Journal of Communicable Diseases
Volume 56, Issue 3 - 2024, Pg. No. 5-9
Peer Reviewed & Open Access Journal

Research Article

A Record-Based Study on Epidemiological and Clinical Characteristics of Measles Patients Admitted in a Tertiary Care Hospital of Ahmedabad City, Gujarat

Arpit Prajapati[1], Sahil Kumari Chaudhari[2], Himadri Patel[3], Margi Sheth[4]

[1]PhD Student, Gujarat University, Professor, Community Medicine Department, GCS Medical College, Hospital and Research Centre Ahmedabad, Gujarat, India.
[2,3]Second year Resident Doctor,[4]Assistant Professor, Community Medicine Department, GCS Medical College, Hospital and Research Centre Ahmedabad, Gujarat, India.
DOI: https://doi.org/10.24321/0019.5138.202442

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Corresponding Author:
Arpit Prajapati, Community Medicine Department, GCS Medical College, Hospital and Research Centre Ahmedabad, Gujarat, India.
E-mail Id:
doc.arpitprajapati@gmail.com
Orcid Id:
https://orcid.org/0000-0002-4944-2876
How to cite this article:
Prajapati A, Chaudhari S K, Patel H, Sheth M. A Record-Based Study on Epidemiological and Clinical Characteristics of Measles Patients Admitted in a Tertiary Care Hospital of Ahmedabad City, Gujarat. J Commun Dis. 2024;56(3):5-9.

Date of Submission: 2024-05-28
Date of Acceptance: 2024-09-20

A B S T R A C T

Introduction: Measles is an acute and highly infectious disease of childhood, transmitted by droplets from the nose, mouth or throat. In India, doses of measles-containing vaccine are postponed or missed due to a lack of awareness among people to utilise immunisation services, rural residence, COVID-19 pandemic, home birth, low birth weight for newborns, early age at first birth, and lower maternal education. This delayed or missed vaccination increases the risk of bigger outbreaks around the world.

Objective: To determine the epidemiological and clinical characteristics of patients with measles.

Material and Method: A record-based study on all clinically or laboratory-confirmed patients admitted in the years 2019 to 2023 was conducted at a tertiary care hospital in Ahmedabad city. Data collection was done using a pre-tested and pre-designed questionnaire to include all the recorded cases diagnosed with measles.

Results: Among a total of 150 participants, there were 52.7% males and 47.3% females. The mean age of patients was 37 months ± 32 SD. Around 61.3% of cases were in the age group of 1–5 years. In 96.6% of patients, fever and rash were the most common symptoms, followed by coryza in 88% and conjunctivitis in 29.3% of the patients. An increase in the number of cases was observed during the winter months of 2022–23, while there were fewer cases admitted during the COVID-19 pandemic period. About 62.7% of patients who were admitted had not taken any dose of measles vaccine.

Conclusion: There were more cases observed in the winter months. The important epidemiological factors found were age group (1–5 years) and unvaccinated status of the children. There is an increasing need for awareness about measles immunisation in order to reduce morbidity among children.

Keywords: Childhood, Fever, Immunisation, Measles, Rash

Introduction

Measles is an acute and highly infectious disease of childhood, transmitted by droplets from the nose, mouth or throat. It is caused by paramyxovirus, which is a single-stranded, negative sense, enveloped RNA virus of the genus Morbillivirus belonging to the family Paramyxoviridae.[1] Humans are natural hosts of this virus. Measles is characterised by three stages i.e. Prodromal stage, eruptive stage and post-measles stage.[1] The prodromal stage is characterised by fever and upper respiratory tract symptoms like cough and cold (coryza). Koplik spots which are pathognomonic of measles appear on the buccal mucosa opposite to the first and second molars. The eruptive phase is characterised by a typical, dusky red macular or maculopapular rash. The rash starts from behind the ears and spreads to the face and neck and extends towards the lower extremities. In the post-measles stage, there will be a loss of weight and increased susceptibility to bacterial and viral infections.[1] In India, outbreaks of the disease are most common in the winter and early spring (January to April). Complication rates, from measles are highest in children less than 5 years of age. The most common complications of measles are otitis media, pneumonia, and acute diarrhoeal disease. Measles vaccination constitutes a protection against complications by preventing natural measles from occurring.[2] Measles vaccination averted 56 million deaths between 2000 and 2021. Even though a safe and cost-effective vaccine is available, in 2021, there were an estimated 128,000 measles deaths globally, mostly among unvaccinated or under-vaccinated children under the age of 5 years. In 2022, about 83% of the world's children received one dose of measles vaccine by their first birthday through routine health services – the lowest since 2008.[3] According to the Centres for Disease Control and Prevention (CDC) around 136000 people mostly children died of measles in 2022. As per the provisional data reported to the World Health Organization as of early February 2024, India stood fourth among the top countries with measles outbreaks. The country reported 12,301 cases between July and December 2023.[4] The MRSF 2021–2030 aims to provide high-level guidance for developing regional and national strategies and operational plans. It was developed through a broad consultative process that generated feedback on achievements and major shortfalls in measles and rubella control over the past decade and defined strategic pivots and focus areas for the next decade, The Measles and Rubella Strategic Framework 2021–2030 envisions "a world free from measles and rubella." Its goal for 2021–2030 is to "achieve and sustain the regional measles and rubella elimination goals.[5] In India, doses of measles-containing vaccine are postponed or missed due to a lack of awareness among people to utilise immunisation services, rural residence, the COVID-19 pandemic, low birth weight for newborns, and early age at first birth. These delayed or missed vaccinations increase the risk of bigger outbreaks around the world.[2]

