What is pulse polio?

A child receives polio vaccine drops on the occasion of National Immunisation Day in Amritsar on January 28, 2018. | Photo Credit: AFP

On January 28, India carried out the first of its two national rounds of the Pulse Polio Campaign for 2018. The second is on March 11. These two campaigns will see a huge mobilisation of resources to give the oral polio vaccine (OPV) to around 17 crore under-five children. Why do Indian policy-makers continue to focus on polio, though the Southeast Asian region, including India, became polio-free in 2014? This is because the threat of resurgence is real and can happen in two ways. As on today, two countries — Pakistan and Afghanistan — still have circulating polio. And the polio virus can cross borders easily through adults who show no symptoms. In 2011, 10 years after becoming polio-free, China's Xinjiang province saw 21 cases of paralytic polio and two deaths. When the virus from the outbreak was sequenced, it turned out to be from Pakistan. In 2009, India exported polio to Tajikistan, where it caused an outbreak of 587 cases. Today, India's only defence against the import of polio is watertight immunisation. A small gap in immunisation among newborns can be enough for imported virus to seep in.

The second risk of resurgence comes, ironically, from OPV itself. In rare cases, this vaccine, which contains weakened but live polio virus, can cause paralytic polio. Also, because the vaccine-virus is excreted by immunised children, it can move from one person to another. This makes OPV a double-edged sword. On the one hand, a vaccinated person protects unvaccinated people she comes in contact with by spreading immunity through faeces. But on the other, such circulation allows the virus to stick around and mutate to a more virulent form, raising the spectre of vaccine-derived poliovirus (VDPV). VDPV, like imported wild polio, can cause outbreaks in under-immunised population. It is for this reason that the eradication of polio worldwide requires OPV to be stopped and replaced with the Inactivated Polio Vaccine (IPV). IPV does not cause VDPV but protects children equally well against polio.

Indian researchers started experimenting with the strategy of 'pulse' immunisation in the 1980s. By then, OPV was a part of India's Expanded Programme on Immunisation, but polio burden remained high, with 1,000 children becoming paralysed each day. The success of the programme was being thwarted by low coverage of the vaccine, problems with potency and blunted immune response among Indian children. Against this background, a group of researchers, led by Vellore-based virologist T. Jacob John, championed the idea of pulse campaigns. While routine immunisation waits for parents to bring their children to the clinic, something that many parents do not do, pulse campaigns try to give a 'pulse' of vaccine to an entire population in one go. Dr. John suggested that routine immunisation worked in developed countries, because parents were motivated to vaccinate their children. But India needed a different strategy.

An early experiment in Vellore in 1978 showed that pulses delivered to a large cohort of children gave them strong immunity even when the vaccine was not so potent. This was because vaccine pulses rapidly replaced the wild-polio virus circulating in the community with the vaccine-virus. Vellore was the first Indian town to become polio-free through the pulse strategy, and the rest of India adopted the strategy in 1995.

Out of the three wild-types of poliovirus that cause the disease, the transmission of one, Wild Poliovirus 2 (WPV-2), was interrupted successfully more than a decade ago.

The two remaining viruses that are circulating in Pakistan and Afghanistan are WPV-1 and WPV-3. Once we stop these two viruses in their tracks, OPV will be phased out and replaced globally with IPV.

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