Polio Vaccines: A Crucial Step Towards Eradication and Sustaining Immunity

Health Services Insights
Volume 16: 1–2

DOI: 10.1177/11786329231186013

Shweta Chauhan, Sai Mahesh Vajjala and Swati Ghonge

Department of Community Medicine, Dr. D. Y. Patil Medical College Hospital & Research Centre, Dr. D.Y. Patil Vidyapeeth, Pune, Maharashtra, India.

Polio is a deadly childhood disease that has caused epidemics and pandemics, claiming millions of lives across the world. However, vaccines, both oral and injectable, have helped control and eliminate the disease, thanks to the pioneers Jonas Salk and Albert Sabin.

The Oral Polio Vaccine, containing Type 1, Type 2 and Type 3 strains (Brunhilde, Lansing and Leon), has played a crucial role in the eradication strategy, with almost all countries successfully certified as Polio-free, except for Pakistan and Afghanistan. Geographically these countries share borders with India.

India achieved the 'Polio Free' status in 2014 with the last reported case of wild polio in 2011. However, the risk of importation from neighbouring countries is still imminent. In 2016, following the switch from trivalent to bivalent vaccine, India (one of the first countries) successfully introduced fractional Inactivate Polio Vaccine (fIPV) in its National immunisation schedule. The switch was necessary due to the risk of increasing circulating polio compared to wild polio.[1] Post-certification strategy in tackling polio is highly critical, as it is essential to maintain a balance of immunity against all three strains among infants, whose maternal antibodies against polio start to wean off from the age of 6 weeks.

The switch has resulted in Type 2 immunity gaps because of unsuccessful timely addition of fIPV preceding the dose while initiating the switch. This has led to 362 cVDPV2 cases across the globe in 2022. These outbreaks are driven by several factors, including low quality and delayed polio outbreak response; declining gut immunity in young children to the type 2 virus after countries switched from trivalent to bivalent oral polio vaccine (bOPV) for routine immunisation in 2016; and insufficient routine immunisation coverage.[2] To address this issue, the upgradation to nVDPV2 strategy for both endemic and non-endemic countries is a game-changer in tackling polio.[2]

The Strategic Advisory Group of Experts (SAGE) has recommended to start fIPV as early as 6 weeks following the bivalent OPV switch. This is backed by Randomised Control Trials.[3] Hence, the introduction of fIPV was done at 6 and 14 weeks of life.

Dose of 0.1 mL fIPV contains all three strains (40, 8 and 32 units). Recent multicentre Randomised Clinical Trials in India have shown that fIPV at 6 and 14 weeks using a BCG needle has significantly higher (85.8% vs 77% and 6.9%) seroconversion against OPV2 compared to, fIPV at 10 and 14 weeks, and IPV single dose at 14 weeks.[4] The findings were intuitive as, at 14 weeks, none of the three groups demonstrated protective antibody levels against OPV2. Also, it was found that successive doses at 10 and 14 weeks did not increase titres to a great extent. Declining titres show the imminent addition of fIPV dose 3 at 9 months of age, as directed by The National Technical Advisory Group on Immunisation.[5]

The trivalent inactivated polio vaccine (IPV) has recently gained attention and is now the only method used in routine immunisation programmes to provide immunity against type 2 poliovirus.

The rationale of introducing the fIPV-3 at 9 months, along with MR vaccine and Vitamin A supplementation, is not only cost-efficient but also increases coverage, ease of access and compliance. It is also significant that India was the first country to introduce this fIPV in 2016.

However, it is crucial not to become complacent and to ensure that routine surveillance strategies run at an enhanced pace, technology is used appropriately, such as e-VIN, and vaccine coverage is maintained high, above 90%, and try to achieve 100% to ensure that vaccine-preventable diseases are prevented. As always said, prevention is better than cure.

Author contributions

All authors read and approved the final manuscript. All authors made equal contributions in designing, writing, read and approved the final manuscript.

ORCID iD

Sai Mahesh Vajjala https://orcid.org/0000-0002-8485-8359

REFERENCES

1. Global Polio Eradication Initiative. Vaccine-Derived Polioviruses. Accessed June 9, 2023. https://polioeradication.org/polio-today/polio-prevention/the-virus/vaccine-derived-polio-viruses/
2. Global Polio Eradication Initiative. OPV Cessation. Accessed June 9, 2023. https://polioeradication.org/polio-today/preparing-for-a-polio-free-world/opv-cessation/
3. Zaman K, Kovacs SD, Vanderende K, et al. Assessing the immunogenicity of three different inactivated polio vaccine schedules for use after oral polio vaccine cessation, an open label, phase IV, randomized controlled trial. *Vaccine*. 2021;39:5814-5821.
4. Ahmad M, Verma H, Deshpande J, et al. Immunogenicity of fractional dose inactivated poliovirus vaccine in India. *J Pediatr Infect Dis Soc*. 2022;11:60-68.
5. The Hindu Bureau. Third dose of fractional fIPV for children from January 4. December 31, 2022. Accessed June 9, 2023. https://www.thehindu.com/news/cities/chennai/third-dose-of-fractional-fipv-for-children-from-january-4/article66324485.ece

TYPE: Letter to the Editor

FUNDING: author(s) received no financial support for the research, authorship, and/or publication of this article

DECLARATION OF CONFLICTING INTERESTS: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

CORRESPONDING AUTHOR: Sai Mahesh Vajjala, Department of Community Medicine, Dr D.Y. Patil Vidyapeeth, Dr D.Y. Patil Medical College Hospital and Research Center, A-22, PG Boys Hostel, Dr. D Y Patil Medical College Campus, Pune, Maharashtra 411018, India. Email: vmahesh98@gmail.com