

Recent Surge in Mumps Cases in India: Need for Urgent Remedial Measures

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ABSTRACT

Mumps is a global public health problem caused by mumps virus, a member of paramyxoviridae family. MMR (Mumps, Measles, Rubella), an effective vaccine, has been incorporated into routine immunization schedules in over 100 countries. On the contrary, in India, vaccine against mumps has not been included in the routine immunization schedule as mumps is still not viewed as a significant public health problem by the government to warrant such an intervention. An increasing number of mumps outbreaks being reported from many parts of the country in the recent past, is matter of concern. The current paper reviews the situation of mumps in India including the recent surge, and discusses the remedial measures to contain these outbreaks. We conclude that inclusion of Mumps component as MMR vaccine in the Universal Immunization Programme of India along with strengthening surveillance is required to tackle the situation.

Keywords: MMR Vaccine, Outbreaks, UIP

INTRODUCTION

India has witnessed a substantial increase in the number of mumps cases, primarily affecting children, in the last few months [1]. This sudden increase in mumps cases has raised concerns among government agencies, healthcare professionals, policymakers, and parents alike. The resurgence of mumps is challenging our healthcare infrastructure and demanding swift, coordinated efforts to curb its spread and mitigate its impact on the vulnerable population, particularly children.

Mumps, an acute highly contagious viral illness caused by a single stranded RNA paramyxovirus, has been a longstanding public health concern, characterized by its sudden onset and association with inflammation of the parotid gland or other salivary glands [2]. Although only one serotype of mumps virus is known, there are 13 genotypes (A to M) that have been determined on the basis of sequencing of the SH protein, which is the most variable protein among mumps strains [3]. Mumps vaccine

contains live attenuated strains of virus such as Jeryl-Lynn, RIT 4385, Leningrad-3, Leningrad-Zagreb, Urabe Am9, S79, Rubini, and others, which have been available since the 1960s [4] and most of Indian MMR (Measles, Mumps, Rubella) vaccine manufacturers use the Leningrad-Zagreb strain [5].

Humans are the only known natural host for the mumps virus and the virus spreads through respiratory droplets or direct contact with an infected person's saliva. People with mumps are infectious from 2 days before through 5 days after parotitis onset [6]. Although, natural infection with this virus is thought to confer lifelong protection [2], mumps virus reinfections do seem to occur [7,8]. Complications of mumps occur with or without parotitis or other salivary gland swelling and generally encompass conditions such as orchitis, oophoritis, mastitis, pancreatitis, hearing impairment, meningitis, and encephalitis. Nephritis, myocarditis and other sequelae like paralysis, seizures, cranial nerve palsies, and hydrocephalus have also been reported occasionally. Complications associated with mumps are usually more common among adults than children [2]. Despite its generally low mortality rate, the potential to cause profound morbidity and complications underscores the importance of preventive measures, with vaccination emerging as the most effective solution [9].

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Received: Jan 21, 2024; Initial review: Jan 28, 2024;

Accepted: Feb 15, 2024

The mumps vaccine, typically administered in combination with measles and rubella as part of the MMR vaccine, has been instrumental in significantly reducing the incidence of the disease since its introduction in 1967 in the United States [10,11]. The success of vaccination programs has been noteworthy, with the incidence of mumps dropping to less than 0.1 case per 100,000 people in many developed countries by 2001 [12]. This achievement demonstrated the effectiveness of widespread immunization in controlling the disease, marking a substantial triumph in public health. However, recent years have witnessed a global resurgence of mumps, challenging the assumptions that successful vaccination efforts would lead to the eradication of the disease [13]. Notably, the resurgence has presented an unexpected demographic shift, with a growing proportion of cases affecting vaccinated young adults, contrary to the traditional perception of mumps as a childhood ailment [9,10,13].

The current paper reviews the Indian context of the mumps resurgence, considering factors such as absence of mumps containing vaccine in the routine immunization program, waning immunity among the vaccinated, the impact of new mumps strains, and the challenges of having a robust mumps surveillance system. By comprehensively examining these facets, we aim to contribute to a holistic understanding of the current mumps resurgence, its implications for public health, and the strategies needed to effectively mitigate it.

