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MEASLES :

LONG-TERM COMPLICATIONS IN THE UNDER-TWO POPULATION OF A RURAL AREA

Knowledge on the epidemiology of measles in Bangladesh is limited. Extensive studies have not been undertaken. A recent study on causes of mortality among pre-school children ranks measles third among killers¹. Measles is regarded as a self-limited childhood disease in developed countries but studies from developing countries have noted the severity and high mortality of the disease especially in countries having a high level of malnutrition^{2,3}. Death rates reported from Africa range from 5–33%, whereas studies from India^{4,5} or Bangladesh⁶ have shown a much lower rate.

Dr. Nigar S. Shahid of ICDDR,B studied retrospectively the long-term complications of measles among children aged under two years in a rural area of Bangladesh. The cases were identified for measles surveillance work by field workers from November 1979 onwards. Cases occurring from March 1980 onwards were considered for sampling. The Field Assistants who carried out this survey did not have formal medical training and were not qualified to provide precise diagnosis of the cause of death. They do however have extensive experience in the diag-

nosis and treatment of diarrhoeal diseases, and the community itself has the local names for some of the common infectious diseases such as tetanus neonatorum ("*Takuria*") and measles ("*lunti* or *hum*").

A sample of the measles cases identified by the field assistants were verified by the resident doctors of Matlab who showed a 99% correlation with the finding of the field assistants.

Since 1963, the ICDDR,B (formerly Cholera Research Laboratory) has been operating a Demographic Surveillance System in 149 villages in a rural area of Bangladesh, 45 km southeast of the capital. The population of the surveillance area was 178,443 in mid-1978. The surveillance system consists of a regular cross sectional census, and longitudinal registration of vital events (births, deaths, migrations and marriages). The field procedure for the collection of the demographic data consists of a four-tier system and has been reported elsewhere⁷.

The measles epidemic in 1980 started in the middle of March and reached a peak between 15th and 22nd March and then tapered off during the last week of April. There were 2,219 cases of measles

amongst all age groups (1.24% prevalence rate). Of all these cases, 763 (34.4%) were among children aged less than 2 years. A ten percent sample from this group (75 cases) were taken into the study and identified from the computer list of the cases. Four villages within the 2 miles radius of the field hospital had 45 cases and were considered as stratum A. Three villages situated further than 2 miles from the field hospital village had 30 cases and were considered stratum B. Controls without measles were selected from demographic records already available. A control was matched from the same village, and within the same age group (± 1 month). The study which was conducted 5 months after the epidemic showed 90% concordance between the mothers' recall and survey results.

Seventy-five cases of measles were included in the study. The mean duration of the diseases was 7.5 days with a standard deviation of ± 3.9 . The age distribution of the cases was, 31 cases among children aged under six months, 19 cases between 6–12 months, 16 cases between 13–18 months and 10 cases

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between 19–24 months. The youngest case was 67 days old.

Complications

Out of the 75 cases studied, 52 (69%) developed at least one complication. Table I shows that children who had rash for 7 days or less, developed more complications. A significant association was found between difficulty in

TABLE I. ASSOCIATION BETWEEN LENGTH OF MEASLES RASH AND DEVELOPMENT OF COMPLICATIONS FOLLOWING CLEARANCE OF RASH

Complications		Duration of Measles Rash		P. Value
		1–7 days	8–15 days	
Difficulty in respiration	+	16	5	.09
	–	30	24	
Ear discharge	+	10	2	.05
	–	30	27	
Conjunctival dryness	+	12	4	.14
	–	34	24	
Length of diarrhoea in days	1–10—	18	7	.05
	> 10—	9	13	



The measles surveillance work was done by field assistants, who do not have formal medical training, but 99% of the measles case identified by them were confirmed by doctors.

respiration, ear discharge, conjunctival dryness and length of diarrhoea.

Children aged less than 1 year developed significantly more complications than those who were between 1 and 2 years old. Complications were highest in the 7–12 month age group. However, there were no correlation between development of complications and distance of the patients' home from the treatment facilities. Children within 2 miles radius of the hospital reported significantly more ear discharge than those living further than 2 miles from the hospital. The hospitalization rate for diarrhoea was higher among cases living

closer. Out of the 75 cases, only one died. The age of the child was 23 months and the immediate cause of death was dehydration due to diarrhoea. No history of hospitalization was given and the death occurred on the 25th day after the onset of rash. The child was from a village which was more than 2 miles from the hospital.

Cases versus Controls

Table II lists the complications in measles and shows that difficulty in respiration, mucoid diarrhoea, bloody diarrhoea, ear discharge, and presence of diarrhoea were symptoms more often recorded and this was more significant in cases than among controls. Conjunctival dryness was found more often among cases than controls and this was directly related with the incidence and duration of diarrhoea in days. No difference was found in the duration of rash and in the complication rates between the two sexes.

