

India without Poliomyelitis: Time to Make it a Reality

India is committed to global eradication of polio; hence it started the Polio Eradication Program way back in 1995. Poliomyelitis is an acute viral infection caused by RNA virus (picornavirus).⁽¹⁾ It is primarily an infection of human alimentary tract but may infect central nervous system (1%). In polio cases, the virus is excreted in the feces commonly for 2-3 weeks but sometimes as long as 3-4 months. There are two very potent vaccines, oral polio vaccine (OPV), and injectable polio vaccine (IPV), available for polio. Both vaccines induce high immunity and have very few side effects. However, due to the presence of very little neuro-virulence, OPV can cause vaccine-associated paralytic polio (VAPP). The incidence of which is one in one million vaccine doses.⁽²⁾

Global Polio Eradication

World Health Organization (WHO) defines polio eradication as, "zero incidence of wild poliovirus transmission anywhere in the world."⁽³⁾ This definition does not include the vaccine-derived polio virus. However, some experts believe that the same should be included in definition.⁽⁴⁾ WHO in the world health assembly held in 1988 resolved to eradicate polio by the year 2000 AD. Till the year 2010 there has been 99% reduction in the number of cases of polio worldwide. The number of endemic countries has come down from 125 to 4 (Nigeria, India, Afghanistan, and Pakistan).⁽⁵⁾ In the year 2010, there were 1292 cases of wild polio virus in the world⁽⁶⁾ compared to 1597 cases in 2009. Figure 1 depicts details of polio cases worldwide. What is alarming is the large number of polio cases occurring in nonendemic countries 1060 out of 1292 (82%), in fact Taziksthan (458) and congo (384) have more cases than any endemic nation, and increase in the number of reinfected countries from 13 in 2008 to 19 in 2010. WHO is trying to address this problem through the program of work 2010-2012.⁽⁷⁾

Indian Scenario

In the year 2005, India reported 66 cases of polio. However, in 2006, the cases of wild polio virus increased to 676. This rise in cases in 2006 was expected due to the 4-year cycle of the polio virus in India.⁽⁸⁾ Figure 2 shows this cycle with an increase in number of cases in 1998 and 2002. The number of polio cases used to subside after every peak but did not subside after 2006 peak. In fact the cases increased in 2007 (874 cases).

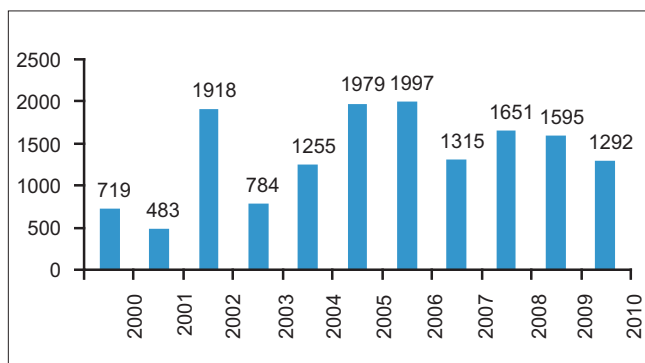


Figure 1: Number of polio cases worldwide from 2000 to 2010

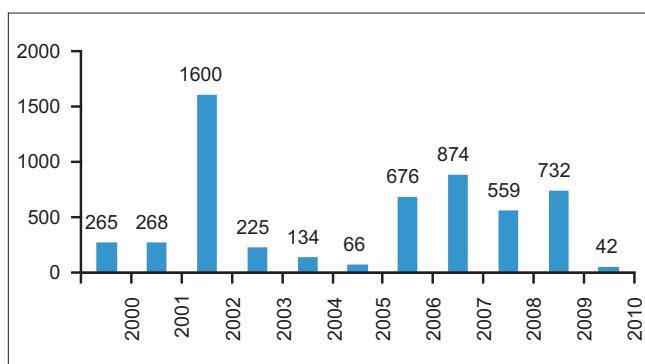


Figure 2: Number of polio cases in India from 2000 to 2010

In 2009, out of 734 cases, 80 were P1 and 653 were of P3 strain.⁽⁹⁾ The second interesting finding was that majority of cases occurred in a low-transmission season, i.e., from November to February the probable reason given was the use of mOPV1 in UP and Bihar in 2005 and 2006, where majority of cases occurred, and secondly the low vaccine coverage which led to spread of the OPV 3 strain virus.⁽¹⁰⁾

Due to the 4-year cycle of polio there was likelihood of increase in number of cases in year 2010. However the number of polio cases in India in 2010 is only 42, lowest ever. Thus now there is a need to be more vigilant and focused in our efforts to eradicate polio from India by 2012. This paper thus tries to highlight important issues and discusses policy options for eradication of polio. Most of the cases in India are restricted to western UP and central Bihar, both highly populated areas.

