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SONNEI IN A SMALL COMMUNITY IN DACCA

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PREFACE

The International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) is an autonomous, international, philanthropic and non-profit centre for research, education and training as well as clinical service. The Centre is derived from the Cholera Research Laboratory (CRL). The activities of the institution are to undertake and promote study, research and dissemination of knowledge in diarrhoeal diseases and directly related subjects of nutrition and fertility with a view to develop improved methods of health care and for the prevention and control of diarrhoeal diseases and improvement of public health programmes with special relevance to developing countries. ICDDR,B issues two types of papers: scientific reports and working papers which demonstrate the type of research activity currently in progress at ICDDR,B. The views expressed in these papers are those of authors and do not necessarily represent views of International Centre for Diarrhoeal Disease Research, Bangladesh. They should not be quoted without the permission of the authors.

ABSTRACT

Dysentery due to shigella sp. is widespread in most of the developing countries of the world and also causes a great deal of morbidity and mortality in Bangladesh. Cholera Research Laboratory, being the main treatment centre for diarrhoeal diseases, receives almost all the patients from Dacca and its suburb. Until 1972 93 - 95% of the shigella isolated were Sh. flexneri, the other type being very few. From 1973 Sh. dysenteriae type 1 (Shiga bacillus) started appearing but till 1975 there were very few Sh. sonnei. Beginning 1976 Sh. sonnei cases started reporting to hospital in large numbers and an outbreak of severe gastroenteritis due to Shigella sonnei occurred in February 1976 in a small community near the industrial area of Dacca. We did not encounter previously an outbreak of dysentery due to Shigella sonnei and there is no recorded evidence of an outbreak in an isolated community in this country. This paper reports the epidemiological, clinical and bacteriological aspects of the disease in that family.

INTRODUCTION

As in most developing countries of the world dysentery causes a great deal of morbidity and mortality in Bangladesh. Major causes of this dysentery are infection by shigella group of organisms which are host adapted to man. Hardy and Watt (1) showed shigella to be the most common cause of acute diarrhoeal disease in the United States. Improved living conditions has remarkably reduced the incidence in the developed countries. Shigella was not a major public health problem in Bangladesh in the pre 1971 period. During and after the liberation movement the normal life and living condition of the people were completely shattered. The incidence of dysentery due to shigellae too accentuated and gradually exceeded all previous records of CRL (2).

Every year a large number of cases of shigellosis are treated at the Cholera Hospital which is the main treatment centre of the diarrhoeal diseases in Bangladesh. Until 1972, 93-95% of these cases were due to Shigella flexneri while the frequency of other serotypes was very low. From 1973 S. dysenteriae, type 1 (shiga bacillus) appeared and dysentery due to this organism became as common as that due to S. flexneri, S. sonnei was isolated from less than 2% of sporadic shigellosis cases and an outbreak due to this organism had not been

previously encountered. Thus, when four persons from a family living in Kunipara reported to the hospital on February 29, 1976, we visited their house and neighbourhood to study the epidemiology of this outbreak.

BACKGROUND

Kunipara is a small village in the southeastern part of Tejgaon Industrial Area, three miles from the city of Dacca. The affected family's house is on the southern boundary of the Mechanical Workshop and in one of a row of 12-13 structures each separated by bamboo fencing. The water source for the area is tubewells and fenced open latrines are used by all families.

Mr. Momtaz Ali, head of the Index family has his wife Zaheda (33F) and sons Rafique (5M), Shafique (6½M), Akhtar (12M) and daughters Parveen (10F) and Momtaz (1½F). The other occupant of the house are Abdus Salam (25M), a house tutor and Rasheda (11F), a female helper. In other house in the compound lives Jalal Mia (40M) a loader of Noorani Flour Mills, his wife Maksuda (25F) and one year old daughter Kulsum.

Momtaz, the youngest child in the Index family was reported having dysentery passing mucoidy stool from February 21, seven days before the onset of other cases. She did not receive any

medicine except some homely care and did not develop any symptoms of disease any time. Even on the 29th she was reported to be purging 7-8 times.

Kulsum, Jalal Mia's daughter also passed mucoidy stool 3-4 times daily since February 27 but did not develop any clinical symptoms.

Epidemiologic Investigation:

On February 29, 1976, four patients, three brothers and one sister were brought to the cholera hospital with symptoms of watery diarrhoea and vomiting. Of the four, Rafique had the onset on February 28 at 5:00 p.m., Parveen, Shafique and Akhtar had onset on February 29, at 3:00 a.m., 8:00 a.m. and 10:00 a.m. respectively. All four were brought to the hospital at 7:40 p.m. on February 29.

On March 1, a study team visited the house from which the ill persons had come and interviewed household members. On March 3, 3 other neighbouring houses were visited and all members questioned. Persons in the index house and neighbouring houses had a daily rectal swab collected for culture. Cultures were discontinued on March 13, when all persons had at least four consecutive negative cultures. In one month on April 14, the index case household was visited and all members cultured.

