EDITORIAL

Optimal timing of measles vaccination in high-risk areas: Insights from MR-1 administration and subsequent dosing efficacy

SINU JOSE[1]
[1] Postgraduate Institute of Medical Education and Research, Chandigarh, India

Keywords

Measles outbreak • Measles vaccination • MR vaccines • Measles infection • Young infant • Case study

Dear Editor,
Infectious diseases have historically represented a persistent threat, serving as a constant reminder of the delicate balance between human well-being and the latent hazards that persist throughout our societies. Measles, a highly contagious viral illness known for its severe impact on young children, represents a persistent adversary in the field of public health [1, 2]. Following exposure to the measles virus, approximately 90% of individuals without prior protection are susceptible to contracting the disease. In the year 1980, prior to the widespread implementation of measles vaccinations, the global count of measles-linked deaths reached a staggering 2.6 million [2, 3].
Despite these grim numbers, substantial progress has been made, with childhood immunization preventing over 56 million measles-related fatalities between the years 2000 and 2021. In India, measles emerges as a significant childhood health threat, with a median case fatality ratio (CFR) of 2.5% [2]. From October 2022 to March 2023, a total of 68,473 measles cases were reported in India [4]. Regrettably, India reports a majority of the world's measles-related deaths.
Inadequate measles coverage and a high case fatality rate are caused by a number of factors, according to a critical analysis of current strategies and how they are being applied in the field. These barriers include socio-demographic factors such as high birth order, low family income, low education for the parents, and a lack of knowledge about measles and the measles vaccine, and low public confidence in vaccines. Inadequate infrastructure, manpower, and communication resources, difficulties with vaccine storage and transportation, as well as issues with maintaining the cold chain, are additional difficulties in reaching remote areas. Defects exist in surveillance programs for reporting adverse events following immunization and dealing with outbreaks. In addition, there are problems with the biomedical waste disposal [5, 6].
While states with better coverage only needed to improve routine immunization programs, some states and union territories with low measles coverage required catch-up immunization campaigns. Furthermore, the majority of the country's regions frequently have incomplete virologic surveillance data. India has so far identified the genotypes D4, D7, D8, and B3 of the measles virus [5, 7, 8].
This article focuses on a particular instance of measles affected infant in Chandigarh's periurban region. On March 19, 2023, the case was reported to the district hospital. The medical staff at the urban health centre immediately started an aggressive response in the families around the afflicted infant after confirming the diagnosis in order to find any symptoms or exposure to the measles infection.
A male infant, seven months and four days old, who lived in a Chandigarh urban slum area was brought to the nearest Community Health Centre with complaints of a cold, cough, fever that persisted for five days, and maculopapular rashes (red, raised skin eruptions) over the face and trunk for three days, accompanied by 1-2 episodes of loose stools. After an assessment, the infant was referred to the district hospital for specialized care. Basic laboratory tests were performed following admission to establish the presence of measles by detecting Immunoglobulin M antibodies against the measles antigen. A single dosage of 1 lakh IU of Vitamin A syrup and intravenous fluids were administered for symptomatic management. The child's medical history did not include any notable incidents, surgeries, or allergies. His birth history was unremarkable, and he had received all the recommended vaccinations for his age, including those for Bacillus Calmette-Guerin, Hepatitis B, Pentavalent, Rotavirus, Oral polio (three doses), Pneumococcal conjugate, and two doses of Fractionate-Inactivated Poliovirus. The boy lives in a nuclear household with his mother and father in a rented two-room house; the father is a laborer. The boy was discharged from the hospital on the fourth day after his condition had improved and achieved hemodynamic stability. He was instructed to follow up in two days and given a prescription for Syrup Amoxyclav 128.5mg twice daily for five days.
An intensified case investigation was launched immediately as the Ig M ELISA test confirmed the diagnosis of measles. The child's parents were interviewed in order to identify potential sources of infection, but they denied having any prior known exposure to measles

cases or conditions. To measure illness dissemination and find susceptible children around the index case, a cross-sectional survey was carried out. The majority of the families in the study comprised up of migrant workers from nearby states like Bihar and Uttar Pradesh. A pre-designed and validated questionnaire containing information on family structure, size, socioeconomic status, immunization status of children under five years old, and measles cases was used for the survey, which was conducted by trained public health nurses. The case definition used for identifying measles cases included generalized maculopapular rashes accompanied by a history of fever, cough, coryza, red eye, or diarrhea. To find out whether kids under five had received their Measles and Rubella (MR) vaccinations, 100 houses close to the index case were polled. Children who had never received the Measles and Rubella vaccine were encouraged to do so and given the necessary support, resulting in 100% coverage in accordance with India's National Immunization Schedule. There were no confirmed measles cases, according to the survey.

