SURVEILLANCE OF SHIGELLOSIS IN RURAL BANGLADESH A 10 YEARS REVIEW

Pages with reference to book, From 75 To 78

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ABSTRACT

Over a period of 10 years 35,620 patients, admitted from a defined surveillance area, had a rectal swab culture done at a rural diarrhoea treatment centre in Bangladesh. Shigella spp. were isolated from 3,440 (9.7%) cases. Marked year to year variations were observed in isolation rates of Shigella spp. ranging from 5.7% to 16.7%. Sh. flexneri was the predominant isolate between 1978 to 1982 (56%-67%), Sh. dysenteriae type 1 predominated from i 983 to 1985 (45%-50%), and again Sh.flexneri became predominant in 1986 (55%) and 1987(61%). Shigella were most commonly isolated from children aged 1-4 years followed by children 5-9 years and elderly people aged 45+ years. Sh. flexneri was isolated most frequently during August - January and Sh.dysenteriae type 1 during June to July. The overall case fatality rate in patients with shigellosis was 0.96%. It was 1.10% in children under 5 years of age. Prevalence of multiple antibiotic resistant strains increased over the years and at present most strains are resistant to commonly used antibiotics such as ampicillin and cotrimoxazole. Nalidixic acid is currently the drug of choice for Shigella infection in this area (JPMA41: 75, 1991).

INTRODUCTION

In Bangladesh, as in most developing countries, shigellosis causes considerable of morbidity and mortality particularly in young children[1-2]. Epidemics of shigellosis have occurred in the developed countries as well[3], and claimed thousands of lives[4]. The Shigella isolation rate at Dhaka Hospital of the International Centre for Diarrhoeal Disease Research, Bangladesh (JCDDR,B) increased from 0.5% in 1970 to 12% in 1981[5]. In the ICDDR, B rural treatment centre at Matlab, Shigella was isolated 5%-6% of admitted cases during 1977-78[6]. Emergence of multiple antibiotic resistance has been reported from Bangladesh and other countries[7-10]. Case fatality rate in Dhaka Hospital ranged from 3-13%[5]. To understand the epidemiologic pattern of shigellosis in rural Bangladesh, we reviewed the clinical and laboratory records of patients admitted at the Matlab Treatment Centre between 1978-87.

PATIENTS AND METHODS

ICDDR, B operates a diarrhoea treatment centre at Matlab, arural area of Bangladesh, which lies 45km south east of Dhaka. Since 1963 a demographic surveillance system (DSS) which consists of regular cross sectional census and longitudinal registration of vital events has been maintained in the area. Details of the study area, its people and field research procedures have been reported elsewhere[11]. From February 1978, rectal swab, stool specimens were obtained from all admitted DSS (about 35% of total admissions) registered patients and cultured for Shigellae, Yibrio cholerae and Salmonellae using standard procedures[12]. The clinical and microbiological records of all DSS patients admitted between February, 1978 and December1987 were reviewed to obtain the age distribution, seasonality, antibiotic sensitivity patterns and mortality information of Shigella patients. During 1977-79[13] and 1983-84[14] Shigella strains were tested for sensitivity to tetracycline, ampicillin, chloramphenicol, kenamycin,

gentamycin, streptomycin and cotriffioxazole by tIle Bauer-Kirby technique[15]. In 1987, these were tested only against ampicillin, cotrimoxazole and nalidixic acid. The Shigella isolation techniques remained same for the whole period of study.

RESULTS

The total number of DSS patients admitted between 1978 and 1987 was 35,620. The admission sharply fell I 1979 because some of the areas were excluded from the DSS in October, 1978. Shigellae were isolated from 3,440 (9.7%) patients. Marked year to year variations were observed in isolation rates of Shigella spp. ranging from 5.7% to 16.7% (Table-I).

TABLE - I. Annual number of diarrhoeal admissions from the surveillance area and shigellae isolation rates.