Material and Methodology

A record-based study was conducted among laboratory or clinically confirmed measles patients in the tertiary care hospital for a duration of 4 months. The sample size included all clinical positive or laboratory-confirmed cases of measles admitted in a tertiary care hospital in Ahmedabad, Gujarat in a period of 2019 to 2023 (a span of 5 years). Records of a total estimated 150 measles patients were analysed for clinical and epidemiological characteristics. Institutional ethical approval and hospital authority approval were taken for the study. Current study was based on records so the permission from authorities taken for the record review.

Criteria for case description for clinical and laboratory-confirmed cases were made as per World Health Organization (WHO) guidelines.

Case Definition as per WHO Guidelines.[6]

- **Clinical case definition:** Any person in whom a clinician suspects measles infection, or any person with fever and maculopapular rash (i.e. non-vesicular) and cough, coryza (i.e. runny nose) or conjunctivitis (i.e. red eyes)
- **Clinically confirmed:** A case that meets the clinical case definition and for which no adequate blood specimen was taken
- **Laboratory confirmed:** A suspected case of measles who has been confirmed positive by testing in a proficient laboratory, and vaccine-associated illness has been ruled out

All patients who satisfied the clinical definition of measles or laboratory-confirmed cases as per WHO guidelines were included in the study.

The study duration was for a period of 4 months. A pre-tested and pre-designed proforma was used to obtain information from medical records. The data was analysed with respect to demographic details, clinical features, and complications using MS Excel and Epi Info™ Version 7.2.

Results

A total of 150 cases of measles were reported from 2019 to 2023 at a tertiary care hospital in Ahmedabad city, Gujarat.

Table 1 showed that out of 150 participants, 52.7% were male and 47.3% were female. The mean age of the patients was 37 ± 32 months. The majority of participants (61.3%) were aged one to five years. Around 80% of participants were from the urban area and 20% of cases were from rural areas. A total of 3.3% of cases were found in the age group of greater than 10 years. The disease burden was found to show a declining trend as age increased.

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202442

Table 2 shows the clinical characteristics of study participants. The majority of them had fever, maculopapular rash, and coryza. Koplik spots were observed in 10.6% of participants.

Table 3 shows the relationship between age group and vaccination status. Out of all individuals, only 37% received the immunisation. A chi-square test was used to determine association (chi-square value: 6.613).

Figure 1 depicts the annual cases of measles hospitalised at a tertiary care hospital from the year 2019 to 2023. In 2022–23, measles cases were high throughout the winter months. In comparison to previous years, cases of measles were high in 2022, whereas cases of measles were low in 2019–20, possibly because of the COVID-19 pandemic.

Figure 2 shows the difference between expected weight and actual weight. Out of the total participants, 33% of participants were 10–20% underweight compared to their expected weight.

As shown in Figure 3, complications were recorded in 25% of the total measles cases, with pneumonia (10%) being the most common complication, followed by diarrhoea (7.3%) and otitis media (7.3%).

Table 1.Socio-Demographic Details of Measles Cases

Gender	Frequency	Percentage
Male	79	52.7
Female	71	47.3
Residence	-	-
Urban	120	80.0
Rural	30	20.0
Age group (years)	-	-
< 1	21	22.7
1–5	99	61.3
6–10	22	12.7
11–15	08	3.3

Table 2.Distribution of Measles Cases According to Clinical Feature

Clinical Feature	Frequency	Percentage
Fever macular/ maculopapular rash	145	96.6
Coryza	132	88.0
Conjunctivitis	44	29.3
Koplik spots	16	10.6

Table 3.Relationship Between Age Group and Vaccination Status

Age Group (Years)	Vaccine Taken n (%)	Vaccine Not Taken n (%)	p Value
< 1	04 (19.0)	17 (81.0)	0.085
1–5	44 (44.4)	55 (55.6)	
6–10	06 (27.2)	16 (72.8)	
11–15	02 (25.0)	06 (75.0)	

