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Case Series

Mumps outbreak in an urban community of Western Maharashtra: a case series

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ABSTRACT

A mumps outbreak was reported in a residential colony in Pune, Maharashtra, starting in September 2023, with the index case being a 12-year-old girl from school A, who presented with fever and parotitis and had no history of measles, mumps, and rubella (MMR) vaccination. A total of 10 cases were identified, including one serologically confirmed case and nine epidemiologically linked cases, traced to two schools (A and B), with likely transmission occurring in communal areas like playgrounds. Only 30% of the cases had documented MMR vaccination, highlighting gaps in immunization coverage. Public health measures, including isolating symptomatic individuals and educating residents on mumps transmission, prevention, and symptoms, were implemented to control the outbreak. This case series underscores the resurgence of mumps in a partially vaccinated urban community, emphasizing the need for improved MMR vaccination coverage and inclusion of the MMR vaccine in India's Universal Immunization Program to prevent future outbreaks.

Keywords: Mumps outbreak, Urban community, Measles, Mumps, Rubella

INTRODUCTION

Mumps virus is a single-stranded ribonucleic acid (RNA) paramyxovirus with a long incubation period of 16 to 18 days. During viremia, the virus spreads to multiple tissues, including the meninges, salivary glands, pancreas, testis, and ovaries. Inflammation in infected tissues leads to characteristic symptoms of parotitis and may result in other complications such as orchitis and aseptic meningitis.[1]

Mumps has a high global burden of 100-1000 cases per 100,000 populations in countries without routine mumps vaccination, with epidemic peaks occurring every 2-5 years.[2] Several studies have found that nearly 60% of children in India are susceptible to the mumps virus.[3] Serological susceptibility rates of around 80% and 70% have been noted in children aged 9-10 months and 15-18 months, respectively.[3]

According to the Global Health Observatory (GHO) data repository, India reported 764 mumps cases between 2021-2022, indicating a considerable burden of mumps, particularly among children.[4] Additionally, the Integrated Disease Surveillance Program (IDSP) recorded 63 outbreaks across various states in the country between 2017 and 2021. Although the disease is not often perceived as a significant public health concern due to limited published data on the community burden of mumps, frequent outbreaks may result in other complications like acute encephalitis syndrome (AES) and acute febrile encephalopathy.[5]

A mumps outbreak occurred in a residential colony in Pune, Maharashtra, in September 2023. The index case was a 12-year-old girl who presented with fever and parotitis on 01 September 2023, whose vaccination status with the measles, mumps, and rubella (MMR) vaccine could not be established because she had no vaccination card and could not recall receiving the vaccine.

CASE SERIES

Case 1: Index case

Demographics

12-year-old female, resident of RMC colony, attending school A.

Presentation

The case was presented on 1st September 2023 with fever and unilateral parotitis.

Vaccination status

No documented history of MMR vaccination.

Diagnosis

Clinically diagnosed as mumps based on World Health Organization (WHO) criteria.

Outcome

Isolated at home, recovered without complications.

Cases 2–10: Epidemiologically linked cases

Demographics

Nine additional cases (ages 5–14 years) from the same residential colony, attending schools A and B.

Presentation

All presented with fever and parotitis (unilateral or bilateral) within the incubation period of the index case.

Vaccination status

Only three cases had documented MMR vaccination.

Diagnosis

Clinically diagnosed as mumps. One case (case 10) was serologically confirmed with high IgG and IgM titres.

Outcome

All cases were isolated, and no severe complications were reported.

Case definition

World Health Organization (WHO) criteria were used to define clinical, serologically confirmed, and epidemiologically confirmed cases.

Line listing

All cases were listed, and epidemiological case sheets were completed.

Serological testing

Case 10 underwent serological testing, confirming active mumps infection.

Contact tracing

Cases were traced back to two schools (A and B). A communal playground was identified as a potential transmission hotspot.

Control measures

Isolation of symptomatic cases for five days; education on mumps transmission, prevention, and symptoms; notification of schools to isolate symptomatic children; and active surveillance for new cases.

Outbreak description

Ten cases of mumps were reported between September and October 2023. The epidemic curve showed sporadic distribution within the incubation period of contact cases.

Spot map

Cases were clustered in the residential colony, with the playground identified as a common interaction area.

Vaccination coverage

Only 30% of cases had documented MMR vaccination, highlighting gaps in immunization.

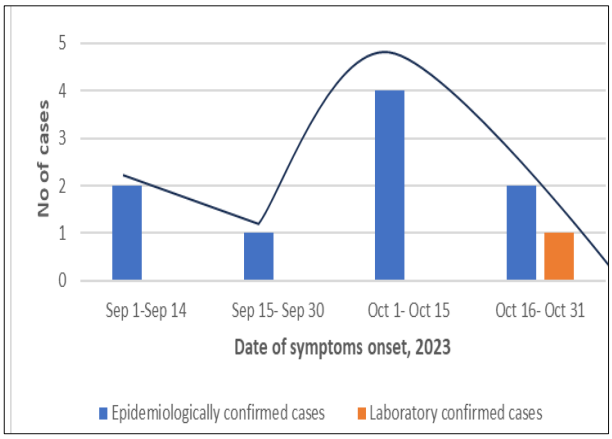

Figure 1: Mumps cases by date of symptom onset in residential colony, Pune 2023.

Cases were reported from 01 September 2023 onwards; 03 cases were reported between 01 September 2023 and 30

September 2023. Following which 07 more cases were reported between 01 October 2023 and 31 October 2023. Distribution of cases was sporadic, and all the cases were found distributed within the range of incubation period of the contact case of mumps.

