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EAST PAKISTAN MEDICAL JOURNAL

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VOL. XII DACCA, APRIL, 1968 NO. 2.

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Introduction

Studies of diarrheal diseases have been conducted in Rayer Bazar by the Pakistan-SEATO Cholera Research Laboratory since 1964. These studies originated with the observation of a total of 243 families over a period of 17 months. Subsequently in 1965, the study was expanded to include the entire community of 7,000 persons. The patterns of general diarrhea morbidity as well as diarrhea specifically due to **Shigella, Cholera** and pathogenic **E. coli** were defined and related to varius environmental factors in the community. The present report summarizes the observations on the frequency of shigellosis and its significance in the spectrum of diarrheal illnesses in this community.

Background

Rayer Bazar economically is a lower class village on the outskirts of Dacca. There are approximately 7,000 persons in 1,200 families. The average family size is 5.9 persons Fifty per cent of the population is below the age of 15 years. Approximately 57% of the population are Muslim ; 43% are Hindu. Regular birth and death registration indicated

that the population growth rate was 2.7% per year.

The residents are mostly potters, day laborers, and small businessmen. There are some lower level government employees. There is no water supply or sanitary arrangement in the village. Most people use dug well water for drinking and household purposes. A few use tube well water. The tanks and canals are used by a large section of the community for bathing and washing. Kutcha pit latrines, as well as the banks of the canals and tanks, are used by most people for passing stools.

Methods

During the family studies carried out in 1964-65, field teams visited selected households weekly. Rectal swab cultures were obtained from all family members irrespective of symptoms and a history of any diarrhea was obtained. The study was continued for 17 months and the association of diarrhea symptoms with the findings of various enteric pathogens was subsequently analyzed.

In September, 1965, the study was expanded to include the entire community. A centrally located diarrhea clinic was established and field teams visited every family weekly. A census of the entire community was carried out so that when diarrhea cases were reported to the clinic, they could be properly identified for study purposes. For all individuals with diarrhea reporting to the clinic for treatment, a rectal swab stool culture was obtained

Bacteriologic Methods

The rectal swabs were streaked directly on MacConkey's and SS agar and then placed in selenite broth for overnight enrichment after which they were again streaked on the same media. Shigella were identified by standard methods.

Results

Table (I) shows the number of shigella isolations by month in 1964-65 during the family study and in 1965-67 during the community study. Shigella cases were found throughout the year. The highest incidence was during the monsoon season (June-October) and the lowest incidence during the winter months. This seasonal pattern paralleled the seasonal pattern of all acute diarrheas found in this populaton.

As a part of the community study, the community was divided into 19 zones based on natural geographic boundaries between various sectors of the community (Figure 1). Examining the Shigella incidence by zone, it can be seen in Figure 1 that no zone was spared Cases of shigella were widely disseminated throughout this entire community. The shigella incidence was unusually high in Zone 1. This could be attributed to the heavy population density in this zone In addition, since this was a low rental housing area, there was a high population turnover with the continual migration in and out of low income families

Table (2) shows the shigella case rate by age from 1965 through 1967. The case rate was highest in children under the age of 5 and fell sharply with increasing age. Overall, of 150 shigella cases identified, 106 were in children under the age of 5 years.

It was of interest to examine the frequency of shigella relative to the total diarrhea experience of this community in order to determine more specifically the significance of shigella as cause of diarrhea. As illustrated in Table 3, from 1965 through 1967, out of a total of 3,430 reported diarrheas, only 150 were due to shigella. This frequency of shigella relative to the diarrheas was approximately the same in all age groups. The etiology of the vast majority of diarrheas in this study was undefined.

The family study provided additional information on the significance of shigella infection among family members. As illustrated in Table 4, among 1,182 members of 177 shigella infected families, 170 (14.4%) had diarrhea. The incidence of diarrhea was highest in children under 4 (24%) and lowest in adults over 15 (3%). In a parallel study of 151 families without shigella, there were only 28 cases of acute diarrhea among 954 family members (2 9%). Thus the diarrhea rate was over 3 times greater in shigella infected families than in families without shigella.

Table 5 summarizes the frequency of isolation of the various types of shigella from 1964 through 1967. Shigella "B" was by far the most common organism found and accounted for 76% of the 336 isolations during the study period. Shigella "D" and "A" each accounted for approximately 10% of the isolations. Shigella "C" was uncommon.

It is of interest to examine the sensitivity patterns of the shigellas found in this study against commonly used antibiotics and sulfas. Table 6 summarizes the sensitivity pattern of 30 strains against various sulfa preparations in peptone broth. It can be seen that many of these strains were resistant to the commonly used sulfa preparations. Similar results were obtained using Muller Hilton medium.

