

## **ISOLATION OF POLIOVIRUS FROM CASES OF ACUTE FLACCID PARALYSIS**

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**Objective:** To evaluate the frequency of isolation of polio and other viruses from fecal samples in subjects with acute flaccid paralysis in northern parts of India. **Setting:** Rural and Urban Immunization Centers used for Expanded Programme on Immunization. **Methods:** 219 fecal samples were collected by anal tube in 1992 from Punjab, Haryana, Himachal Pradesh and Chandigarh and processed for virus isolation. **Results:** Of 219 fecal samples, 103 (47%) were positive for viruses in the age group of 3 mo to 5 yr. Amongst the positive samples, the predominant isolate was poliovirus type 1 (70.9%) from all the States. Non polio enteroviruses were isolated from 20.4% of fecal samples. **Conclusion:** Even though poliovirus is still the most common etiologic agent for acute flaccid paralysis in northern India, non polio enteroviruses are also emerging as important causal pathogens in this condition.

**Key words:** Acute flaccid paralysis, Poliomyelitis, Enterovirus.

**I**N India oral polio vaccine (OPV) was included in the Immunization Mission since 1979. Despite significant decline, poliomyelitis still continues to be a problem among "under 5" children in India. The coverage level with three doses of OPV in children below twelve months of age in 1990-91 was estimated to be around 75-80% and declining trend of poliomyelitis was recorded. The incidence of poliomyelitis in India has declined from 28,350 cases reported in 1987 to 5669 in 1991(1), which is likely to decline further with the introduction of pulse polio programme by Government of India in 1994. The main aim of this programme is to immunize all children below three years with two shots of OPV irrespective of the previous immunization status.

In May 1988 at the World Health Assembly, WHO had committed for the global eradication of poliomyelitis by the year 2000(2). All the countries in South East Asia region have prepared their

national plan of action for poliomyelitis. One of the strategies included is the epidemiological and laboratory investigations of cases of flaccid paralytic disease and also appropriate outbreak response. In 1990, Central Research Institute, Kasauli was identified as one of the National Laboratories for isolation and identification of poliovirus from stool samples of cases of poliomyelitis from the northern states of India.

The present study was undertaken to confirm the clinical findings of poliomyelitis cases in the laboratory by isolation and identification of polioviruses. Prevalence of the type of poliovirus causing the disease and age-wise distribution of cases were also studied.

### **Material and Methods**

Two hundred and nineteen fecal samples of patients with acute flaccid paralysis were received in 1992 from the

Immunization Officers of the states of Punjab, Haryana, and Himachal Pradesh and U.T. Chandigarh. The samples collected by the anal tube method were transported to the laboratory in transport medium under cold chain. On receipt the samples were processed for virus isolation as per the method recommended by WHO(3). Identification of the isolates was done using monospecific serum against the three types of poliovirus.

### Results

A total of 219 fecal samples were processed. Highest number 111 was received from Haryana followed by 75, 25 and 8 samples from Punjab, Chandigarh and Himachal Pradesh respectively. Of these, 103 (47%) samples were found positive and 116 (53%) negative for poliovirus. The rate of virus isolation ranged from 40 to 60% and all the 8 samples from Himachal Pradesh were negative. A total of 55, 72, 29, 20, 8 and 16 samples were received from cases in the age group 6 months to 1 year, 1-2 years, 2-3 years, 3-4 years, 4-5 years and >5 years respectively and positive isolations varied from 37.5 to 56.25% (Table I).

Table I shows the distribution of samples of cases in different age groups. There were significant higher number- of cases and positive isolations in the age group ranging from 6 months to 5 years. The highest number (n=72) and positive isolates (n=37) were observed in the age group 1 to 2 years.

In the samples found positive (Table II), predominant was poliovirus type 1 (60-80%) in all the places. Poliovirus type 2 was isolated in three samples only from Punjab. Poliovirus type 3 was isolated in 1, 2 and 1 samples from Punjab, Haryana and Chandigarh respectively. Isolation of mixture of two poliovirus types (1+2 and 1+3) was found in one sample each received from Haryana. Isolation of non-

polio enteroviruses was 11.1%, 31.1% and 15.4% samples from Punjab, Haryana and Chandigarh respectively.

