in the study group.**

| Age group | Males (n=43) | Females (n=36) | Total (n=79) |
|---|---|---|---|
| ≤5years | 23 | 19 | 42 (53.1%) |



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| | | | |
|---|---|---|---|
| 5-12 years | 13 | 11 | 24 (30.3%) |
| 12-18 years | 7 | 6 | 13 (16.4%) |

**Table 3: Distribution of cases according to socioeconomic status.**

| Socioeconomic Status | No of cases |
|---|---|
| Upper class | 3 (3.7%) |
| Upper middle class | 7 (8.8%) |
| Middle class | 14 (17.7%) |
| Lower middle class | 24 (30.3%) |
| Lower class | 31 (39.2%) |

**Table 4: Distribution of cases according to grade of malnutrition.**

| Grade of malnutrition | No of cases |
|---|---|
| No malnutrition | 6 (7.4%) |
| Grade 1 | 21 (26.5%) |
| Grade 2 | 11 (14.2%) |
| Grade 3 | 30 (37.6%) |
| Grade 4 | 11 (14.3%) |

**Table 5: Distribution of cases according to immunisation status.**

| Immunisation status | No of cases |
|---|---|
| Completely immunised | 12 (15.1%) |
| Partially immunised | 19 (24.2%) |
| Unimmunised | 48 (60.7%) |

**Table 6: Reasons cited for not vaccinating the child against measles.**

| Reason | No of cases |
|---|---|
| No specific reason | 8 (11.9%) |
| COVID 19 /lockdown | 38 (56.7%) |
| Forgot to vaccinate | 9 (13.4%) |
| Away from home | 12 (17.9%) |

## DISCUSSION

Measles is a highly infectious disease characterised by fever with rash. Although easily preventable by use of an effective vaccine, it has seen a recent surge in various parts of our country. Surprisingly outbreaks were reported even in those areas where measles was trending almost towards elimination [11].This study was conducted to study the clinico-demographic profile of patients admitted with measles.

In our study, a prevalence rate of 1.34% was reported . During the study period between January to May 2023, March saw maximum number of cases ie 36.7% while April reported 29.4% of the cases. Similarly, in a study conducted in South Gujarat, India, by Mehta KP et al, majority of the cases (81%) occurred during the postwinter season of March and April [3].

In our study, the most common age group affected was ≤5years in which 42 (53.1%) patients were reported. This was followed by 6-12 years (30.3%) and 12-18 years age group (16.4%). In a study by Patel SV et al conducted in Ahmedabad,India, an age predeliction for children between 9 months and 5 years (63.92%) was seen [7]. Similar results were shown in study by Bendale et al., which showed 56.7% of children affected in 1–5 years age-group [12] Also Babita et al. in their study in Bihar reported similar findings in Bihar [13].

In all the age groups that were studied in our study a slight male preponderance was seen which was similar to findings reported by Mehta KP et al [3]. However, Patel SV et al found that female children (50.68%) were marginally more affected than male children in their study [7].

During the study it was found that lower middle (30.3%) and lower (39.2%) socioeconomic class households reported majority of the cases of measles which was also seen by Patel SV et al in their study in Ahemedabad. They also reported highest attack rate of measles in urban slums of Ahemdabad [7]. Bendale AG et al., from Maharashtra, reported 52% of cases from lower socioeconomic status [12]. This higher incidence of measles in lower socioeconomic households could be attributed to overcrowding and poor nutrition which have been implicated as risk factors for the disease.

Majority of the affected children in our study were malnourished. Grade III malnutrition was found in 37.6% of the total patients while grade 1 malnutrition was seen in 26.5% of the total cases. Only 7.4% of the total cases were not malnourished. Patel SV et al also showed that majority of the patients in their study had either moderate acute malnutrition or severe acute malnutrition [7]. Bendale et al also came out with similar results in their study [12]. These results are in



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line with the established risk factor of malnutrition for occurrence of measles.

With regards to the vaccination status, in our study it was found that majority of the patients were unimmunised (60.7%) against measles while 24.2% cases were partially immunised. Only 15.1% cases were found to be completely immunised against measles. In the study by Patel SV et al, 78% of the total cases of measles occurred in children who were unvaccinated or had received a single dose of measles-containing vaccine, or had no documented evidence of vaccination while only 21% of cases had definitely taken two doses of vaccine [7]. Thus, it was concluded that by increasing the immunization coverage, there can be a significant reduction in number of measles cases. In the study by Mehta KP et al it was found that half of the study participants were vaccinated against measles while the other half was unvaccinated against measles [3].

On probing about the reason for not vaccinating the child, the most common reason cited was lockdown due to COVID 19 (56.7%). Similar reason was reported by Patel SV et al in their study where 67% of the respondents stated COVID-19 pandemic as the major reason for not taking vaccine [7]. The National Family Health Survey also documented that the immunization coverage in India suffered immensely due to COVID 19 pandemic [14]. This has led to a major setback to immunization practices and its widespread coverage which was crucial in controlling the highly infectious illness like measles in a developing country like India.

COVID 19 pandemic disrupted health care systems all over the world. Higher incidence of measles in children who were not adequately immunised or unimmunised because of COVID 19 pandemic points towards an urgent need to boost immunization coverage for an efficient control of vaccine preventable disease like measles.

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