CURRENT SITUATION OF MUMPS IN INDIA

The Indian context adds another layer of complexity to the global mumps resurgence. As per Global Health Observatory (GHO) data repository, India reported 764 mumps cases between 2021-22, indicating a substantial burden of mumps, particularly affecting children [14]. Previous surges in mumps cases have triggered heightened concerns among government agencies, healthcare professionals, policymakers, and parents alike [15]. The increasing burden of mumps in India underscores the need for a comprehensive understanding of regional variations in disease dynamics, vaccination coverage, and healthcare infrastructure [15].

The rising number of mumps cases among children in Maharashtra, Uttar Pradesh, Odisha and Rajasthan, is a concerning trend [16-18]. The fact that this surge has been observed after a span of 4-5 years raises questions about the factors contributing to the resurgence of the disease in these regions. In October and November 2023, mumps outbreaks in Idukki and Palakad in Kerala, Sivagangai in Tamilnadu, Udupi in Karnataka, and Rajnandgaon in Chhattisgarh, served as poignant reminders of the challenges posed by this infectious disease [16]. The cases

primarily emerged among children, presenting with mild fever and swelling. The response to these outbreaks, led by District Rapid Response Teams, involved multifaceted approaches, including community awareness campaigns, house-to-house surveys, and extra immunization sessions [16].

FACTORS CONTRIBUTING TO RESURGENCE OF MUMPS

Several factors may have contributed to this recent rise in mumps cases across India. Despite the recommendations of the World Health Organization [19], the Universal Immunization Programme (UIP) of India does not include mumps vaccine in the routine immunization. In India, children are offered the MR vaccine in a two-dose strategy for children at 9 and 15 months to cover measles and rubella but not mumps [20]. MMR vaccine is only available in the private sector in India and remains out of bounds for over 80% of the children of the country [21].

One of the important reasons for mumps resurgence in India, which has predominantly a naive child population due to the absence of mumps component in UIP, is because prior to introduction of vaccination, mumps was an epidemic disease, with a cycle of 4-5 years [22]. A meta-analysis performed to assess immunogenicity and waning rate estimates for the measles, mumps, and rubella components of MMR vaccines concluded that there is significant annual waning of immunity for mumps component among the vaccinated individuals [23]. An important reason for waning of immunity, among the vaccinated ones, might be ascribed to the alterations between the circulating and vaccine strains [24]. Additionally, overcrowding, inadequate sanitation, and limited and remote access to healthcare facilities in certain regions may facilitate the rapid spread of the virus [25].

REMEDIAL MEASURES

Inclusion of MMR over MR Vaccine in Universal Immunization Program

The inclusion of the MMR (Measles, Mumps, Rubella) vaccine in the universal immunization Program (UIP), in place of MR (Measles, Rubella) vaccine, emerges as a potential remedial measure which is also based on comprehensive studies on mumps-containing vaccines in India. Longitudinal follow-up studies of the indigenously produced MMR vaccine demonstrated excellent immunogenicity and low reactogenicity of the mumps component and high sero-positivity for mumps-specific antibodies even after 6 years of vaccination, emphasizing its effectiveness [26,27]. However, the need for two doses of the vaccine is highlighted to boost circulating antibodies adequately [27,28]. Adding the third dose of MMR was

found to be effective in outbreak settings among children who had a longer period since vaccination [29].

While challenges, such as limited seropositivity in some studies, underscore the importance of large-scale investigations [30], the overall evidence supports the inclusion of the MMR vaccine in India's UIP to mitigate the burden of mumps and associated complications [13,15,21]. WHO as well as the Indian Academy of Pediatrics (IAP) recognize the MMR vaccine as a highly effective way of preventing mumps and the IAP includes it in its vaccination schedule for children and adolescents [31].

Healthcare Infrastructure Strengthening and Environmental Modifications

The recent mumps outbreaks in various parts of India also emphasize the value of a robust healthcare infrastructure capable of promptly identifying, segregating, treating, and containing infectious diseases. Improving diagnostics, ensuring an adequate supply of medicines and vaccines, and training healthcare professionals to recognize and manage mumps cases are essential steps in mitigating the impact of the outbreak. Environmental modifications compatible with a healthy lifestyle may further help in disease mitigation [32]. Addressing the social determinants such as overcrowding, poor sanitation and hygiene is essential to create an environment less conducive to the transmission of mumps and other infectious diseases.