Year	Total Patients cultured (DSS Patients)	Shigella Isolated	
		Number	Percent
1978	6301	360	5.7
1979	3931	384	9.8
1980	3622	304	8.4
1981	3096	351	11.3
1982	3755	318	8.5
1983	3939	400	10.2
1984	3074	513	16.7
1985	2472	214	8.7
1986	2738	176	6.4
1987	2692	420	15.6
TOTAL	35,620	3,440	9.7

The distribution of Shigella spp. isolated in different years is shown in Table II

TABLE - II. Shigellae isolations by species.

Year	Sh. Flex	Sh. Dys 1	Sh. Boydii	Sh. Sonnei	Sh. Dys(2-10)	Total
1978	221(61.4)	40(11.1)	54(15.0)	32(8.9)	13(3.6)	360
1979	232(60.4)	75(19.5)	42(10.9)	22(5.7)	13(3.4)	384
1980	170(55.9)	47(15.5)	47(15.5)	26(8.6)	14(4.6)	304
1981	234(66.7)	28(8.0)	49(14.0)	32(9.1)	8(2.3)	351
1982	182(57.2)	21(6.6)	64(20.1)	30(9.4)	21(6.6)	318
1983	157(39.2)	192(48.0)	33(8.2)	13(3.2)	5(1.2)	400
1984	195(38.0)	259(50.5)	33(6.4)	18(3.5)	8(1.6)	513
1985	89(41.6)	96(44.9)	16(7.5)	7(3.3)	6(2.8)	214
1986	96(54.5)	67(38.1)	6(3.4)	1(0.6)	6(3.4)	176
1987	258(61.4)	110(26.2)	35(8.3)	13(3.1)	4(1.0)	420
Total	1834(53.3)	935(27.2)	379(11.0)	194(5.6)	98(2.8)	3440(100)

Figures in parentheses are row percentages.

Sh.flexneri was predominant between 1978 to 1982 (56% - 67) and Sh.dysentcriae type I from 1983 to 1985 (45% - 50%), Sh.felxneri again became predominant during 1986 and 1987 (55% and 61%). Sh.boydii, Sh.sonnei and Sh.ysenteriae type (2-10) were isolated in all years, but were never predominant. The age distribution of the patients and Shigella species isolation rates are shown in Table III.

TABLE - III. Shigellae species isolation rate by age group.

Age (year)	1978-87 Total DSS Patients	Shigella Species Rate/1000 Patients					
		Flex	Shiga	Boydii	Sonnei	Others	Total
<1	6497	28	7	7	5	1	48
1-4	11994	75	32	12	10	5	134
5-9	3546	45	47	10	5	3	110
10-14	1835	32	37	7	3	1	80
15-29	5233	40	23	8	2	2	74
30-44	2829	34	22	10	1	3	70
45+	3686	61	26	17	3	2	109
Total	35,620	51	26	11	5	3	97

Shigellae were most commonly isolated in children aged 1-4 years, followed by children between 5 - 9 years and elderly people aged 45 years and above. Sh.flexneri was isolated most frequently in younger children (1 -4 year) and Sh. dysenteriae type 1 in older children (5 - 9 year). The lowest isolation was found in infants. Sh.fiexneri was isolated most frequently during August-january. Sh.dysenteriae type 1 isolation usually peaked in june-july (Figure-).