Spot map shows the residential colony where the outbreak was detected with cases representing houses for the months of September and October. The playground which is depicted in the spot map was the focus area of attention as all the contact tracing led to this as the communal area of interaction.

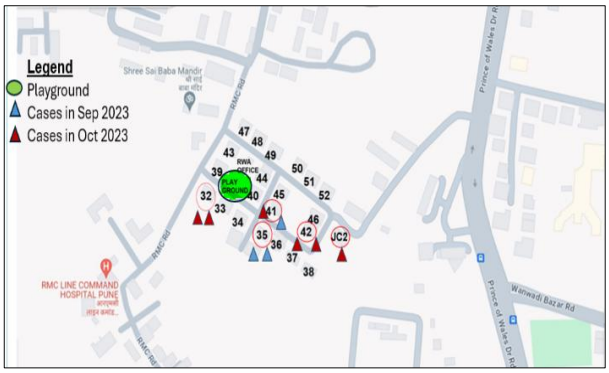

Figure 2: Spot map of residential colony, Pune 2023.

Establish existence of a outbreak	The first case presented with fever and parotitis to OPD on 01 Sep 2023
Verification of diagnosis	03 clinically diagnosed cases of mumps are registered by 17 Sept 23
Define and identify cases	Cases were identified and investigated as they happened
Descriptive epidemiology	There were 06 clinical diagnosed cases who had mumps that were discovered from the same colony; investigation of outbreak was carried out, cases were traced back to schools 'A' & 'B'
Determine who is at risk	School going children with median age of 9 years and who are unvaccinated for MMR vaccine were at risk
Additional studies to develop hypothesis	An active case was reported from school A on 29 October 2023, lab investigation mumps virus antibodies panel was carried out which came positive for IgG and IgM in high titres
Evaluate hypothesis	All cases were interviewed, clinical diagnosis and epidemiological case sheets correlated
Reconsider hypothesis	On evaluation an outbreak of mumps was confirmed
Implement control measures	Residents of residential colony were asked to take isolation measures on suspicion of mumps illness and local playground and residence were sanitised
Communicate the findings	Findings of outbreak investigation was communicated to school authorities for neccessary actions to be undertaken

Figure 3: Chronological evolution of mumps outbreak investigation, Pune 2023.

DISCUSSION

We reported 10 cases of mumps during an outbreak occurring in a residential colony of western Maharashtra. The vaccination status with the measles-rubella (MR) vaccine was documented in only 3 out of 10 cases. Apart from mumps, this also highlights the possible lack of routine immunization coverage, which needs to be strengthened. During the same period, multiple outbreaks were occurring across the country and in Maharashtra.

The present outbreak seems to be a part of the ongoing transmission across Maharashtra. The rapid increase of cases in the residential colony indicates the transmission potential of the virus. This is possibly due to a secondary attack rate of 86% and the interaction of children while playing in common areas. The implementation of control

measures, including isolation at the first appearance of signs and symptoms, reduced the number of secondary cases and helped to control the present outbreak.

In India, the resurgence of mumps, primarily affecting a population largely composed of naive children due to the absence of the mumps component in the Universal Immunization Program (UIP), can be attributed to several factors. Historically, mumps was an epidemic disease occurring in cycles of 4-5 years prior to the introduction of vaccination. A meta-analysis evaluating the immunogenicity and waning rate of the measles, mumps, and rubella components of MMR vaccines revealed significant annual waning of immunity for the mumps component among vaccinated individuals.[6] This decline in immunity may stem from differences between circulating and vaccine strains.[7] Moreover, factors like overcrowding, inadequate sanitation, and limited access to healthcare exacerbate viral spread.

Both WHO and the Indian Academy of Paediatrics endorse the MMR vaccine for mumps prevention, emphasizing its efficacy and safety, even when administered as early as 9 months.[8] Studies suggest comparable seroconversion rates between doses given at 9 and 12-15 months, minimizing interference from maternal antibodies.[9] Moreover, the response to the mumps strain appears consistent across different ages. Lowering the age of the first dose could enhance accessibility, suggesting administration before 12 months as a viable strategy. Cost-effectiveness analyses from industrialized nations underscore the economic benefits of mumps prevention, including reduced absenteeism and prevention of long-term complications.[10]

Addressing the issue of the inclusion of the MMR vaccine in India's UIP requires further Health Technology Assessment and evaluation because of the higher cost concerns with the MMR vaccine. For example, 'TRESIVAC PFS,' manufactured by Serum Institute of India, is priced at 508 rupees, whereas MR vaccines are priced at 60–80 rupees. Replacing the MR vaccine presents a promising solution supported by comprehensive studies.[11] Longitudinal studies on indigenously produced MMR vaccines demonstrate sustained effectiveness against mumps, even after 6 years, with the need for two doses to ensure adequate antibody levels.[12] In outbreak scenarios, a third dose has proven effective, especially for children with longer intervals since vaccination. While challenges like limited seropositivity necessitate further investigation, the overall evidence favours MMR vaccine inclusion to reduce the mumps burden.[13]

CONCLUSION

This case series highlights the resurgence of mumps in a partially vaccinated urban community in Western Maharashtra, underscoring the need for strengthening routine immunization programs to include the MMR vaccine, enhancing public awareness about mumps transmission and prevention, and implementing timely isolation and surveillance measures during outbreaks. Additionally, it emphasizes the importance of conducting further research on vaccine efficacy and cost-effectiveness to support informed policy decisions. The inclusion of the MMR vaccine in India's UIP is crucial to reducing the burden of mumps and preventing future outbreaks.

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