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### *Letters to the Editor*

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#### **Did India have the World's Largest Outbreak of Poliomyelitis Associated with Injections of Adjuvanted DPT ?**

The recent report of an explosive outbreak of poliomyelitis in an orphanage in Delhi(1) and the subsequent correspondence(2,3) have highlighted the phenomenon of 'provocation poliomyelitis'. If an intramuscular injection is given during silent poliovirus infection, paralysis may set in within a day or two. In a community in which poliovirus circulation is intensive, children are at increased risk of developing paralysis for one month after the injection; only those children who happen to get infected during that interval are at risk. The more intensive the endemicity of polioviruses, the greater the probability of provocation poliomyelitis.

Dr. Wyatt wrote(2): "The dangers of poliomyelitis following intramuscular injections given to children in institutions have been known for eighty years. It is surprising and very fortunate that far more incidents have not occurred, although some may not have been reported". Indeed, many outbreaks may not even have been recognized as due to provocation by injections. I wish to point out that India had a poliomyelitis outbreak of gigantic proportions, lasting a decade from 1979 till 1988, and it is my hypothesis that it was largely due to faulty immunization policies resulting in infants and children having been put at increased risk of poliomyelitis partly by provocation by intramuscular injections, largely of DPT, while many of them were

not protected from poliomyelitis by immunization.

*Fig. 1* illustrates the numbers of officially reported cases(4) of poliomyelitis in India from 1974 to 1994. The graph should be examined in three phases, namely, pre-EPI (1974-1978), polio outbreak (1979-1988) and polio control (1989-1994). India launched EPI in 1977 and immunization started in the next year. Since 1978, there was a "paradoxical" increase in the reported cases of polio. Theoretically better reporting could have increased the numbers, but there is no evidence that reporting had improved. There is independent evidence of increased incidence of poliomyelitis, including an unprecedented nation-wide polio outbreak with steep increase in the numbers of children admitted in hospitals in many regions of India in 1980-81 and yet again in 1987-88. It is obvious that during these ten years two opposing forces were operating, one to reduce the incidence by immunization with OPV and another unidentified factor that actually resulted in increased incidence; the latter is postulated to be the provocation of polio by the many millions of DPT injections given without ensuring adequate immunization and protection against polio.

From the time OPV was introduced in EPI, there must have been increasing proportions of infants being protected, resulting in decreasing incidence of "natural" polio (somewhat like the graph of polio after 1988), if an opposing force was not operating. Cases in excess could be attributed to the opposing force. My estimate is that about two million children developed poliomyelitis during this decade-long outbreak, in excess of what could have been expected in the face of immunization