Strengthening Mumps Surveillance System

Investing in surveillance systems can provide timely data to guide public health interventions to contain re-emerging infectious diseases like mumps [33]. The mumps surveillance in India is mainly done through Integrated Disease Surveillance Programme (IDSP), an infectious disease surveillance system under National Centre for Disease Control, Ministry of Health and Family Welfare, Government of India. [34]. However, IDSP only records outbreaks of mumps currently and mumps is not included in the list of notifiable diseases. IDSP worked actively during the outbreaks of mumps in Kashmir in 2017 [35]. WHO's vaccine preventable diseases (VPD) surveillance system in India also does not include mumps as mumps containing vaccine is still not part of UIP. Another surveillance system for mumps existing in the country is "IDSurv", an IAP initiative which is an Infectious Disease Surveillance and AEFI (Adverse Event Following Immunization) reporting system. The surveillance system mainly relies on reporting by the private practitioners [36]. Overall, mumps surveillance in India is not of satisfactory standards and requires an integrated approach both from government and private sectors. For improving the mumps

surveillance, IDSP should include the disease in the list of routinely reported diseases. As per WHO, surveillance for mumps need to be tailored according to the level of control to match specific objectives which monitor disease burden and trends over time, identify and respond to outbreaks and find populations requiring additional disease control measures for mumps [37]. For the same, it recommends 6 indicators for assessing the performance of mumps surveillance: *i*) completeness and *ii*) timeliness of reporting, *iii*) timeliness of investigation, *iv*) adequacy of specimen collection, *v*) timeliness of specimen transport and *vi*) timeliness of reporting laboratory results and the target level for a good surveillance system is $\geq 80\%$ for each of these indicators [37]. WHO's VPD surveillance should include mumps in India for the same which currently only include measles and rubella. Further, mumps surveillance in the country could only be made as robust as AFP and measles surveillance through the combined effort of IDSP, NCDC and WHO. IAP could play a major role in improving the mumps surveillance through increased reporting of mumps cases through the network of pediatricians working in govt and private sectors and training the medical officers on mumps case identification and management. Further, regular monitoring of the surveillance indicators needs to be undertaken to identify areas of weakness and specific areas of the surveillance system that require corrective actions.

Public Awareness and Education

A critical component of controlling the mumps outbreak lies in public awareness and health education [38]. All parents may not be fully informed about the route of transmission of mumps and importance of vaccinations. Myths should be removed through targeted health education.

Global Collaboration and Lessons from Other Countries

India can benefit from international collaborations and learn from the experiences of other countries that have successfully controlled mumps outbreaks [39]. In Israel, for example, a comprehensive ring vaccination campaign was performed to contain the spread of mumps during outbreaks in the Israeli civilian and military populations [40]. Sharing best practices, research findings, and strategies for vaccine delivery can contribute to a more effective response. Collaboration with international health organizations can also facilitate the procurement of vaccines and necessary resources to address the outbreak comprehensively.

CONCLUSION

The recent outbreaks of mumps reported from different

parts of in India serves as a harsh reminder for the inclusion of mumps vaccine in UIP along with strengthening the surveillance system and building resilient healthcare system. As the nation struggles with this public health challenge, a multifaceted approach involving public awareness campaigns, healthcare infrastructure strengthening, government intervention, and global collaboration is essential. It is imperative for all stakeholders, including government agencies, healthcare professionals, policymakers, parents, and the global community to come together to ascertain the root cause of these outbreaks to implement a sustainable solution. Through collective efforts, India can not only contain the current surge in mumps cases but also build a foundation for a more resilient and responsive healthcare system to protect the wellbeing of its children.

Contributors: MAB: Conceptualization, literature review; IAK: Drafting the manuscript; MAB and SG: Critical appraisal and revision of manuscript. All authors approved the final version for submission.

Funding: None; *Competing interests:* None stated.

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