Pulse Polio Eradication Program in India

India adopted pulse polio immunization in 1995 and

since then biannual National immunisation days (NIDs) using fixed site OPV vaccination has been conducted to supplement routine OPV vaccination. During 1999, supplementary immunization activities (SIAs) were intensified, with the addition of house-to-house vaccination after an initial day of fixed site activity.⁽¹¹⁾ The eradication program in India is coordinated by National Polio Surveillance Project with combined efforts of Government of India and WHO. India's annual nonpolio AFP rate is 8-9 per 100,000 population in under 15 years, which is above the standard set by WHO. The initial target to eradicate polio in India was by the year 2000. Since then, the target has been revised to 2002, then to 2007, and now the new target is to eradicate polio by the year 2012. The Indian expert advisory group has recommended six national immunization days, nine subnational immunization days, and 40 mop-up rounds for the period 2009-2010 to 2011-2012. For this an amount of Rs. 3203.98 crore has been committed by the Government of India.

Besides conventional strategies like routine high immunization, NIDs, surveillance of AFP, and mopping up vaccination, newer strategies like special supplementary immunization activities were undertaken in underserved, hard to reach areas, and transit points (bus stops, railway stations). Administration of mOPV1 and mOPV3 was carried out in selected areas. From the year 2010, bivalent OPV1 and OPV3 is used in UP and Bihar in all NIDs/Sub National immunisation days SNIDs.⁽¹²⁾

There are various unanswered issues in the quagmire of pulse polio eradication in India. Few of them being why was a shift made to mOPV without any trial? Possible role of IPV in polio eradication? Eradication efforts started without preliminary work, techno-centric approach without any importance to water, hygiene, and sanitation, issues in effectiveness of OPV, cold chain maintenance, impact of sustained, and prolonged eradication drive on routine immunization, and issues concerning the goal of eradication itself, i.e., the socioeconomic and public health importance of polio vis-a-vis other diseases. An effort has been made to discuss these issues in the subsequent sections.

Barriers in Polio Eradication

In spite of 15 years of dedicated efforts, resources, and implementation, the goal of polio eradication remains elusive. Several barriers for the same can merit consideration. They can be classified as technical, administrative, sociocultural, environmental, and demographic barriers.

Technical barriers include limitations of polio vaccine

itself. OPV has shown reduced efficacy in tropical countries as evident by cases of wild polio virus even in children receiving 10 or more doses. Studies have shown only 20-30% sero-conversion in western UP and central Bihar even after 4-5 OPV doses.⁽¹³⁾ Factors like malnutrition, diarrhea, and enterovirus infection are known to lower the effectiveness of vaccine. Another problem with OPV is its interaction with enteroviruses present in the gut of children especially in areas having high diarrheal rates. This interaction may lead to a neurovirulent strain acquiring wild polio-like characteristics. Such viruses are known as circulating vaccine-derived polio virus (cVDPV). The only difference between the two is the lineage and can be differentiated by laboratory support only.⁽¹⁴⁾ A Polio virus being the live virus should not be given to immune-compromised as there is risk of iVDPV. These cases are known to excrete virus from their feces up to 10 years. OPV is also associated with problem of incomplete administration and maintaining cold chain. As highlighted earlier, administration of mOPV has failed and was one of the factors for increases in the number of polio cases. Though the strategy of bivalent OPV has reduced the incidence yet it is again without any scientific back-up; hence the reduction cannot be fully attributed to its use. Though vaccine vial monitoring is useful for onsite evaluation of vaccine potency, vaccine check through accredited lab is necessary as there are instances of its failure as a surrogate marker of vaccine potency.

Inactivated polio vaccine is an injectable vaccine which may not be acceptable to many in the public health program. There is also a risk of precipitants of polio cases in high endemic or outbreak situation. IPV requires a large number of trained human resources (health workers) for its administration in the general population. Besides this there are also problems of providing sterile syringes, appropriate disposal of the used syringes and needles, observing universal precautions by healthcare personnel, etc. Although the cost of manufacturing IPV and OPV is same, IPV's high demand in industrialized nations and consequent low supply makes it 10 times costlier.⁽¹⁵⁾ This also restricts its introduction in national health programs.