Maternal immunity against measles also tends to decline by the fourth month, so malnourished children also had a higher rate of diseases by the end of the first six months of life. In this study, children aged between 7–12 months have shown a higher rate of complication than any other age group. It was found that when the duration of the rash was less than 7 days, the children developed significantly more complications after clearance of the rash, than did the children having a prolonged skin rash. The complications most often mentioned were as follows:-

TABLE II. FREQUENCY OF DISTRIBUTION OF SYMPTOMS IN MEASLES CASES (AFTER CLEARANCE OF RASH) AND IN CONTROLS (AFTER MARCH 31, 1980)

Variables	Cases		Controls		P. Value
	+	–	+	–	
1. Cough (1)	30	46	56	21	P < .01
2. Difficulty in respiration (1)	21	55	5	72	P < .01
3. Watery diarrhoea (1)	36	40	43	34	N.S.
4. Mucoid diarrhoea (1)	32	44	15	62	P < .01
5. Bloody diarrhoea (1)	16	59	7	70	P < .05
6. Fits with fever (1)	4	72	3	74	N.S.
7. Fits without fever (1)	4	73	0	77	N.S.
8. Ear discharge (1)	12	64	2	75	
9. Diarrhoea (any type) (1)	69	6	19	56	P < .01
10. Anaemia (2)	30	44	33	42	N.S.
11. Skin infection (2)	6	69	4	73	N.S.
12. Enlarged liver (2)	9	66	12	65	N.S.
13. Enlarged spleen (2)	1	75	3	74	N.S.
14. Ear discharge at present (2)	4	72	1	76	N.S.
15. Conjunctival dryness (2)	16	58	5	68	P < .01

(1) from history taking
(2) on clinical examination

difficulty in respiration (28% of cases), ear discharge (16%), various types of diarrhoea (92%), conjunctival dryness (21%).

Cases with measles had significantly more mucoid and bloody diarrhoea than the control group. This study found that the measles attack rate was 36% in the under-two population and 24% in the under-one population.

RECOMMENDATIONS

The following areas were identified for further research.

1. To know at what age protein-calorie malnutrition sets in by taking the pre-albumin levels of children in this period. Since 24% cases occurred in children below 1 year of age it would be interesting to know the age at which maternal immunity tends to decline. A prospective study could be carried out to note the level of nutrition of the children shortly before measles and after. This would enable us to examine the interaction of nutrition and measles. Correction of nutritional status could be done by giving supplementary food and noting whether complication rates are affected by the improvement of nutritional status.

2. To study exactly how much weight is lost during an attack of measles and the level of nutrition in the children who get measles at an earlier age. Does diarrhoea persist after correction of the nutritional status by supplementary diet? What is the vitamin A level of the children at the time of the attack and does xerophthalmia occur in children who are given vitamin A supplement? Does health education given to mothers prevent the development of complications?

3. The attitudes and beliefs towards measles in rural Bangladesh could be explored.

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DRUG OF CHOICE FOR TREATING SHIGELLOSIS *

Immediately after a nationwide outbreak of *Shigella dysenteriae* type 1, shigella resistant to ampicillin were isolated. Because ampicillin is the drug of choice, resistance of the isolates to the drug gave rise to the need for an alternative drug for the treatment of shigella dysentery. A clinical trial was conducted in Matlab to compare the efficacy of trimethoprim-sulfamethoxazole (TMS) and ampicillin (AMP) for the treatment of shigella dysentery. Patients with symptoms of dysentery and no other complications were randomized into two treat-

ment groups. One hundred and eighteen patients ranging from 6 months to 65 years of age were entered into the study, 55 were treated with AMP, and 63 with TMS.

Patients in the two groups were comparable with respect to age, sex, presenting complaints, stool examination and the shigella strains isolated. On admission the percent of patients presenting with fever of 101°F or more was 30% vs 28%, severe dehydration (14% vs 15%) or the mean initial WBC (16,000 vs 15,000) did not differ significantly between groups. All

TABLE I. COMPARISON OF SHIGELLA PATIENTS RANDOMIZED TO AMPICILLIN (AMP) VS TRIMETHOPRIM-SULFAMETHOXAZOLE (TMS) TREATMENT GROUP

Comparison	Percent of Total		P. Value*
	AMP (N=55)	TMS (N=63)	
Age (years)			
0-4	58	59	
5-14	14	16	NS
15+	28	25	
Sex-% Male	64	65	NS
Presenting Complaints			
Abdominal pain	98	100	NS
Tenesmus	98	97	NS
Blood in stool	89	92	NS
Vomiting	57	49	NS
Fever	95	97	NS
Stool examination			
WBC < 10	11	9	
11-25	23	29	NS
26+	66	62	
Blood	63	63	NS
Mucous	96	97	NS
Shigella strains			
<i>dysenteriae</i> type 1	47	47	
flexneri	45	44	NS
other	8	9	

* CHI square test

- Koster FT, Aziz KMA, Haque A, Curlin GT. Measles in Bangladesh: synergy between measles, diarrhoea and malnutrition. In: Annual report of Johns Hopkins University International Center for Medical Research, 1976-77. Baltimore, Md., 1977:29-32.
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the patients responded well to both the regimens of treatment. However, patients who took TMS had a significantly shorter duration of fever, abdominal pain and persisting stool mucous and blood than those taking ampicillin.