To improve citizens' knowledge of the clinical characteristics, complications, prevention techniques, and control measures associated with measles, Mass health education campaigns were conducted. To reduce mortality among children under the age of five, Oral Rehydration Solution (ORS) packets were supplied along with instructions on how to prepare and use them. At the urban health training centre, initiatives to support Measles and Rubella vaccination were stepped up, with strict attention to administration and storage procedures. Integrated Child Development Services (ICDS) personnel worked with Anganwadi staff to conduct passive measles surveillance. Such monitoring is still essential for identifying changes in epidemiological patterns and assessing the success of regional immunization programmes.

The report deftly examines a case investigation and outbreak response in a high-risk urban slum in Northern India, illuminating the obstacles that the measles still poses despite persistent vaccination campaigns. Even with a vaccination rate of over 80%, measles continues to be a major cause of illness and mortality in children in India. A coverage rate of above 90% is necessary to further reduce the effects of the measles; hence strong reinforcement of routine vaccination practices is required [4, 10, 11]. The discussion emphasizes that through identifying underserved communities, raising community knowledge about immunization, and extending accessible healthcare facilities, this goal can be accomplished.

The effectiveness of measles vaccinations is demonstrated by the reported 92% vaccine efficacy after a single dosage and the skyrocketing to 100% after two doses [11]. The substantially reduced attack rate among children who received two doses of the vaccine during the outbreak supports this conclusion further [12]. These findings validate the effectiveness of the immunization strategy and highlight the pivotal role in lowering disease incidence.

It thoroughly examines the crucial argument around the administration of early MR doses and the best time to provide the measles immunization. When given to infants younger than nine months old, the MR-1 vaccine exhibits extraordinary seropositivity and strong immunization effectiveness [12]. Importantly, the age at which MR-1 is administered has no impact on the T-cell responses to subsequent doses, adding to the efficacy of the strategy. This discussion supports the rationale for initiating the MR-1 vaccine at six months of age, particularly in contexts of high disease prevalence, such as those seen during epidemics [1].

The discussion's findings are in line with the scientific title, emphasizing the critical nature of ideal vaccine storage, fortified routine immunization coverage, vitamin A supplementation, and improved healthcare systems for underserved populations. The debate offers a thorough foundation for comprehending the crucial importance of early measles immunization, especially in areas with high rates of transmission. The results confirm the central concept of the title by highlighting the critical role that timing of vaccination, particularly MR-1 injection, plays in generating substantial measles immunity.

To effectively combat the measles outbreak, it is essential to gain a deeper understanding of its underlying causes. This includes addressing the availability and accessibility of measles vaccines in remote or underserved areas, as well as overcoming logistical and supply chain challenges that may impede vaccine distribution. Moreover, it is crucial to enhance the capacity for proper vaccine handling and delivery, while also addressing community factors that influence vaccine hesitancy [13].

Implement targeted catch-up vaccination campaigns aimed at reaching older children who may have missed their initial vaccine doses, encourage community involvement by collaborating with local leaders and organizations to promote vaccination actively. Invest in strengthening routine immunization programs ensuring that children receive the recommended second dose of the measles vaccine. Additionally, establishing a robust surveillance system for prompt recognition of measles outbreaks and continuously analyze data for trend detection, enabling adaptive vaccination strategy adjustments. This comprehensive approach is vital for effectively addressing the ongoing measles outbreak.

In essence, the topic effectively endorses the title by providing an in-depth analysis of the optimal timing of measles shot and its efficacy, especially in high-risk areas. The findings distinctly highlight the significance of implementing this vaccination method into practice in order to enhance overall immunization coverage and hence significantly reduce the morbidity and mortality caused by measles.

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Conflict of interest statement

None.

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Correspondence: Sinu Jose, Department of Community Medicine and SPH, Postgraduate Institute of Medical Education and Research, Chandigarh, India. E-mail: sinujosekudilil87@gmail.com

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