

- Carabana J, *et al.* Molecular epidemiology of measles virus: Identification of pathways of transmission and implications for measles elimination. *J Infect Dis* 1996; 173: 32-37.
27. Rota JS, Wang ZD, Rota PA, Bellini WJ. Comparison of sequences of the H, F, and N coding genes of measles virus vaccine strains. *Virus Res* 1994; 31: 317-330.
 28. Rota JS, Hummel KB, Rota PA, Bellini WJ. Genetic variability of the glycoprotein genes of current wild-type measles isolates. *Virology* 1992; 188: 135-142.
 29. Tamin A, Rota PA, Wang Z, Heath JL, Anderson JL, Bellini WJ. Antigenic analysis of current wild type and vaccine strains of measles virus. *J Infect Dis* 1994; 170: 795-801.
 30. Rota PA, Bloom AE, Vanchiere JA, Bellini WJ. Evolution of the nucleo-protein and matrix genes of wild-type strains of measles virus isolated from recent epidemic. *Virology* 1994; 198: 724-730.
 31. Paul Y. OPV cannot eradicate polio from India: Do we need any further evidence? *Vaccine* 2008; 26: 2058-2061.

Polio Eradication and Environment

Whenever we talk of dealing with infections, we think only in terms of research and development of vaccines and drugs. What we forget are the basics *i.e.*, poor environmental sanitation and public health system. This holds as much true in the case of Polio Eradication Program (PEP) as for others. Consider the following quotes:

ENVIRONMENT: THE MISSING LINK IN POLIO ERADICATION PROGRAM

“Improved sanitation explains the virtual eradication of Polio from the USA in the early 1960s, when only about two-thirds of the population was immunized with the Salk vaccine, and the subsequent absence of circulating wild-type polio viruses in the United States and Europe. Poor sanitation and crowding have permitted the continued transmission of poliovirus in certain poor countries in Africa and Asia, despite massive global efforts to eradicate polio, in some areas with an average of 12-13 doses of polio vaccine administered to children in the first 5 years of age”(1).

“The science, applied in repeated vaccination campaigns, had also begun to perplex the public why repeated doses? Hasn't my child been protected enough? Why must we do it round after round year after year? And why is my child still infected by polio when he has been vaccinated many times”..... In industrialized countries children

were sufficiently protected after receiving three doses of OPV, usually through routine immunization. For developing countries, epidemiologists had yet to determine exactly how many doses were enough due to the presence of a host of other viruses in unhygienic environments. The practice of open defecation and fecal contamination of drinking water easily precipitated viruses' transmissions. Children's vulnerability to infections and diarrhea somehow reduced the efficiency of each dose of OPV in fighting the poliovirus. More than three doses were thus required for developing countries, delivered through the NID, a supplementary immunization activity to bring additional dosage to children, including newborns. For India, where 80% of its rural population had no toilet at home, the Ministry of Health and Family Welfare recommended eight to ten doses for each child”..... “There was also a difference between protecting the child from the virus and eradicating the disease..... A child adequately protected from the virus would not lead to disappearance of the disease in the environs. As long as there were other children unvaccinated or inadequately protected with enough dosage, the virus would continue to thrive. As the virus was discharged from the guts of infected children or adults by means of feces, the untreated human waste often ending up in open sewers, lanes and rivers—would become the source of transmission for others. Once out in the open, the virus looked for human

bodies to host it. Children in the surroundings who were either inadequately immune or worse still, unvaccinated at all, would succumb to its lethal, crippling effect. The eradication of polio thus called for rounds after rounds of campaign to vaccinate every targeted child, including the annual cohort of 25 million newborns in India”(2).

ON THE SCENARIO OF SANITATION IN INDIA

“Half of the Indians, let’s say over 500 million people, have no access to toilets..... One out of every five people worldwide with no access to basic sanitation facility is an Indian.” [Jon Lane, Head of the Water Supply and Sanitation Collaborative Council of Geneva, Switzerland](3).

ON THE ECONOMIC ASPECTS

1. “By 2005, we had spent more than 25 billion rupees in the polio eradication campaign. We had further borrowed a loan of 180 million US\$ from the World Bank”(4-6).
2. “The Cabinet Committee on Economic Affairs (CCEA) on Friday decided to implement the Polio Eradication Strategy recommended by experts for the period 2007-09, with an expenditure of Rs. 2344.56 crores”(7).
3. “The Union Budget for the year 2007-2008 allocates Rs. 1290 crores for polio eradication(8). Rest of the money needed for the program to be accessed from external funds”(7) and the “Union budget this year has increased the allocation for sanitation to Rs. 1200 crores”(8).
4. “If the government spends \$ 1 on sanitation, it actually gains \$ 9, (quoting WHO statistics)” [Jon Lane](3).
5. “Due to poor sanitation, people in India face many health hazards and in monetary terms the cost to the country of treatment of such ailments is Rs. 2 billion and the lost of working days due to it is worth Rs. 3 billion. An improved toilet system would help India save Rs. 5 billion every year which can be utilized for the benefit of economically weaker sections of society.” [APJ Abdul Kalam, former President of India](3).