A two year old girl in the ampicillin group had clinical dysentery for 14 days even though her

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Epidemiologic Pattern of Diarrhoea Caused by Non-Agglutinating Vibrio (NAG) AND EF-6 Organisms in Dacca/Moslem-uddin Khan, M. Shahidullah. June 1981. (Working paper no 21)

Diarrhoea due to non-agglutinating vibrio (NAG) has been present in Dacca for a long time. The NAGs and a new organism EF-6 caused a severe diarrhoea epidemic in Dacca

in 1976 and 1977. The most common NAGs detected were groups II, V and VII which were present all the year round with peak in the spring and postmonsoon seasons, whereas EF-6 appeared in October and attained its peak in March NAG diarrhoeas occurred in all areas of the city with a higher incidence in poor areas, simulating the distribution of cholera. EF-6 diarrhoea were also detected in the poor areas. Although NAG and EF-6 infected all age groups, the

attack rates in males were twice as high as in females and EF-6 more often affected the age group 0-4. The overall secondary attack rates in contacts of NAG groups II, V and VII ranged from 10% to 25%. None in the EF-6 group affected families. Open sources of water were very often contaminated with NAGs. Twentyfive percent of the open sources were infected, although there were no active cases in the neighbouring families. About half of the isolates from contacts and water sources were of groups other than the index case. NAGs were commonly found in the environment, but very few EF-6. Water was probably the vehicle of transmission for these organisms.

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stool had no shigella after day 2. On day 14 she was treated with TMS and recovered within 48 hours. The mean WBC count and the percent of bands had returned to normal in both groups of patients 5 days after treatment began. Table II gives the sensitivity percentage of

with TMS recovered from their symptoms more rapidly and that may make it a preferred antibiotic in treating severe shigella dysentery. The pattern of antibiotic resistance does seem to correlate with clinical recovery and should be monitored to insure the most effective therapy.

Protein-Losing Enteropathy in Diarrhoea: Application of α_1 -Antitrypsin Assay/M. A. Wahed, M. Mujibur Rahman, R. H. Gilman, W.B. Greenough III, S.A. Sarker. August 1981. (Working paper no. 22).

Protein-losing enteropathy (PLE) has been documented in several disorders, but little is known about it in diarrhoeal diseases of various etiologies. As diarrhoea and malnutrition are closely inter-related, determination of the role of direct loss of plasma protein in diarrhoeal diseases was considered to be important. By assaying α_1 -antitrypsin in both stool and serum and using the ratio, it was possible to document that 87% of patients with shigellosis, 63% with infection due to enterotoxigenic *E. coli*, and 42% with rotavirus were associated with protein-losing enteropathy. None with cholera or healthy subjects without diarrhoea were positive for PLE. In this population it was noted that presence of pus cells and red blood cells in the stools was strong evidence of both PLE and shigellosis. A summary of this paper appeared in the October issue of Glimpse 1981.

TABLE II ANTIBIOTIC RESISTANCE PATTERN OF SHIGELLA STRAINS ISOLATED DURING THE TREATMENT TRIAL AT MATLAB, 1977-1979

Antibiotics*	% Resistant			
	Shiga (N=55)	Flexneri (N=53)	Others (N=10)	Total (N=118)
Tetracycline	93	74	75	93
Ampicillin	5	7	20	7
Chloramphenicol	0	8	0	4
Kanamycin	0	5	0	2
Gentamicin	0	0	0	0
Streptomycin	94	89	80	91
Trimethoprim-sulfamethoxazole	5	0	20	3

* Disc sensitivity

the 118 shigella isolates tested. It was found in this study that trimethoprim-sulfamethoxazole and ampicillin are both effective in the treatment of severe shigellosis. While candida is a recognized side effect of ampicillin treatment, we found an almost equal number of patients with oral thrush in each treatment group. Few of the shigella isolated in this study were resistant either to ampicillin or trimethoprim-sulfamethoxazole. Patients treated

*** A Clinical Trial of Ampicillin Versus Trimethoprim-Sulfamethoxazole in the Treatment of Shigella Dysentery/Md. Yunus, A.S.M. Mizanur Rahman, A.S.G. Faruque, R.I. Glass. September 1981. (Scientific report no. 53)**

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