VACCINE PREVENTABLE DISEASES IN EASTERN MAHARASHTRA--A HOSPITAL BASED ANALYSIS

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ABSTRACT

A retrospective study of hospital admissions of six vaccine preventable diseases from 1982-86 was carried out to save as a baseline data for future evaluation of vaccination programmes.

Children between1-4 years predominated the admissions in all diseases except whooping cough. The frequency of admissions of tuberculosis showed no change. Measles showed classical cyclical trend. Male female ratio was 1.8 : 1.0. The mortality rate in meningeal tuberculosis was not influenced by the immunization status. Relatively small number of admissions of diphtheria and whooping cough indicates a decline due to natural causes or due to intervention programmes.

Key words: *Vaccine preventable diseases, Hospital admissions, Morbidity.*

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India has the second largest child population in the world. Every 1.5 seconds a baby is born, *i.e.*, 55,000 babies every day, 21 million every year. Out of every 1000 babies born in a year, 100 babies die before completing one year(1).

Infectious diseases even today remain an important cause of illness and death in children(2). Inspite of rapid advances in the field of antibiotics and chemotherapeutic agents, prophylactic immunization forms the core of our policy in the efforts to eradicate communicable diseases in children. The main base of our policy in regard to prevention of communicable diseases is necessarily mass immunization programmes. There are no country-wide statistics on vaccine preventable diseases(3). There is an overt need for the epidemiological studies of these diseases. Many diseases are showing a decline in incidence and prevalence. Whether this decline is due to our mass immunization programmes or is it a part of the natural decline of the diseases due to environmental and improved socio-economic conditions is yet to be settled. An intensive immunization programme under the Technology Mission was initiated in Wardha district during 1987. A 5-year-study of hospitalized patients between 0-14 years was proposed to save as a baseline data because of its reliability.

Material and Methods

A retrospective study of hospital admissions in Kasturba Hospital of children suffering with 6 vaccine preventable diseases (tuberculosis, polio, measles, diphtheria, whooping cough, tetanus) was undertaken. Cases were defined as per the positive criteria laid down by the Government of India(4) and case confirmation was carried

out wherever possible. The Hospital is rural based and draws the cases from villages in Wardha District, the catchment area being villages around Sewagram. Admission case sheets of children between 0-14 years from 1982-86 from Pediatrics, Orthopedics and Surgery Departments were analyzed for 6 preventable diseases for which potent vaccines were available. The immunization status was classified as follows(5):

1. Fully immunized children
   (12-23 months) – BCG(1), DPT(3): OPV(3), Measles(1)
   (>24-59 months) – BCG(1), DPT(4), OPV(4), Measles(1)
   (>60 months) – BCG(1), DPT(4), Measles(1) OPV(4), DT(1)
2. Partially immunized–Some immunizations have been administered but immunization is not complete.
3. Not immunized–Not even a single dose of any vaccine has been administered.

Results

Table I shows that over a period of 5 years (1982-86) tuberculosis has not shown any significant change in the frequency of admissions. Poliomyelitis showed a peak incidence in 1984 and not a single case in 1985. Measles which had a peak incidence in 1982, showed a gradual decline till 1984 but showed another spurt in 1985.

It is observed from *Table II* that there was a general male sex preponderance in hospitalized cases of tuberculosis, poliomyelitis and measles. However, diphtheria, pertussis and tetanus showed equal frequency in both sexes.

Table III depicts that tuberculosis in infancy was lowest and showed an increase with advancing age with peaks occurring at 1-4 years and 10-14 years age groups. Of 146 cases of poliomyelitis, 56.2% occurred in the age group of 1-4 years. Of 111 cases of measles, maximum cases occurred between the ages of 1-4 years (56.8%). Pertussis showed maximum incidence in infancy. Seventeen cases of tetanus occurred before 10 years of age.