Antibiotic sensitivities were studied with 107 strains as illustrated in Table 7. These organisms were almost uniformaly sensitive to tetracycline, chloramphenicol and neomycin. They were uniformly resistant to the other antibiotics tested, most notably streptomycin which is commonly used in preparations for the treatment of dysentery.

Summary

In 3 years' observation in a low economic community in Dacca, it has been found that shigellosis occurs throughout the year with a seasonal peak incidence in the monsoon season corresponding to the pattern of all acute diarrheas. The infection was distributed throughout all areas of the study community. The case rates were highest in children under 5 years and fell with

increasing age. While shigella was common in this community, it accounted for less than 5% of all the diarrheas observed. Shigella "B" was the most frequent isolate during the study period. Antibiotic sensitivity patterns revealed that most strains tested were resistant to the commonly used sulfa drugs and to dihydro-streptomycin. They were characteristically sensitive to tetracycline, chloroamphenicol and neomycin

Acknowledgement :

We thank the entire bacteriology section, specially, Mr. C. R. Day and Mr. Anisur Rahaman for their active participation in identifying the shigellae and their sensitivity tests against sulfonamides and antibiotics.

TABLE I

Incidence of Shigella Isolations by Month in Rayer Bazar

	(Family Study) 1964-65	(Community Study) 1965-67
January	4	6
February	9	2
March	9	8
April	16	9
May	8	18
June	11	11
July	24	13
August	33	22
September	27	18
October	34	16
November	7	15
December	4	12
TOTAL	186	150

TABLE 2

Shigella Case Rate by Age in Rayer Bazar, 1965

Age Group	Population	Cases	Rate per 1,000
<1	217	15	69.1
1—4	1118	91	81.4
5—9	1447	28	19.4
10—19	1618	11	6.8
Over 20	3174	5	1.6
Total	7574	150	20.0

TABLE 3

Proportion of all Diarrheas due to Shigella by Age in Rayer Bazar, 1965-1967

Age Group	Total Diarrheas	Number with Shigella	Per cent with Shigella
<1	415	15	3.6%
1—4	1699	91	5.4%
5—9	733	28	3.8%
10—19	218	11	5.0%
Over 20	365	5	1.4%
TOTAL	3430	150	4.4%

TABLE 4

Incidence of Diarrhea Among the Members of Shigella Affected and Shigella Free Families

	177 Shigella Affected Families			151 Shigella Free Families		
Age Group	Number of Family Members	Number of Diarrheas	Percent with Diarrhea	Number of Family Members	Number of Diarrheas	Percent with Diarrhea
0—4	242	59	24.4%	180	6	3.3%
5—14	454	72	15.9%	360	15	4.2%
Over 15	486	39	8.0%	424	7	1.7%
	1182	170	14.4%	964	28	2.9%

TABLE 5

Types of Shigella isolations in Rayer Bazar

Year of Isolation

Type	1964-65	1965-66	1966-67	Total	Per cent
Shigella "A"	9	8	17	34	10.1%
Shigella "B"	140	42	74	256	76.2%
Shigella "C"	6	2	0	8	2.4%
Shigella "D"	31	2	5	38	11.3%
TOTAL	186	54	96	336	100.0%

TABLE 6

Sulfonamide sensitivity of Shigella Organisms

Number sensitive at 2·5 m lligrams per milliliter.

Type of Shigella	Number tested	Sulfadiazine	Sulfathiazole	Sulfamerazine	Sulfaguanidine
Shigella 'A'	5	0	1	0	0
Shigella 'B'	17	0	0	0	0
Shigella 'C'	5	0	1	0	0
Shigella 'D'	3	0	0	0	0
Total	30	0	2	0	0

TABLE 7

Antibiotic Sensitivity of Shigellas

Number Sensitive

Shigella Type	No. Tested	Tetra-cycline	Chloram-phenicol	Neomycin	Albamycin	Erythro-mycin	Penicillin	Dihydro Strepto-mycin	Linco mycin
"A"	19	19	19	19	0	0	0	1	0
"B"	63	60	62	63	0	0	0	0	0
"C"	7	7	7	5	0	0	0	0	0
"D"	18	18	18	18	0	0	0	1	0
	107	104	106	105	0	0	0	2	0

Concentration of Antibiotics per disc.

Tetracycline	5 mgm	Neomycin	5 mgm
Albamycin	5 mgm	Penicillin	2 units
Chloromycetin	5 mgm	Dihy. Strep.	2 mgm
Erythromycin	2 mgm	Lincomycin	2 mgm

INCIDENCE OF SHIGELLA BY ZONES.

FIGURE -I