After getting a report from the house tutor of the index household of additional cases of dysentery in the area the houses were visited again on May 4, 1978. At this time 51 persons in 10 household were cultured every alternate day until all persons were negative for three consecutive days.

The rectal swabs were streaked directly onto MacConkey Agar (3) and Salmonella shigella Agar (SS Agar) (4) and enriched onto gram negative (GN) broth (5). The enrichment broths were subcultured onto MacConkey and SS Agar after overnight incubation. Suspected non-lactose fermenting colonies were confirmed biochemically and serologically using standard procedures.

Samples of water from water sources used by each family and drinking water from pitchers from each house were collected. These were concentrated on 0.45 millipore filters and enriched in double strength gram negative broth. After overnight incubation the broth was subcultured onto MacConkey and SS Agar.

In vitro sensitivity testing was done on all S. sonnei isolates by standard Kirby-Bauer disc method (6) on Muller Hinton Agar plate.

Clinical Picture:

In all the four hospitalised children Parveen, Akhtar, Rafique and Shafique, the onset of diarrhoea was abrupt; the patients had watery stool, vomiting from 10-28 hours and

fever 100°F to 101°F. The patients had profound weakness. Of the four, Parveen was admitted in the hospital, the others were treated in the outdoor with I.V. Acetate solution and syrup Tetracycline. Parveen showed initial drowsiness and lethargy and became unconscious with ++convulsion within 4 hours of admission. Body temperature rose to 104°F, lung showed crepts ++both sides. Blood chemistry showed sugar 36 mg%, creanine 0.5, Na-136, K-4.8, CO₂-14.5, Cl-102 and Sp.Gr.-1.020. Medications accompanied by oxygen inhalation were given. The patient died at 3:00 a.m. on March 1, 1978.

The other three male children treated at the outdoor got 300-500 ml. I.V. acetate and 20 ml. of 25% glucose while they were in the outdoor for about 16 hours. They were discharged on March 1, with syrup Tetracycline 125 mg/6 hourly for Rafiqul and Shafiqul and Cap. Tetracycline 250 mg/6 hourly for Akhtar. All members of the index family and two (Rashida and Kulsum) from adjoining house complained of loose motion only March 4 and were brought to the hospital. Considering the antibiogram of the first isolates from these patients, Furoxone was given to the less sick people and Ampicillin to the very sick ones and were sent home. They responded very well and recovered by 8th March.

RESULTS

Bacteriological findings:

Results of the rectal swab cultures done of the Index case and the contacts of the same house and the adjacent houses in the first visit are shown in Table 1 and Figure I. Excepting these persons all the other members were found to be negative for pathogens. All the water sample collected were also found to be negative for pathogens. It may be seen that the four cases from the index family showed positive sonnei culture on the 29th February and this continued in the family up to the 7th March when all became negative.

Of the R/S culture obtained on April 14, Momtaz, daughter of Momtaz Ali was found positive for S.sonnei. All others were negative. Momtaz became negative on the third day but again developed diarrhoea on April 26. She was swabbed but found to be negative for pathogens. All other inmates were also negative.

On May 9, 51 persons of the 10 different families (including the index family) were cultured. Shigella flexneri was isolated from Zaheda of the index family and two other isolations of Sh.flexneri and Sh.sonnei was made. Rectal swab was taken every alternate day from all 51 persons. 3 persons including Momtaz of the index family had Sh.sonnei and 3 others from adjoining houses showed Sh.flexneri. By May 19, everybody became negative for three consecutive days.

