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RESEARCH ARTICLE

Polio Eradication Efforts in India

Raj Kamal Choudhary^{1*}, Kumari Ragini², Varsha Kaushik¹

1 Jawaharlal Nehru Medical College, Bhagalpur

2 A.N.M.M.C, Gaya

* rajkamalbgp@yahoo.com

ABSTRACT

With the global initiative of eradication of polio in 1988 following World Health Assembly resolution, pulse polio immunization program was launched in India in 1995 with goal to eradicate Polio from the world. This involves a high risk population that is children in the age group of 0-5 years, were administered polio drops on a single day through out the nation.

India is working on four pillars of polio eradication:

- Routine immunization
- Supplementary immunization
- Surveillance
- Target mop-up campaign

With continuous efforts, India has been removed from the list of polio-endemic countries. India continues to hold one NID and two Sub National Immunization Days for polio every year to maintain population immunity against wild poliovirus and to sustain its polio-free status.

Introduction

The 1988 resolution passed by the WHO for polio eradication was committed by many countries including India.

The pulse polio immunization program was started in 1995. Polio immunization is done on National Immunization Day (NID). Immunization is done twice a year. Sub-national immunization day (SNID) is additionally done with the aim of multiple rounds (minimum 2), especially targeting high-risk states.

The target population is children in the age group of 0-5 years, and they are given polio drops. Over 170 million children are immunized during each NID and 77 million during each SNID.

Since 1997, the acute flaccid paralysis (AFP) surveillance program has been used in conjunction with a laboratory network to monitor for the transmission of the poliovirus.

Materials and methods

1. South-East Asia Region of WHO including India has been certified polio-free by "The Regional Certification Commission (RCC)" on 27th March 2014.

2. India reported its last polio case from the district of Howrah, West Bengal on 13th January 2011.

3. WHO on 24th February 2012 removed India from the list of "endemic countries with active poliovirus transmission."

Last Reported Polio Case in Country		
Polio Virus Type	Date of last case	Location
P1	13 January 2011	Howrah (Panchla), West Bengal
P2	24 October 1999	Aligarh, Uttar Pradesh
P3	22 October 2010	Pakur (Pakur), Jharkhand

4. There are 24 lakh vaccinators and 1.5 lakh supervisors involved in the successful

implementation of the Pulse Polio Programme (NID).

5. The total number of cases and number of affected districts during past 7 years is as below:

Years	Cases of polio	Number of districts
2005	66	35
2006	676	114
2007	874	99
2008	559	90
2009	741	56
2010	42	17
2011	01	01
2012	00	00
2013	00	00
2014	00	00
2015	00	00

INITIATIVES BY GOVERNMENT OF INDIA

1. Sustaining annual high-quality national and subnational polio vaccination campaigns.

2. A very high degree of vigilance is being maintained nationwide through surveillance for the importation or spread of VDPV and the poliovirus. In Mumbai, Delhi, Patna, Kolkata, Punjab, and Gujarat, environmental surveillance (sewage sampling) has been developed to track the spread of the poliovirus and to gauge the success of any programmatic interventions.

3. A Rapid Response Team (RRT) has been established in each of the nation's States and Union Territories to respond to any polio outbreaks.

4. All States have also created Emergency Preparedness and Response Plans (EPRP) that outline the actions to be performed in the event that a polio case is discovered.

5. Continuous vaccination teams (CVT) administer international border immunization to all eligible children around the clock in order to lower the danger of importation from neighboring nations. At the international borders that India shares with Pakistan, Bangladesh, Bhutan, Nepal, and Myanmar, specific booths are built to provide these services.

6. As of August 31, 2015, 7.8 million youngsters had received their OPV vaccinations.

7. Guidelines for the mandatory requirement of the polio vaccination for all international travelers for travel to India and other afflicted countries, including Afghanistan, Nigeria, Pakistan, Ethiopia, Kenya, and Somalia, have been released by the Indian government and are effective as of March 2014. Cameroon and Syria.

