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DESCRIPTIVE ANALYSIS OF MUMPS CASES IN TAMIL NADU, JANUARY – MAY 2024 (BASED ON IHIP DATA)

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Abstract

INTRODUCTION : Mumps, a viral infection affecting children, leads to parotid gland swelling and is moderately to highly contagious. Complications include aseptic meningitis, encephalitis, orchitis, oophoritis, deafness, and pancreatitis. This study examines mumps cases in Tamil Nadu from January to May 2024 using data from the Integrated Health Information Platform (IHIP), focusing on district incidence, rural-urban differences, and age-specific attack rates.

METHODS : This cross-sectional study utilized Integrated Disease Surveillance Programme data from January to May 2024. Analyzed variables included gender, age, urban/rural classification, district, onset date, and geographical coordinates. Statistical analyses were performed using Epi Info, Open Epi, and QGIS to assess mumps trends, incubation period distribution, district-wise attack rates, and rural-urban differences.

RESULTS : From January 1 to May 20, 2024, 1,726 mumps cases were reported in Tamil Nadu. Cases increased sharply from January, peaked in April, and declined significantly in May, with similar patterns in rural and urban areas. Children aged 0-6 years had the highest attack rate, being about 9 times more likely to contract mumps than older individuals (95% CI: 8.196-9.902, $p < 0.05$). Males showed a significantly higher risk of infection [OR 1.176 (95% CI: 1.069-1.292, $p < 0.05$)]. Attack rates varied significantly across districts, with higher rates in Chennai, Kanyakumari, Kallakurichi, Tiruchirappalli, and Perambalur.

CONCLUSION : The high attack rate among children aged 0-6 years highlights the need to address mumps-related complications in this age group. Uneven case distribution across districts indicates potential hotspots, necessitating targeted public health interventions. The higher incidence among young children and males underscores the need to address vaccination gaps and improve public health awareness to mitigate severe outcomes.

KEYWORDS : Mumps, Age-specific attack rates, Rural and urban populations, District-wise analysis

INTRODUCTION

Mumps is a common viral infection in children, characterized primarily by swelling of the parotid gland (Parotitis). The mumps virus, which causes mumps infection, is an enveloped RNA virus classified under the genus Rubulavirus in the Paramyxoviridae family. Under electron microscopy, the virion appears as a particle with a shape that can be spherical or pleomorphic and has a diameter of approximately 200 nm . Virion membrane fusion appears to be linked to neurovirulence. The lipid membrane makes the virus vulnerable to ether and alcohol-based disinfectants. The virus remains stable at 4°C for several days. Complications of mumps include aseptic meningitis, encephalitis, orchitis in adult men, oophoritis in adult women, deafness, and pancreatitis.

Mumps is a moderately to highly contagious infection that is restricted to human beings. Transmission of the virus is by direct contact, droplet spread, or contaminated fomites. The incubation period is about 15 to 24 days (median, 19 days) Infected patients become most contagious 1 to 2 days before onset of clinical symptoms and continue so for several days afterwards. Mumps virus can, however, be isolated from saliva as early as 7 days before and until 9 days after onset of clinical symptoms.

Mumps is acquired through inoculation and replication of the virus in the nasal or upper-respiratory-tract mucosa. Infection can remain localised to the respiratory tract. Transient plasma viraemia is probably frequent, occurs late in the incubation period, and leads to viral spread into organs. Infected mononuclear cells can also contribute to systemic viral spread. The parotids are the most commonly affected organs, but parotitis is not a primary or necessary step for mumps infection. The central nervous system (CNS), urinary tract, and genital organs can also be affected. Infection of the kidneys leads to viruria, which is present in most patients and lasts for 10–14 days.

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This study aims to describe mumps cases reported across Tamil Nadu using data from the Integrated Health Information Platform (IHIP). The study will focus on the incidence of mumps in various districts, differences between rural and urban populations, and the age-specific attack rates.

METHODOLOGY

This is a cross-sectional study utilizes data collected from the Integrated Disease Surveillance Programme under Integrated Health Information portal (IHIP) covering the period from January 2024 to 20th May 2024. The data include reported provisional mumps cases from various districts in Tamil Nadu. The following variables from IHIP such as gender, age, urban local body, district, date of onset, longitude, latitude was used to analyze in this study. Official permission to conduct this study was obtained from Director of Public Health and Preventive Medicine (DPH &PM), Tamil Nadu. Based on the line listing data of mumps infections during the study period, analysis was carried out by Epi info software (version 7.2.5), Open epi along with QGIS software to determine trends in mumps cases, distribution by incubation period, district-wise attack rates, and differences between rural and urban populations and statistical analysis were performed to identify significant associations.