COMMENTS

It is clear from above that we need to have a relook at our priorities and reallocate our finances accordingly. A good environmental sanitation is going to be, by far, the biggest help in eradication of poliomyelitis. In the absence of this we will continue to debate on the number of doses of the vaccine or the number of rounds of vaccination needed for eradication. Even, whether at all we will be able to do so or which vaccine is superior.

Much of the resistance seen in the program is not against the program per se but to the chronic apathy to providing the basic amenities: “Meerut residents use pulse polio campaign to voice their concerns..... during a pulse polio drive on Sunday, officials had to face the opposition from the locals who furnished a list of their demands.....the government is spending hefty amount of money on the pulse drive, which is useless unless our living conditions are improved, charged the local residents.” *Hindustan Times* (page 3, August 4, 2006 New Delhi).

The United Nations has quite appropriately declared 2008 as year of sanitation. The Indian Academy of Pediatrics (IAP) needs to grasp this opportunity and take it as a mission and a crusade to focus on intensive efforts in the field of improving environmental sanitation and public health system. Every occasion, every opportunity should be taken to press this point.

“Changes are brought about not by those with credentials but by those with concern” (anonymous).

Funding: None.

Competing interests: None stated.

Ajay Kalra,

Professor of Pediatrics,

SN Medical College, Agra, UP, India.

E-mail: drajaykalra@yahoo.com

REFERENCES

1. Simoes EAF. Polioviruses. In: Behrman RE, Kliegman RM, Jenson HB. Nelson Textbook of Pediatrics. 18th Edition. New Delhi: Saunders Elsevier; 2008. p. 1344.
2. The OPV condundrum. A critical leap to polio eradication in India. Unicef regional office for

- South Asia. Working paper June 2003, page 13. Minutes of the informal meeting of Experts for Polio Eradication, India. www.unicef.org/rosa/critical.pdf. Accessed on 16.03.2008.
3. Improving sanitation in India will cut down the disease treatment cost. www.indiaenews.com/india/2007/105/79035.html. Accessed on 16.03.2008.
 4. Sathyamala C, Mittal O, Dasgupta R, Priya R. Polio eradication initiative in India: Deconstructing the GPEI. *Int J Health Services* 2005; 35: 367-383.
 5. World Bank. Project Appraisal document: on a proposed IDA credit in the amount of sdr 106.5 million (US \$ 142.6 million equivalent) to India for an immunization strengthening project, 32. Health and Nutrition and Population sector unit, South Asia Region 2000.
 6. World Bank. Supplemental credit document. International development association, proposed supplemental credit of SDR 59.5 million (US \$ 83.4 million equivalent) to India for the Immunization Strengthening Project, Human Development Unit, South Asia Region, 2003.
 7. Rs. 2344 cr polio eradication program cleared. www.in.news.yahoo.com/20080308/r_t_ie_nl_politics/tnl-rs2344cr_polio_eradication_program_0058794.html. Accessed on 16.03.2008.
 8. Budget 2007, Budget 07-08, India budget 2007-08. The strategy for polio eradication is revised. www.exim.indiamart.com/budget2007-08. Accessed on 16.03.2008.

IPV Revisited... Yet Again !

INTRODUCTION

Several years back, we reviewed literature on Inactivated Polio Vaccine (IPV)(1,2) including immunogenicity, protective efficacy, safety profile, local immunity, herd protective effect, duration of protection, feasibility of introduction and cost considerations. Thereby we suggested its phased introduction in the routine immunization program, beginning with states free from poliomyelitis for at least 3-5 years(1,2). This was ignored amid the hype that eradication was 'just round the corner'; and could be accelerated by pumping in more doses of OPV. Further, evidence that vaccine associated paralytic poliomyelitis (VAPP) is a serious problem(1-4) was also downplayed(5,6). Naturally, the additional argument that India should indigenously produce IPV, rather than rely on imports was also drowned in the din (7,8).

It is, therefore, ironic that IPV is now regarded an essential tool that should be used in "campaign mode" and "given as per the availability of doses"(9). These recommendations of Indian Academy of Pediatrics experts, temporally coincide

with availability of IPV in the Indian market. Although we were the first to suggest using IPV almost a decade back, we are in complete disagreement with the motives and methodology proposed recently by the IAP expert group. This article highlights the scientific arguments behind this disagreement and once again proposes a rational frame-work for India.

ISSUE 1: WHY IS IPV IMPORTANT IN INDIA?

1.1 There are four major reasons:

1. OPV used in the current manner has failed and cannot ensure eradication of poliomyelitis, at least in the near future. Therefore either it should be used more judiciously (strengthening routine immunization and down-scaling aggressive pulse polio campaigns) or we should switch to an alternate vaccine. Further, the current program in India is only focused at recording absence of virologically confirmed wild poliovirus cases (zero-polio status) for three consecutive years and calling this 'eradication', although this is not the true sense of the term(1).