

ACUTE POLIOMYELITIS IN CHILDREN: COMPARISON OF EPIDEMIOLOGICAL AND CLINICAL FEATURES AMONG IMMUNIZED, PARTIALLY IMMUNIZED AND UNIMMUNIZED

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ABSTRACT

This study was conducted to compare the epidemiological and clinical features of acute poliomyelitis among immunized, partially immunized and unimmunized, as these have been postulated to be different amongst these sub-groups. Of 614 children with acute poliomyelitis admitted at the Institute of Child Health, Madras, 162 (26.4%) were immunized, 183 (29.8%) were partially immunized and 269 (43.8%) were unimmunized. Poor environmental sanitation, unprotected water source and parental illiteracy were significantly more common among unimmunized group compared to the immunized group. It is concluded that there is no significant difference in symptoms, signs, clinical types, severity of paralysis and case fatality between the immunized, partially immunized and unimmunized.

Key words: Acute poliomyelitis, Immunized, Partially immunized, Unimmunized, Clinical features.

Immunization has been considered as the most cost-effective intervention meant for the prevention of poliomyelitis along with provision of sanitary facilities(1). Poliomyelitis among fully immunized with 3 doses of trivalent oral polio vaccine (TOPV) is a recognized phenomenon in India(2-4). In those who had 3 doses of TOPV, but were not protected against the disease, it is reported to have reduced the severity of the paralysis(5-7). The objective of the study was to determine whether the paralysis and its severity, the clinical types and the epidemiological features are different amongst the immunized compared to partially immunized and unimmunized.

Material and Methods

Cases of acute poliomyelitis (APM) admitted during January, 1988 to September, 1989 in the Institute of Child Health, Madras, were prospectively recruited. The diagnosis was based on clinical grounds(8). The historical details like age of the child, immunization status, presenting symptoms were obtained and clinical examination was done by one of the principal investigator. Immunization status was verified from the records when available. The children were

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grouped into three categories namely Group A, 'immunized' when they had recovered at least 3 primary doses of TOPV, Group B, 'partially immunized' if they had received one or two doses of TOPV and Group C, 'unimmunized' if they had not received even a single dose. Chi square test was used to test the statistical significance.

Results

Age distribution

The total number of APM children recruited were 614. Males constituted 58, 56 and 57.6% among the Groups A, B and C, respectively. Immunization status of these children among various age groups is shown in *Table I*. The proportion of the three groups in different age groups are significantly different. The proportion of Groups B and C in the age group of 6-11 months is 83.5% compared to 68% for the age group >11 months.

Epidemiology

The immunization status of the APM

children among different religions did not differ ($p=0.18$). The proportion of Groups B and C children (83%) was significantly more from an environment/community who had access only to unprotected water supply when compared to 66% of Group A ($p<0.001$). A seventy five per cent of the unimmunized were from a community which practiced open air defecation compared to 56% of immunized groups ($p<0.001$). This proportion is significantly more among children of laborers and agriculturists ($p=0.03$). Nearly 60% the mothers of unimmunized APM children were illiterate compared to 44.3% of mothers of immunized ($p<0.001$). Similarly, fathers of 81% of unimmunized children were illiterate compared to 21% among immunized. Intramuscular injection was given earlier to paralysis in 74, 70.5 and 69% of Groups A, B and C, respectively and there was no significant difference ($p=0.9$).

Clinical presentation

Symptoms and clinical types of paralysis among the three groups is shown in *Tables II and III*. There was no significant

TABLE I—Acute Poliomyelitis: Age with Relation to Immunization Status*

Age (mo)	Immunized	Partially immunized	Unimmunized	Partial+ Unimmunized	Total**
0-05	2 (5.1)	15 (38.5)	22 (56.4)	37 (94.9)	39 (6.4)**
6-11	25 (16.5)	56 (36.8)	71 (46.7)	127 (83.5)	152 (24.7)**
12-23	89 (30.6)	74 (25.4)	128 (44.0)	202 (69.4)	291 (47.4)**
24-35	31 (34.4)	27 (30.0)	32 (35.6)	59 (65.5)	90 (14.7)**
≥36	15 (35.7)	11 (26.2)	16 (38.1)	27 (64.3)	42 (6.8)**
Total	162 (26.4)	183 (29.8)	269 (43.8)	452 (73.6)	614 (100)

*Figures in parentheses are row percentage except for "Total" column.