8. To respond to the detection or importation of wild poliovirus (WPV) or the appearance of circulating vaccine-derived poliovirus (cVDPV), a rolling emergency stock of OPV is kept on hand.

9. The third dose of DPT should be administered nationwide in the last quarter of 2015, together with the injectable polio vaccine (IPV), according to the National Technical Advisory Group on Immunization (NTAGI).

INJECTABLE INACTIVATED POLIOVIRUS VACCINE (IPV)

1. The Polio Eradication & Endgame Strategic Plan 2013-2018, which calls on nations to strengthen routine immunization programs and introduce at least one dose of injectable inactivated poliovirus vaccine (IPV) in all countries using only oral polio vaccine (OPV), was approved by the World Health Assembly in May 2012.

2. In 2015, India will join 125 other nations in routinely administering the Inactivated Poliovirus Vaccine (IPV) as part of the Polio Eradication and Endgame Strategic Plan. For infants under the age of one year, IPV would be administered along with the third dose of the oral polio vaccine (OPV) at 14 weeks of age.

Discussion

Among developing countries, India was the worst affected with polio prior to its decline in the 1990s. India committed to the resolution

passed by World Health Assembly for global polio eradication in 1988. India was the pioneer leader in polio research

epidemiology, vaccination-prevention and in manufacture of both OPV and IPV. Polio vaccine is the best way to protect against polio. India introduced the polio vaccine under Expanded Programme on Immunization (EPI, 1978), and subsequently in the Universal Immunization Programme (UIP, 1985), but started carrying out special polio campaigns in 1995 under Pulse Polio Program. Even after the introduction of OPV in EPI, the number of polio cases did not fall for about 10 years with estimated annual numbers of cases being 200,000 to 400,000; translated to daily averages, some 500 to 1000 children were developing polio paralysis each day. The reported number of cases of poliomyelitis under sentinel surveillance was 28,757 in 1987, not any lower than in the pre-EPI era. Only by 1989, one decade after the launch of EPI in India, did the number of polio cases decline to the pre-EPI levels which is attributed to the cumulative effect of increasing coverage with vaccine- both direct vaccine efficacy and indirect herd effect. However, the fall was still short of polio "control", if defined as a >95% decline in incidence.

The four strategic components promoted by WHO were to reach and maintain high routine OPV coverage, to top up immunization with supplementary doses of OPV, to establish systematic surveillance of polio with laboratory virological support and to use local area mop up OPV campaigns to interrupt any remaining chains of WPV transmission.

By 1990 when 80% 3-dose OPV coverage was achieved, the burden of polio had begun declining in India. The estimated number of polio cases in 1994 was 50,000; that amounted to an average of 137 children getting paralyzed every day. The Polio burden had not yet reached control status.

During the first decade of the EPI era, polio had continued to persist endemically with superimposed outbreaks at intervals of 5-7 years; 1992 was an epidemic year. Thereafter, cases declined to less than half of the number in the pre-EPI era. In 1995, 3142 cases were reported.

In 1994, a pilot immunization campaign was conducted in Delhi, targeting one million children up to 3 years of age. Since then supplementary immunization activities (SIA) have been popularly called Pulse Polio Immunization (PPI) which was expanded nationally in 1995 during which a total of 88 million under-3 children were immunized. From the next year, the target age group was increased to all children under the age of 5 yr. This resulted in further decline in number of polio cases to 1005 reported in 1996.