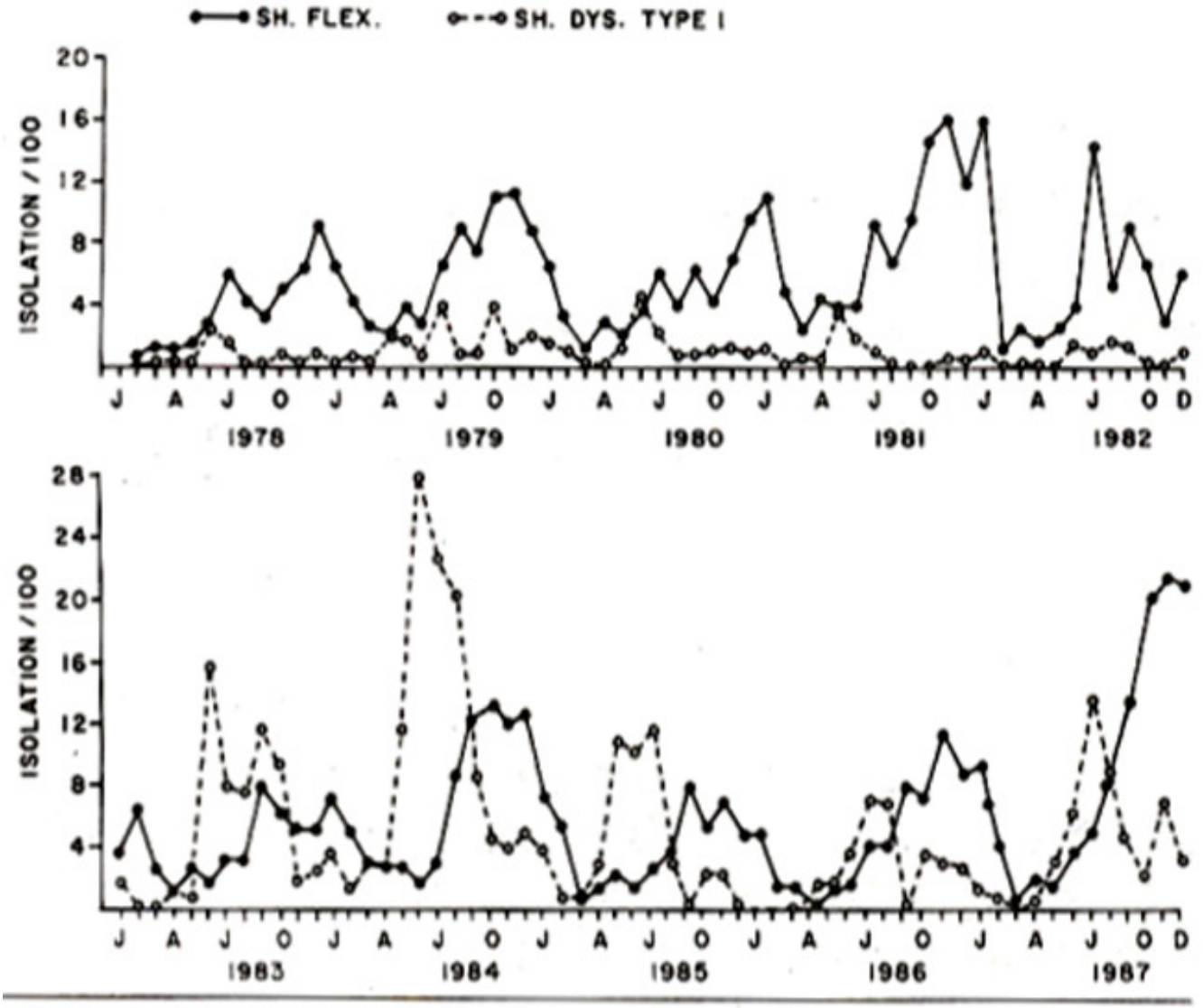

Figure. Seasonal variation of patients infected with shigella flexneri and shigella dysenteriae type 1 at the ICDDR,B Matlab hospital between 1978 and 1987.

The overall case fatality rate in patients with shigellosis was 0.96% (33/3440). Highest fatality (2.1%) was observed in children aged 5-9 years (Table-IV).

TABLE - IV. Shigella deaths by shigella species and age of the patients.

Age (year)	Sh.Flex	Sh.dys type 1	Other Shigellae	Total
<1	3(1.7)	0	0	3(1.0)
1-4	13(1.4)	4(1.0)	1(0.3)	18(1.1)
5-9	3(1.9)	3(1.8)	2(3.1)	8(2.1)
10+	2(0.3)	1(0.3)	1(0.5)	4(0.4)
Total	21(1.1)	8(0.9)	4(0.6)	33(0.96)

( )Case fatality rate.