Table IV shows that of 111 children with pulmonary tuberculosis, only 54 (48.6%) were immunized. There were 3 deaths from the unimmunized group. However, in cases of meningeal tuberculo-

TABLE I–*Yearwise Distribution of six Vaccine Preventable Diseases in Children*

Diseases	1982	1983	1984	1985	1986	Total
Poliomyelitis	36	16	62	Nil	32	146
Tuberculosis						
Infants	4	2	5	6	3	20
1-14 yrs	61	55	37	55	58	266
Measles	46	17	11	28	9	111
Diphtheria	Nil	4	1	Nil	2	7
Whopping cough	2	2	6	Nil	1	11
Tetanus						
Tetanus neonatorum	Nil	1	1	Nil	1	3
Tetanus	4	4	4	Nil	6	18

TABLE II—*Sexwise Analysis of Vaccine Preventable Diseases*

Diseases	Male	Female	Total
Poliomyelitis	94	52	146
Tuberculosis	181	105	286
Measles	68	43	111
Diphtheria	4	3	7
Whopping cough	5	6	11
Tetanus	12	9	21
Total	364	218	502

TABLE III—*Agewise Analysis of Hospitalized Patients*

Age	Tuberculosis		Polio-myelitis	Measles	Diphtheria	Whooping cough	Tetanus	
	Pulm onary	Extra pulmonary					Neo-natal	Oth ers
0-1	13	7	16	13	1	7	3	–
1-4	35	63	82	63	2	2	–	5
5-9	24	49	35	23	4	2	–	9
10-14	39	56	13	12	–	–	–	4
Total	111	175	146	111	7	11	3	18

sis, 26 (38.8%) were immunized and 28 (41.8%) were unimmunized with BCG. Out of 18 deaths, 8 belonged to immunized group.

Of 146 cases of poliomyelitis, only 10 (6.8%) were fully immunized. This shows a poor coverage. All the cases of measles were unimmunized.

Discussion

This retrospective study of case records of hospitalized patients (0-14 years), demonstrates that in infancy the number of hospitalized cases of tuberculosis are very few. The reasons attributed to these finding are (*a*) difficulty to diagnose tuberculosis in infancy when the disease is in the initial stages of development; (*b*) the disease is mild in nature which does not need admission; and (*c*) the natural history of the disease as such shows less frequency in infancy.

Tuberculosis showed identical frequency throughout the five year period. Tuberculosis is common in old age and in childhood(6). The peak was observed in 1-4 years age group (34.3%). The commonest extrapulmonary sites were meninges 67 (38.3%), lymph nodes 57 (32.6%) and others 51 (29.1%).

The immunization status in pulmonary cases (48.6%) was higher than extra pul-

TABLE IV—*Immunization Status of Hospitalized Patients (0-14 Yrs) Suffering from six Vaccine Preventable Diseases*

S.No.	Disease	Immunization Comp.	Part.	No immunized	Immunization not recorded	Mortality (Rate/1000 cases)	
1.	Poliomyelitis	10	6	63	67	Nil	
2.	Tuberculosis						
(*a*)	Pulmonary	54	–	39	18	3	(27.0)
(*b*)	Meningeal	26	–	28	13	18	(268.7)*
(*c*)	Others	21	–	18	69	Nil	
3.	Measles	–	–	111	–	Nil	
4.	Diphtheria	1	2	4	–	Nil	
5.	Whooping cough	1	1	6	3	Nil	
6.	Tetanus						
(*a*)	Neonatorum	1	–	2	–	2	(666.7)
(*b*)	Others	1	2	14	1	2	(111.1)

Comp. = Complete, Part. = Partial;
* = indicates significant cases fatality rate difference between immunized and unimmunized group ($p<0.05$).

monary cases (26.8%). The mortality rate in unimmunized cases of meningeal tuberculosis was higher than that in the immunized group ($p>0.05$).