**Column percentage.

TABLE II—Acute Poliomyelitis: Symptoms with Relation to Immunization Status (n = 614)

Symptoms	Immunized n=162 (%)	Partially immunized n=183 (%)	Unimmunized n=269 (%)
Fever	150 (92.6)	172 (94.0)	257 (95.5)
Diarrhea	75 (46.3)	79 (43.2)	110 (40.0)
Vomiting	10 (6.2)	21 (11.5)	30 (11.2)
Pain limbs	46 (28.4)	42 (22.9)	46 (17.1)
Loss of head control	34 (20.9)	41 (22.4)	61 (22.7)
Feeble cry	30 (18.5)	41 (22.4)	61 (22.7)
Difficulty in swallowing	3 (1.9)	6 (3.3)	7 (2.6)
Breathlessness	12 (7.4)	13 (7.1)	15 (5.6)

p>0.05

TABLE III—Acute Poliomyelitis: Types of Paralysis in Relation to Immunization Status

Signs	Immunized n=162 (%)	Partially immunized n=183 (%)	Unimmunized n=269 (%)
<i>A. Clinical types*</i>			
Spinal	129 (79.6)	149 (81.4)	211 (78.4)
Bulbar	2 (1.2)	2 (1.1)	8 (3.0)
Spinobulbar	31 (19.2)	32 (17.5)	50 (18.6)
<i>B. Specific Paralysis*</i>			
Cranial nerves	31 (19.0)	30 (16.4)	55 (20.5)
Intercostal muscles	5 (3.1)	5 (2.7)	4 (1.5)
Diaphragm	10 (6.2)	6 (3.3)	9 (3.4)
Neck muscles	33 (20.4)	46 (25.1)	67 (24.9)
Paraspinal muscles	118 (72.8)	113 (61.8)	163 (60.6)
Abdominal muscles	45 (27.8)	52 (28.4)	75 (27.9)

*p> 0.05

difference in symptoms and clinical presentation between the three groups (p=0.6 and 0.7). The distribution of severity of paralysis of limbs among the three groups is shown in *Table IV* and the difference in the proportion of limbs involved with various grades is not statistically significant (p=0.09). The case fatality was 2.5, 3.8 and

3.9% among the Groups A, B and C, respectively and the difference was not significant (p=0.8).

Discussion

Our data shows that the proportion of unimmunized children in 6-11 months age

TABLE IV—*Acute Poliomyelitis: Muscle Power on Admission in Relation to Immunization Status Limbs Involved (n = 1047)*

Muscle power (grade)	Immunized		Partially immunized		Unimmunized	
	n	(%)	n	(%)	n	(%)
0	138	(51.30)	183	(55.79)	265	(58.89)
1	51	(18.96)	47	(14.33)	67	(14.89)
2	34	(12.64)	34	(10.37)	47	(10.44)
3	29	(10.78)	36	(10.98)	55	(12.22)
4	17	(6.32)	28	(8.53)	16	(3.56)

$p > 0.05$

group is high as compared to other age groups and confirms the observations made by earlier workers(5-7). This is due to postponing of TOPV immunization for later months of infancy since, as per the UIP, immunization needs to be completed before 12 months of age. Even if the expected coverage of 80% is achieved, still a good proportion of children shall remain unimmunized between 6-11 months. It is time to take another look into the targetted age of OPV immunization. We strongly feel that the targetted age should be brought down to under 6 months instead of 12 months.

Lack of adequate sanitary facility is an important contributing factor for the feco-oral infections like poliomyelitis. Our data has shown that unimmunized children are more among those who did not have access to protected water supply and sewerage disposal. This is in agreement with the report of Sen *et al.* regarding sanitary facilities. However, they reported no difference in source of water supply(6). These findings suggest that immunization coverage has to be intensified in this community. Besides, the population must be educated on and provided with protected water supply and good sanitary facilities. Our study confirms the reports of earlier studies that

in the unimmunized groups more cases were from poor and illiterate community compared to that of immunized group(9, 10). These factors would be contributing to the acceptability, affordability and compliance of the population in immunizing their children. Intramuscular injection as a provoking factor was reported in a high proportion among immunized children than among unimmunized children by Sen *et al.*(5, 6). Our data shows no such difference. Our data as well as some earlier studies do not find any difference in symptoms, signs and clinical types between the three groups(5-7). Few earlier studies reported better muscle power at presentation among immunized children(5,6). Our data show no such difference in muscle power among immunized and unimmunized. Mortality among these groups was also similar emphasizing the fact that the onset and course of the disease in these children did not differ among the immunized and unimmunized.

We conclude, that there were no differences in clinical presentations, muscle power and case-fatality of acute poliomyelitis among immunized, partially immunized and unimmunized. Health education and immunization program has to be effectively implemented for the most needed,

namely the poor and illiterate community. We further conclude that the age for coverage evaluation for 3 primary doses of OPV should be advanced to under 6 months instead of 12 months. Besides, research studies are needed to identify the probable reasons for vaccine failure in those cases who received 3 doses of TOPV.

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