### Discussion

A high incidence of paralytic poliomyelitis is reported in India(4). The present study shows that large numbers of cases of poliomyelitis are prevalent in the northern parts of India. 47% of samples found positive for poliovirus indicates that large number of population is at risk. Identification of poliovirus type 1 in most of the samples (60-80%) shows that it is the pre-dominant causative agent of poliomyelitis. Poliovirus type I has been reported as the major causative agent of poliomyelitis in India by various workers also(5-9). Isolation of non-poliovirus in 11-31% samples indicates that immunizations with trivalent OPV does not take care of the disease caused by non-polioviruses. Such a situation clinically can mislead for OPV failure. Hence laboratory diagnostic support is important in such cases. However, non-isolation of poliovirus from a case of suspected poliomyelitis does not mean that the child is not suffering from the disease; confirmation of residual paralysis after 60 days follow up is mandatory.

Age-wise distribution of cases show that there was great variation in the number of cases and positive isolates in different age groups and large number of samples were from cases in the age group ranging from 6 months to 4 years, and highest number being in the age group 1-2 years, thus indicating the highest prevalence of disease in the age group 1-2 years. The same pattern has been observed from all the places and the age at risk is from 6 months to 4 years suggesting that vaccination must be completed before 6 months of age.

Sokhey(1) reported the shift of the disease age to 12-23 months. Kakre *et al.* (10) also reported that the median age

TABLE I—Age-wise Distribution of Cases with Positive Fecal Samples

Age	Punjab		Haryana		Himachal Pradesh		Chandigarh		Total	
	n	+ve	n	+ve	n	+ve	n	+ve	n	+ve
<3	0	0	3	0	1	0	1	0	5	0
3-6 mo	4	2 (50.0)	8	2 (25.0)	1	0	1	1(100)	14	5 (35.7)
6m - 1Yr.	21	11 (52.4)	25	11 (44.0)	1	0	8	4 (50)	55	26 (47.3)
1-2 Yrs.	19	14 (73.7)	45	19 (42.4)	2	0	6	4 (66)	72	37 (51.6)
2-3 Yrs.	10	5 (50)	15	8 (53.3)	2	0	2	1 (50.0)	29	14 (48.3)
3-4 Yrs.	8	6 (75)	8	2 (25.0)	0	0	4	1 (25.0)	20	9 (45.0)
4-5 Yrs.	6	3 (50)	2	0	0	0	0	0	8	3 (37.5)
>5 Yrs.	7	4 (75)	5	3 (60)	1	0	3	2 (66.6)	16	9 (56.3)
Total	75	45 (60)	111	45 (40.5)	8	0	25	13 (52)	219	103 (49.3)

Figures in parentheses indicate percentages.

TABLE II—Identification of Polio and Non-Polioviruses in Positive Fecal Samples

State	No.	Poliovirus type			Poliovirus types		Non-polio enteroviruses
		1	2	3	P <sub>1+2</sub>	P <sub>1+3</sub>	
Punjab	45	36 (80.0)	3 (6.6)	1 (2.2)	0	0	5 (11.1)
Haryana	45	27 (60.0)	0	2 (4.4)	1 (2.2)	1 (0.2)	14 (31.1)
Himachal-Pradesh	0	0	0	0	0	0	0
Chandigarh	13	10 (76.9)	0	1 (7.7)	0	0	2 (15.4)

Figures in parentheses indicate percentages

of onset of poliomyelitis was 9 months with the range from 6 months-24 months. In the present study also in the age group 1-2 years, maximum number of cases was observed. Poliovirus type 1 was predominantly causing the disease. Proper vaccination against this preventable disease is essential. Alternative strategies are required besides vaccination where other non-polio enteroviruses are isolated from patients with acute flaccid paralysis.

In conclusion, even though poliovirus is still the most common etiologic agent for acute flaccid paralysis in northern India, non polio enteroviruses are also emerging as important causal pathogens in this condition.

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