RESULTS

Trends in Mumps Cases:

From January to 20th May 2024, a total of 1726 mumps cases were reported in Tamil Nadu. The total number of mumps cases shows a sharp increase from January, peaking in April, followed by a significant decline in May. Both rural and urban areas follow a similar pattern, with cases rising from January to April and then decreasing in May. (Figure 1)

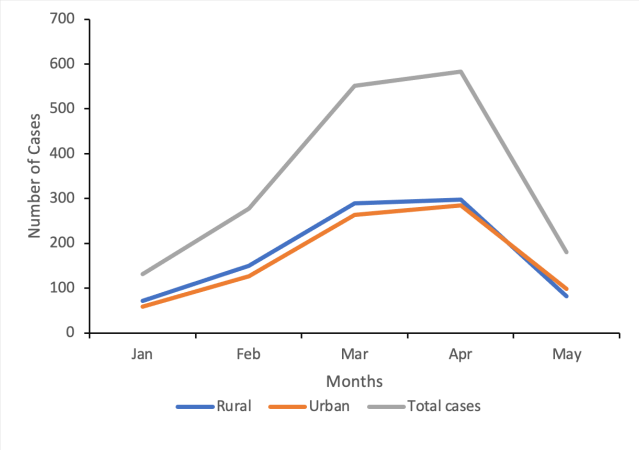


Figure 1: Trend of Mumps cases in rural and urban population in Tamil Nadu (Jan 2024 – Feb 2024) (N=1726)

Distribution by date of onset infection:

The Histogram (Figure 2) shows the distribution of mumps cases by the incubation period in Tamil Nadu from January 2024 to May 2024. There is a noticeable increase in the number of mumps cases from January and February 2024. The peak of the outbreak appears to be around mid-March 2024, with the highest number of cases reported on or around 18-03-2024. After the peak, there is a gradual decline in the number of cases through April and into May 2024. The highest bar, representing the peak, is approximately 120 cases. After the peak, the number of cases mostly ranges between 40 to 80 cases until the decline becomes more pronounced in May.

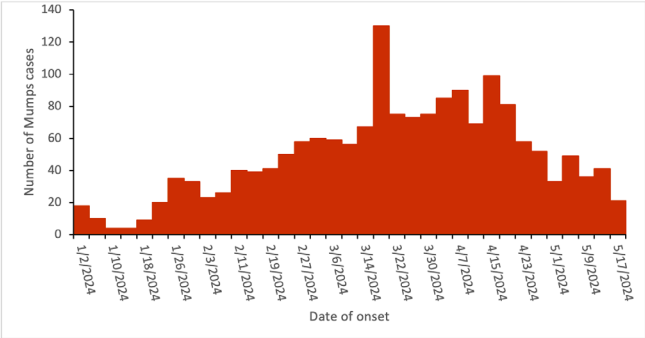


Figure 2: Distribution of Mumps cases by incubation period in Tamil Nadu (Jan 2024 – May 2024) (N = 1796)

District-Wise Attack Rates:

The attack rate, calculated in proportion to the population, varied significantly across districts as shown in Figures 3 and 4. Some districts, such as Chennai, Kanyakumari, Kallakurichi, Tiruchirappalli, and Perambalur, exhibited higher rates compared to others. In contrast, districts like Tirunelveli, Namakkal, Mayiladuthurai, Dindigul, Erode, and Thiruvarur showed lower attack rates. Notably, Dharmapuri and Nagapattinam did not report any mumps cases during the study period. This variation underscores the uneven distribution of mumps cases and identifies potential hotspots for outbreaks.