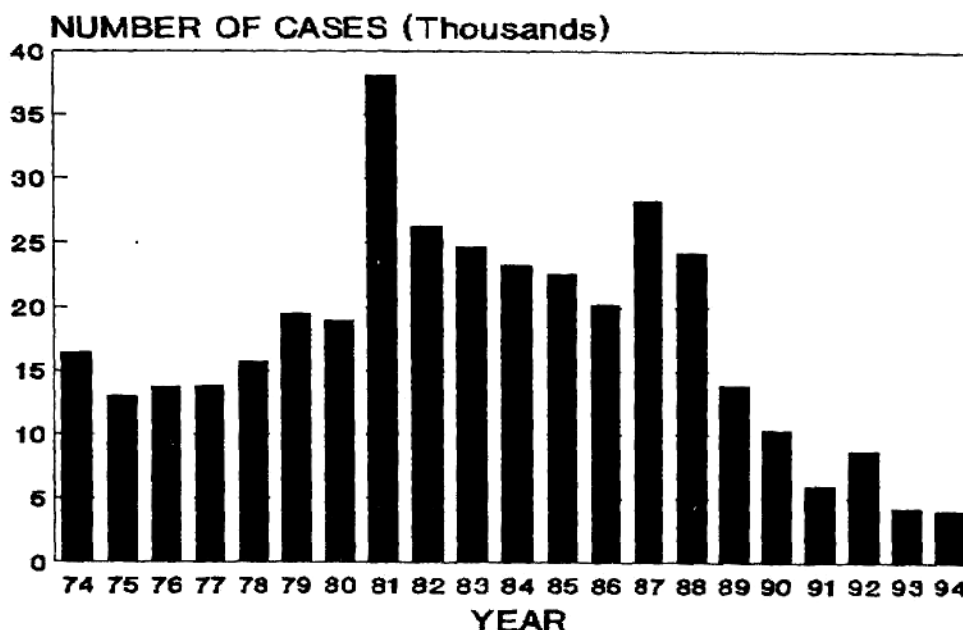


Fig 1 The reported(4) annual numbers of cases of paralytic poliomyelitis in India during two decades, 1974 to 1994

against polio. For arriving at this estimate I have assumed a reporting efficiency of 10%; in other words, only one in ten cases were being reported throughout the polio outbreak phase.

Even before the launching of EPI it had been clearly and repeatedly documented that 3-dose OPV regimen was inadequate for individual protection of a significant proportion of vaccines. The then target of 85% coverage with 3 doses could not have achieved good control of poliomyelitis in our country. Therefore, the force intended to reduce the incidence of polio by giving 3 doses of OPV was grossly inadequate to oppose the forces of intense virus transmission and the provocation of polio by DPT, both tending to increase the incidence of polio. Worse still was that in the early years of EPI, millions of DPT injections were given to infants without giving them even a single dose of OPV. Ultimately, by the late

1980's the cumulative effect of continuous and widespread coverage with OPV had resulted in the retardation of the circulation of polioviruses as evidenced by the steady decline of the numbers of reported cases of polio.

In summary, the "excess" cases of poliomyelitis were due to two defects in the immunization programme. One was the sub-optimal immunization using inadequate number of doses of OPV resulting in "vaccine-failure" cases of poliomyelitis. The incidence of vaccine-failure cases could not have been higher than its incidence prior to the establishment of EPI (see the pre-EPI phase of *Fig. 1*), but indeed it would have been much less. The second was the failure to factor in the risk of provocation poliomyelitis due to DPT injections in the immunization scheduling. As Dr. Wyatt has pointed out, this risk also was known long before the launching of EPI.

A detailed and careful analysis of the history of polio control in India from the time of the establishment of EPI must be undertaken to throw further light on this matter. It would be appropriate for the Government of India to appoint an expert enquiry commission to investigate the sequence, causes and effects of these events. If injury and injustice had been done to children and their families, they deserve to be informed and compensated.

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## Impact of Maternal and Child Health Strategy on Child Survival

In a recent paper on this subject(1), the authors studied mortality rates in twelve villages of Pondicherry and compared these with data from a health survey conducted in 1967, prior to the setting up of a comprehensive health delivery system in this area. The inputs consisted of two medical officers, three public health nurses, two auxiliary nurse-midwives, two pharmacists, one social worker, one sanitary inspector and a vehicle available throughout the day and night for any emergency transport. There was also considerable input in health and nutrition education. The response of the community regarding antenatal visits, delivery by trained personnel and immunization was extremely good. Ninety four per cent deliveries were conducted by trained personnel. Besides, there was a very active ICDS project in the area and most pregnant women and children took advantage of the food supplement of-

fered. While the mortality rates have come down considerably, certain points of interest and concern emerge. Although there is no difference in IMR between the cohort study and the sample registration scheme (SRS) data from rural Tamil Nadu (64/1000 live births in both), there is a great deal of difference in the neonatal mortality. Neonatal mortality as a percentage of infant mortality is 54.7% in the cohort studied. The figures for rural Tamil Nadu and rural India are 83.1% and 63.7%, respectively. Obviously the neonatal mortality has been reduced considerably due to the inputs mentioned earlier, but it has not made a similar impact on the post-neonatal mortality, in spite of ready access to health services. This is a pointer to the importance of other socio-economic factors such as education, environment, income, nutritional status, *etc.* Importance of birth weight and gestation (regarding which we have no information in the paper) cannot be overlooked because low birth weight babies both term and pre-term continue to have higher neonatal and infant mortality rates