Poliomyelitis is receiving increasing attention in developing countries as a more serious and widespread public health problem(7). Hospitalized cases show only the tip of iceberg as only one in 15 poliomyelitis cases were reported to the health authorities. The peak incidence of polio in the present analysis was between 1-4 years. Of 146 patients, only 10 were immunized completely. This finding is in concordance with the polio vaccine awareness in mothers which was 46.6% as reported by Sushila Nayar *et al.*(8) whereas Phadke *et al.*(9) reported that 35% of hospitalized cases of poliomyelitis received vaccination.

Measles immunization was started recently in these selected areas. When compared with poliomyelitis, the number of cases of diphtheria and pertussis are very few and showed very poor immunization coverage. In Wardha the coverage of DPT is around 50%(8). This gives us a second thought that although the coverage is poor, the diseases with an incidence of 0.47/1000 and 5.87/1000(7) showed minimum number of cases admitted contrary to polio with an incidence of 1.3-2.5/1000(1) in preschool children. The possible reasons are: (*i*) prevalence of diphtheria and pertussis is low in this area; (*ii*) there may be natural decline in some diseases like diphtheria and pertussis or there might be an increase in poliomyelitis(11,12); (*iii*) the route of transmission is different for diphtheria, pertussis and poliomyelitis and therefore improved living might have reduced the transmission in selected diseases; and (*iv*) the need of hospitalization is different in poliomyelitis and diphtheria and pertussis. The analysis of hospital records and the

coverage surveys carried out after implementation of Universal Immunization Programme can be used for interpretation on disease trend and the effectiveness of vaccination programmes.

In conclusion, the analysis of six vaccine preventable diseases over a five year period in hospitalized children showed no change in the disease profile of tuberculosis, poliomyelitis, measles and tetanus. The admitted case of diphtheria and pertussis are small in number. The immunization coverage of these cases admitted in the hospital is poor. The above analysis indicates that children between 1-4 years need maximum protection from measles, poliomyelitis and tuberculosis. The Immunization Programme needs strengthening in epidemiology of vaccine preventable diseases.

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REFERENCES

1. Ghose S. Infant and childhood mortality. Indian Pediatr 1987, 24: 613-618.
2. Galazka AM, Lauer BA, Henderson RH, Keza K. Indications and contraindications for vaccines used in the Expanded Programme on Immunization. Bull WHO 1984, 62: 357-366.
3. Srivastava RK, Bhatnagar SK, Naresh Chand V, Mehrotra. Paralytic poliomyelitis—Rehabilitation point of view. Indian Pediatr 1985, 22: 41-45.
4. Sokhey J, Kim Farley RJ, Bhargava I. Case definitions in the surveillance of vaccine preventable disease. Indian Pediatr 1988, 25: 599-604.
5. Government of India. Evaluate Vaccination Coverage National Immunization Programme Series. New Delhi, Ministry of Health and Family Welfare, 1989, p 13.
6. Benenson AS. Control of Communicable Diseases in Man, 13th edn. Washington, The American Public Health Association, 1981, p 374.
7. Sehgal S, Bhatia R. Universal Immunization Programme. Comm Dis Bull 1988, 5: 1-9.
8. Nayar S, Ghuliani KK, Sharma KVR, *et al*. Study of evaluation of existing patterns of health care systems. ICMR. Project Report, 1985.
9. Phadke MA, Pote PD, Joshi AS *et al*. Poliomyelitis in Pune vis-a-vis immunization in urban slums. Indian Pediatr 1986, 23: 351-354.
10. Basu RN. Magnitude of problem of poliomylitis in India. Indian Pediatr 1981, 18: 507-511.
11. Sundravali N, Narmada R, Sankar, Nedunchezian, Mukundan P. Spurt of poliomylitis in Madras. Indian Pediatr 1981 18: 539-543.
12. Vijayan P, Mukundan P, Shukoor AA, Panicker CKJ, John JT. Epidemic poliomyelitis. Indian Pediatr 1985, 22: 569-573.
13. Das and Chakladar BK. An epidemiological study of paralytic poliomyelitis cases in Kasturba Hospital, Manipal. J Comm Dis 1989, 21: 183-189.