The resistance pattern of Shigellae to antibiotics is shown in Table-V.

TABLE - V. Resistance pattern of Shigella dysenteriae type 1 and Shigella flexneri isolated

SH.DYSENTERIAE TYPE 1

ANTIMICROBIALS	1977-79+ (n-55)	1983-84+ (n-181)	1987 (n-108)
Tetracycline	93	98	*
Ampicillin	5	4	91
Chloramphenicol	0	96	*
Kenamycin	0	1	*
Gentamicin	0	0	*
Streptomycin	94	2	*
Cotrimoxazole	5	96	94
Nalidixic acid	*	*	3

SHIGELLA FLEXNERI

ANTIMICROBIALS	1977-79 (n-53)	1983-84 (n-79)	1987 (n-237)
Tetracycline	74	89	*
Ampicillin	7	22	53
Chloramphenicol	8	63	*
Kenamycin	5	4	*
Gentamicin	0	1	*
Streptomycin	89	86	*
Cotrimoxazole	0	3	22
Nalidixic acid	*	*	3

Data expressed as percentages

*Not done

+Sensitivity results during 1977 - 79 and 1983 - 84 were taken with the kind permission from the authors (Ref. 13 and 14).

Five percent of Sh.dysentenae type 1 isolates were resistant to ampicillin in 1977-79, 4% in 1983-84; while 91% were resistant in 1987. Resistance to cotrimoxazole was also 5% in 1977-79 but increased to 96% in 1983-84 and 94% in 1987. 7% of Sh.flexneri isolates were resistant to ampicillin in 1977-79 and increased to 53% in 1987. During the same period resistance to cotrimoxazole also increased from 0% to 22%. Both Sh.dysentenae type 1 and Sh.flexneri were highly (97%) sensitive to nalidixic acid in 1987.

DISCUSSION

In the developed countries the predominant species of shigella is Sh.sonnei[16]. At Matlab Sh.flexneri was most common in all the years studied except 1983-85 when multiresistant Sh.dysenteriae type I epidemic swept through Bangladesh and India[17,18]. Our lowest isolation rates were in infants. This is similar to results obtained in earlier studies and might be due to less exposure and/or protective effect

of breast eeding[19-21]. Cotrimoxazole and ampicilim were equally effective against Shigella in 1979[13]. But during 1983-84 most (96) isolates of Sh. dysenteriae type 1 were resistant to cotriqoxazole while there was also a marked increase in Sh.dyenteriae type 1 isolation. However, at that time sensitivity particularly of Sh.dysenteriae type 1 to ampicillin was sill very high (96%) and the drug was being used effectively By the year 1987 more than 90% of Sh.dysenteiae type 1 isolates were resistant to ampicillin and cotrumxazole, 53% of Sh.flexneri isolates were resistant to ampicillin and 22% to cotrimoxazole. Nalidixic acid iecame the drug of choice for treating all kinds of shigelae. We observed only 3% of Shigella isolates were resistant to nalidixic acid. In Teknaf, another rural arear)f Bangladesh resistance to nalidixic acid has been observed as high as 86% of Shigella isolates[22]. Frequent use of antibiotics in subtherapeutic doses and for illnesses which they are not indicated has been observed in Matlal area[23]. This is generally true for other areas of Banglades!. Such abuse and over use of antibiotic may have contributed to the increase in antibiotic resistant strains in rural Bangladesh. Because this overuse is still continuting the situation must be monitored. The case facality rate in our was much lower than that of Dhaka hospital. [5]. This may be due to difference in case mix at these tv0 facilities. All our patients are from a defined surveillane area, and many of them report to our hospital early and often with mild illness. Dhaka hospital draws patients from a much larger catchment area and serves as a referal centre for complicated cases of diarrhoea. We conclude that shigellosis still remains a major health problem in rural Bangladesh. Research should be continued to identify alternative antimicrobias for the treatment of shigellosis and to identify the risk factors associated with acquiring resistant Shigella infections. Preventive measures such as hand washing[24], need be promoted and intensified for better control of the disease.

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