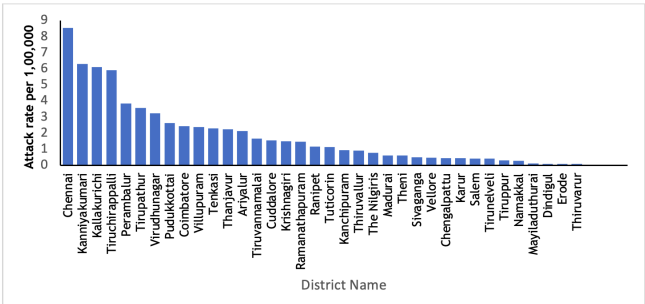


Figure 3: District wise Attack rate of Mumps cases in Tamil Nadu (Jan 2024 – May 2024) (N = 1726)

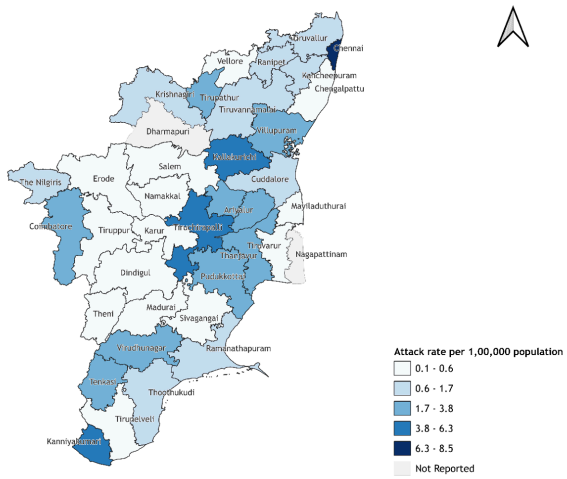
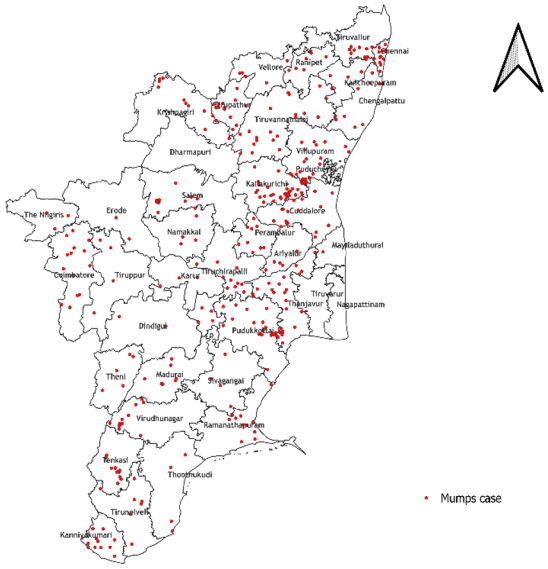


Figure 5: Spot map of Mumps cases reported in Tamil Nadu from Jan 2024 May 2024 (N = 1726)



The spot map (Figure 5) shows the distribution of mumps cases reported in Tamil Nadu from January to May 2024. Mumps cases are spread throughout the state of Tamil Nadu, affecting multiple districts. The red dots represent individual mumps cases. There are notable concentrations of cases in several districts, indicating potential clusters or outbreaks. Northern Tamil clusters are seen in the northern districts including Chennai, Kanchipuram, Tiruvallur, and Chengalpattu. Central Tamil Nadu Districts such as Vellore, Tiruvannamalai, and Villupuram also show a high number of cases and in southern Tamil Nadu Madurai and its surrounding areas such as Theni and Virudhunagar have visible clusters of mumps cases. This could be due to higher population density and increased person-to-person contact.

Age and Gender Specific Attack Rates:

The age group (0 – 6 years) shows the highest proportion of mumps cases and the attack rate was highest among children aged 0-6 years, followed by those aged 7-18 years. The odds ratio (OR) for mumps infection in children aged 0-6 years compared to older individuals in Tamil Nadu is 9.009. This means that children in this age group have about 9 times higher odds of contracting mumps than older individuals. The result is statistically significant, with a 95% confidence interval (CI) ranging from 8.196 to 9.902 and a p-value less than 0.05. The calculated Odd Ratio of 1.176 for males was statistically significant (95% CI: 1.069, 1.292, $p < 0.05$), suggesting a reliable association between being male and an increased risk of mumps infection. This association was statistically significant, suggesting that gender plays a role in susceptibility to mumps.