There is always a debate that whether polio cases in India are occurring because of vaccine failure or due to failure to vaccinate. While Indian official figures claim 90% coverage, a survey done by WHO and UNICEF during the same period shows coverage to be only 20-40%.⁽⁸⁾

Sustaining program momentum of such a large program which is repeated periodically is a mammoth task leading to fatigue and demotivation of the healthcare staff. At global level, for the strategic plan 2010-2012 the funding gap is US\$1.4 billion.⁽¹⁶⁾ Unless this gap is filled by

individual or voluntary donations or government funds, there is likelihood of big set-backs for the program.

Social barriers like gender, caste, purdah system, etc. have always limited the administration of pulse polio vaccine. There is poor vaccine acceptance by certain religious groups in states like Bihar and UP. A new case of polio (wild polio virus 1) in Malegaon in Maharashtra in 2010 is a glaring example where the community has refused or dodged (there are no children at home) the healthcare worker. There are still various myths present in the community like children becoming sterile after taking polio drops and a large conspiracy by USA to finish a certain community.^(17,18)

Since the program is running from over 15 years, people have started thinking of it as government routine activity with very little community involvement. There are incidences in Bihar where people have tried to leverage the urgency of pulse polio immunization to secure certain basic necessities like ration card, electricity, etc. and also rarely for monetary benefits.⁽¹⁹⁾

Environmental conditions like warm and humid climate, poor sanitation, lack of safe drinking water favor the persistence, multiplication, and transmission of the virus. Bihar is a flood-prone area and such calamities not only disrupt routine immunization but also lead to damage to water supplies and sanitation facilities.

Demographic factors like high population density, low literacy, large birth cohort, large mobile population, low socioeconomic conditions are known to sabotage public health efforts of interrupting transmission of the polio virus. However there are areas where the polio virus has been eradicated despite the presence of the above-mentioned environmental and demographic barriers. Biomedical research regarding the characteristics of the polio virus or genetic research for host characteristics may be undertaken for eliciting actual reasons.⁽²⁰⁾

Overcoming Barriers

Global polio eradication initiative envisages a need of strong political advocacy to ensure community participation and maintain momentum at global, national, and regional level. It also emphasized the importance of strengthening routine immunization to prevent reemergence and/or reimportation of the wild polio virus.

Appropriate vaccine strategy as per epidemiologic and sociodemographic profile should be chosen. Introduction of bivalent polio vaccine is one such strategy. There is a great role of IPV in polio eradication and it has to be considered in near future at least in routine

immunization, where vaccine coverage is high.⁽²¹⁾

Social mobilization is the need of hour by creating awareness among people about the importance of polio vaccine and thus ensuring community participation and co-operation. IEC campaigns in local languages according to their knowledge and sociodemographic profile should be undertaken. Media messages should be audience and region specific. Religious leaders, opinion markers, and volunteers should be involved actively to overcome myths present about the disease in the society.⁽²²⁾

Strengthening and increasing capacity of laboratory is required in changing scenario, firstly to be sure of vaccine coverage (sero surveillance) and secondly to differentiate between cVDPV and WPV as administering multiple OPV doses in community where a case due to cVDPV has occurred is unethical and unnecessary. The role of the quality surveillance system in eradication of any disease cannot be overemphasized.

Environmental link has not been given due importance and is still missing in the polio eradication strategy, i.e., improvement in hygiene, sanitation, and provision of safe drinking water.⁽²³⁾ A multisectoral and holistic approach wherein active participation and contribution from other sectors like public health engineering department, education, rural, and urban slum development, linkage with a poverty alleviation program should be sought as a strategy to eradicate polio in addition to the biomedical methods.

Conclusion

The traditional four-stage strategy has restricted wild polio virus to only few pockets. Newer strategies like SNIDs and introduction of bivalent vaccine have worked. The year 2010 was very crucial for polio eradication as this year falls in the 4-year cycle of polio virus. Now that we have achieved lowest ever cases of polio, we have to strive for eradication of polio at the earliest; for this we have to garner the support of communities by overcoming their myths and misbelieve, by inculcating in them polio immunization as their own need and not just as a government duty. Community mobilization remains the chief corner stone. Also, there is a need to view eradication program from not just techno-centric or biomedical point of view but to take into consideration a holistic and sociocultural view and as a step in sustainable development of the country. There is no space for complacency and we need to be more vigilant as there is a constant threat for its spread to other areas, as shown in the increase in number of reinfected countries from 13 in 2008 to 19 in 2010.

Thus a multipronged, area-specific strategy addressing local needs, change in vaccine strategy, health system research, concrete efforts by healthcare workers, and participation of community is needed to eradicate the disease from India and thereafter from the globe. The task for accomplishing it should be done with great urgency and utmost dedication and if there ever was or will be a better chance to eradicate polio from India it is now.

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