Till 1998-1999, PPI consisted of vaccination of children at fixed booths on two National Immunization Days, separated by 6 weeks, during winter months. After the nationwide PPI campaigns, WPV2 stopped circulating by 1999. The coverage of trivalent OPV had reached to a level sufficient to interrupt WPV2 but was insufficient to interrupt WPV 1 and 3 transmission. In the view of missing goal of reaching zero incidence of polio by 2000, PPI was further intensified in 2000. Four nationwide PPI rounds were conducted in October, November, December 2000, and January 2001, followed by 2 sub-national rounds in 8 states (Assam, Bihar, Gujarat, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh and West Bengal) that had continuing polio and had low EPI coverage. In spite of reaching 94-95% of target children in PPI campaigns, WPV transmission could not be interrupted in the high-risk states of UP and Bihar. It was obvious that as near 100% children as possible had to be vaccinated repeatedly for success. So, in addition to booth immunization, a house-to-house search of missed children and vaccinating them in the next 2-3 days following each national and sub-national PPI was done.

In 2000 and 2001 there were only 265 and 268 cases due to WPV1 and 3, for more than 99% decline in India from the 1980s. Thus, polio was effectively controlled by 2000, but WPV transmission was not interrupted.

In 2002, an outbreak with 1600 cases, nearly 87% of cases detected globally, mostly of type 1, and 1,363 cases in UP and Bihar alone. In 2003, the 'underserved strategy' was introduced as part of better communication efforts in UP to reach out to and get support of marginalized sections of society especially those living in poor Muslim communities, lacking access to basic sanitary and healthcare services, and were often missed in

tOPV rounds. In 2005, monovalent OPV type 1 and type 3 were licensed based on an early Indian study showing 2.5 to 3 times higher vaccine efficacy of mOPV-1 and mOPV-3 than that of tOPV. There was a polio outbreak in 2006, with 648 cases of type 1 and 28 of type 3, again most cases occurring in UP and Bihar. To compensate for low routine coverage, the PPI campaigns have been increased to 10 per year. Due to the high efficacy of mOPV-1, WPV type 1 came under control, but immunity gaps remained for type 3, since routine immunization was not reaching a majority of infants and vaccination campaigns used mOPV-1. In 2006, the IPV was licensed in India.

India prioritized the elimination of WPV1 from 2006/2007 because it was the most frequent cause of paralytic disease, was responsible for >90% of polio cases in the country during the previous 5 years and had been the agent of re-infection of a few polio-free countries. Moreover, the next anticipated WPV1 outbreak year was 2010. Ultimately areas that previously had the highest incidence of WPV1 recorded the lowest numbers in subsequent years and finally its transmission ceased in January 2011. However, this tactic could not address the type 3 outbreaks that occurred in 2007-2008 in Bihar and in 2008-2009 in UP, adding up to totals of 874 cases in 2007, 559 in 2008, and 741 in 2009. These outbreaks were in part due to the very low EPI coverage with tOPV in Bihar and UP. Thereafter bivalent OPV containing type 1 and 3 use was recommended to address both WPV-1 and 3. Only 42 WPV cases were detected in 2010. This emboldened the Government of India to recommend responding to each case of polio as a public health emergency. Finally, there was only one case in 2011 and the responsive mop-up immunization was exemplary.

The introduction of bOPV in SIAs beginning in January 2010 contributed substantially to the sustainment of simultaneous reduction in WPV1 and WPV3 cases. In India, the last confirmed WPV3 case had occurred on October 22, 2010 in Jharkhand and the last WPV1 case occurred on January 13, 2011 in West Bengal.

Subsequently, on 24th February 2012, India was removed from the list of polio endemic countries after completing a year without reporting any more WPV isolate from case or environment samples.

South-East Asia Region of WHO including India has been certified polio free by "The Regional Certification Commission (RCC)" on 27th March 2014.

Conclusion

In India, the fight to eradicate poliomyelitis has entered a crucial phase. There are tools that have been shown to work successfully all around the world. The vast differences in routine immunization coverage across different parts of the nation are impeding eradication attempts. Social mobility caused by migrant labor moving to metropolitan corporations exacerbates the issue. Focusing eradication efforts on these high-risk populations is necessary, along with mop-up work for absentee and defaulter immunization. The community's involvement is still essential to success and must be ensured for improved compliance.

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