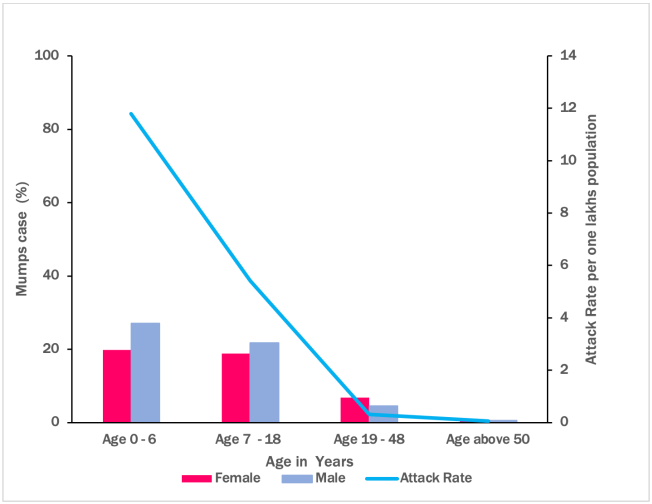


Figure 6: Gender and Age Group Distribution of Mumps Cases in Tamil Nadu (January - May 2024, N = 1726)

DISCUSSION

The high attack rate among children aged 0-6 years underscores the urgent need to address the risks of complications associated with mumps for this age group. Young children are particularly vulnerable to severe outcomes from mumps, including meningitis, encephalitis, orchitis (inflammation of the testicles), oophoritis (inflammation of the ovaries), and pancreatitis. The absence of immunization exacerbates these risks, leading to higher transmission rates and more severe health outcomes.

For children aged 7-18 years, while the attack rate is relatively lower compared to the 0-6 age group, they are still at significant risk for complications. Adolescents are particularly susceptible to orchitis, which can lead to sterility in post-pubertal males. Additionally, mumps in this age

group can result in hearing loss, which may have a lasting impact on educational and social development. A study conducted in Uttar Pradesh, India, by Kumar and Raj found a high incidence of mumps among children aged 0-6 years, mirroring the high attack rate observed in Tamil Nadu. This study also highlighted the risk of severe complications in this age group due to lack of immunization and indicated that males had a higher incidence of mumps than females, consistent with the gender-specific findings in Tamil Nadu, where males showed a higher odds ratio for contracting mumps.

Vaccination plays a crucial role in the control of mumps, particularly for the age groups 0-6 and 7-18 years. The Measles-Rubella (MR) vaccine, which is available in the Universal Immunization Programme (UIP) in India, provides partial protection.

However, the absence of the Mumps component in the UIP leaves a significant gap in the prevention strategy. Including the Mumps vaccine in the UIP could be highly beneficial, as evidenced by studies demonstrating the effectiveness of the MMR (Measles-Mumps-Rubella) vaccine in reducing mumps incidence and associated complications by Cohen et al., 2007 and by Dayan & Rubin, 2008). The MMR vaccine has been shown to significantly decrease the rate of mumps-related complications, such as orchitis, meningitis, and pancreatitis, thereby reducing the burden on healthcare systems and improving quality of life.

The rate of complications due to mumps is notably high, particularly among unimmunized populations. For instance, studies have shown that mumps can lead to complications in 10-20% of cases, with meningitis occurring in about 1-10% of mumps cases, and encephalitis occurring in less than 1% but with potentially severe consequences in the study by Hviid et al., 2008.

Orchitis affects approximately 15-30% of post-pubertal males with mumps, and it can lead to sterility in a small percentage of cases in the study done by Bitsko et al., 2016. Pancreatitis, although rarer, can also occur and lead to significant morbidity.

Timely treatment of mumps complications is essential to mitigate long-term health impacts. Ensuring prompt medical intervention, especially for severe outcomes such as encephalitis and orchitis, is crucial. Supportive care, including pain management and hydration, is often necessary, along with monitoring for secondary infections or complications as stated in the study by Plotkin, 2018. Public health efforts should focus on increasing immunization coverage, educating the public about the benefits of vaccination, and implementing strategies to ensure timely medical care for affected individuals.

CONCLUSION

This cross-sectional study of mumps cases in Tamil Nadu demonstrates the significant impact of mumps on public health, particularly in the absence of immunization. The data indicate a pressing need for targeted efforts to mitigate the risks of complications associated with mumps, especially among young children. Conducting longitudinal studies to monitor the long-term effects of mumps is deemed necessary. Evaluating the effectiveness of health education interventions in increasing awareness can reduce the burden of mumps-related complications and improve overall community health, particularly among the most vulnerable age groups.

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