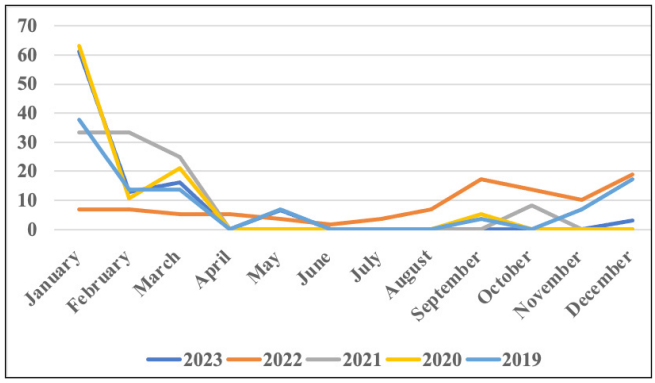

Figure 1.Annual Distribution of Measles Cases

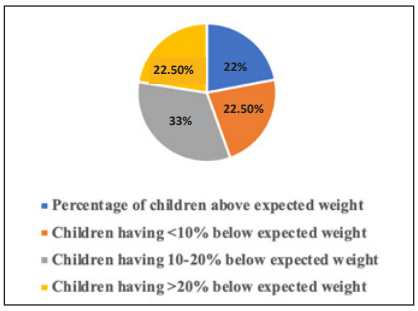

Figure 2.Percentage Difference Between Actual Weight and Expected Weight

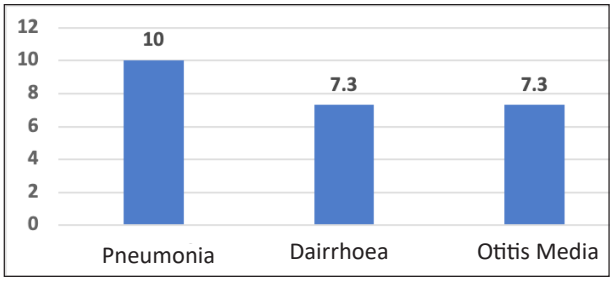

Figure 3.Complications Observed among Measles Cases

Discussion

In the present study, the disease was found to be slightly more prevalent among males (52.7%) when compared to females (47.3%) similar finding was observed in the study conducted by Panda et al. where the disease prevalence was higher among males.[7]

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202442

In this study, the most common clinical presentation among study subjects was fever with rash (96.6%) and coryza (88%). This study finding was similar to a study conducted by Walekhwa et al.[8]

It was observed that measles was highest in the 1–5 years age group followed by less than one-year-old children. This could be because the first dose of the measles vaccine is often administered between the ages of nine and sixteen months. Hence, the children are not protected from measles till then.

In this study, the maximum number of reported cases was seen in the age range of 1 to 5 years. Similar findings were observed in a study conducted by Michael et al. in Tanzania. Additionally, in our analysis, the highest number of cases were recorded in 2022, similar findings were observed in another study.[9]

Possible reasons for an increase in incidence in 2022 include delayed or missing immunisation during the COVID-19 pandemic, Although immunisation performance regained pre-COVID-19 pandemic performance levels in 2022, The high immunity gap generated by the pandemic resulted in increased measles transmission. Among the factors contributing to low vaccination rates was the COVID-19 pandemic that negatively impacted immunisation activities as a result of the cancellation of mobile and outreach services, hence suboptimal surveillance performance. Similar observations have been reported in other countries, whereby the COVID-19 pandemic has been linked with low vaccination coverage.[10]

In this study, only 37% of participants were vaccinated against the measles vaccine. This finding was similar to a study conducted by Idé et al., where 28% of participants were vaccinated against measles.[11]

In the present study, the most common complication was pneumonia (10%) followed by diarrhoea (7.3%) and otitis media (7.3%). The present study findings were similar to studies conducted by Indwar et al. and Mehta et al.[12,13]

In the current study, the majority of the cases were recorded in the late winter months of December and January, and the early spring months. This corroborates with the findings of another study done in Gujarat which observed the same seasonal variation pattern with measles.[13] This could be due to various climate conditions which prevail in these months It has been shown in studies that the measles virus becomes inactive after half an hour when exposed to sun, so, the transmission of measles is infrequent in summer months. Also, it survives best in the low humidity weather which is common in late winter and early spring months.[14]

Limitations of Study

There were a few limitations in this study. Only children admitted for measles were included, therefore those treated as outpatients were excluded during the study period. The small sample size may make it difficult to generalise results to the larger population. The study was conducted at a single centre which may limit the generalisability of the finding to other populations.

Conclusion

Measles is re-emerging as an infectious disease in children and hence the prevalence has been increasing worldwide. There was a surge of measles cases in 2022–2023 during the winter months. The important epidemiological factors found were age group (1–5 years) and unvaccinated status of the children. There is an increasing need for awareness about measles immunisation in order to reduce morbidity among children.

Source of Funding: None

Conflict of Interest: None

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ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202442