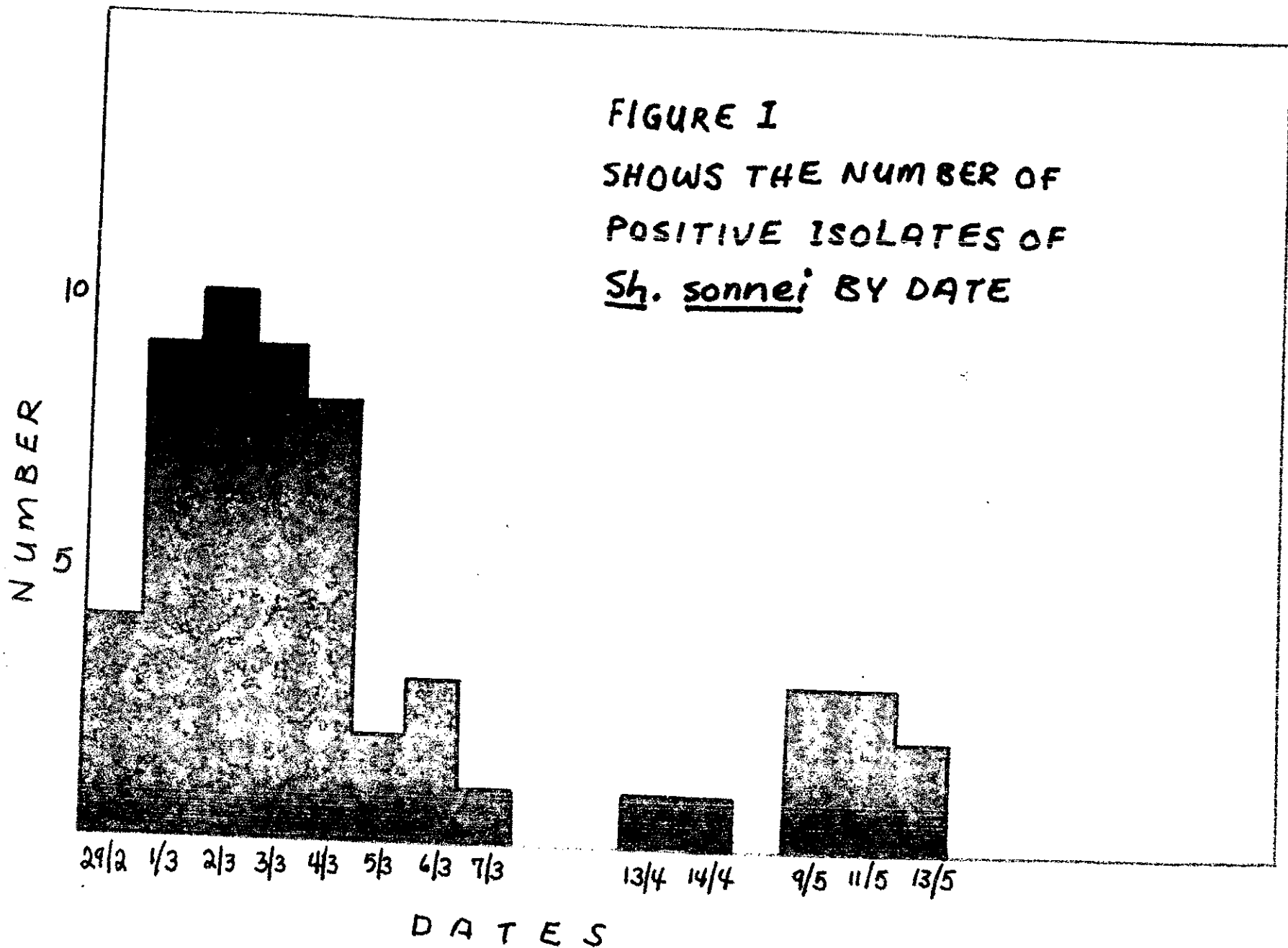
TABLE I

RESULTS OF THE R/S CULTURES TAKEN FROM INDEX FAMILY AND
CONTACT HOUSES ON FIRST VISIT

	29/2	1/3	2/3	3/3	4/3	5/3	6/3	7/3	8/3	9/3	10/3	11/3
Parveen	+	Died										
Momtaz Ali		+	NS	+	+	0	+	0	0	0	0	
Zaheda		+	+	+	+	+	+	+	0	0	0	0
Shafiqul	+	+	+	+	+	0	0	0	0			
Rafiqul	+	+	+	+	+	0	0	0	0			
Akhtar	+	+	+	+	+	0	0	0	0			
Momtaz		+	+	+	+	+	+	0	0	0	0	
A. Salam		+	NS	+	+	0	0	0	0			
Rashida		+	+	0	0	0	0					
Jalal		NS	0	0	0	0						
Maksuda		0	+	0	0	0						
Kulsum		+	+	+	0	0						

} LEFT FOR VILLAGE HOME

FIGURE I
SHOWS THE NUMBER OF
POSITIVE ISOLATES OF
Sh. sonnei BY DATE



DISCUSSION

Shigella was not a major public health problem till 1971. The incidence of shigellosis increased a few times during the post 1971 period. Almost 85-91% of the isolates during this time were of Shigella dysenteriae type 1 and Shigella flexneri. Figure II shows the quarterly isolations of all Shigella types from January 1973 to June 1977. From this Figure it can be seen that Shigella sonnei constituted a negligible percentage of the total isolates. Table 2 shows the monthly isolations of Shigella sonnei during 1969-1977 period. A more clear picture comes out of this table where it can be seen that from January 1976 there were sudden increase in the rate of isolation of Shigella sonnei compared to other months of the previous years. All the isolations of the previous years were sporadic. The cases which appeared in this study was first documented Sonnei outbreak in a family or community which spread over a period of time. This study, thus, gave us an opportunity to look into all aspects of Shigella sonnei outbreak in a household or community.

It can be inferred from the findings that though the four brothers and sisters who were hospitalised on 29th February were the first documented cases of Shigella sonnei, the organism might have entered the family through Momtaz who was said to be passing loose watery diarrhoea from February 21,

FIGURE - 2
QUARTERLY ISOLATION OF SHIGELLA
PERIOD: 1972-1977

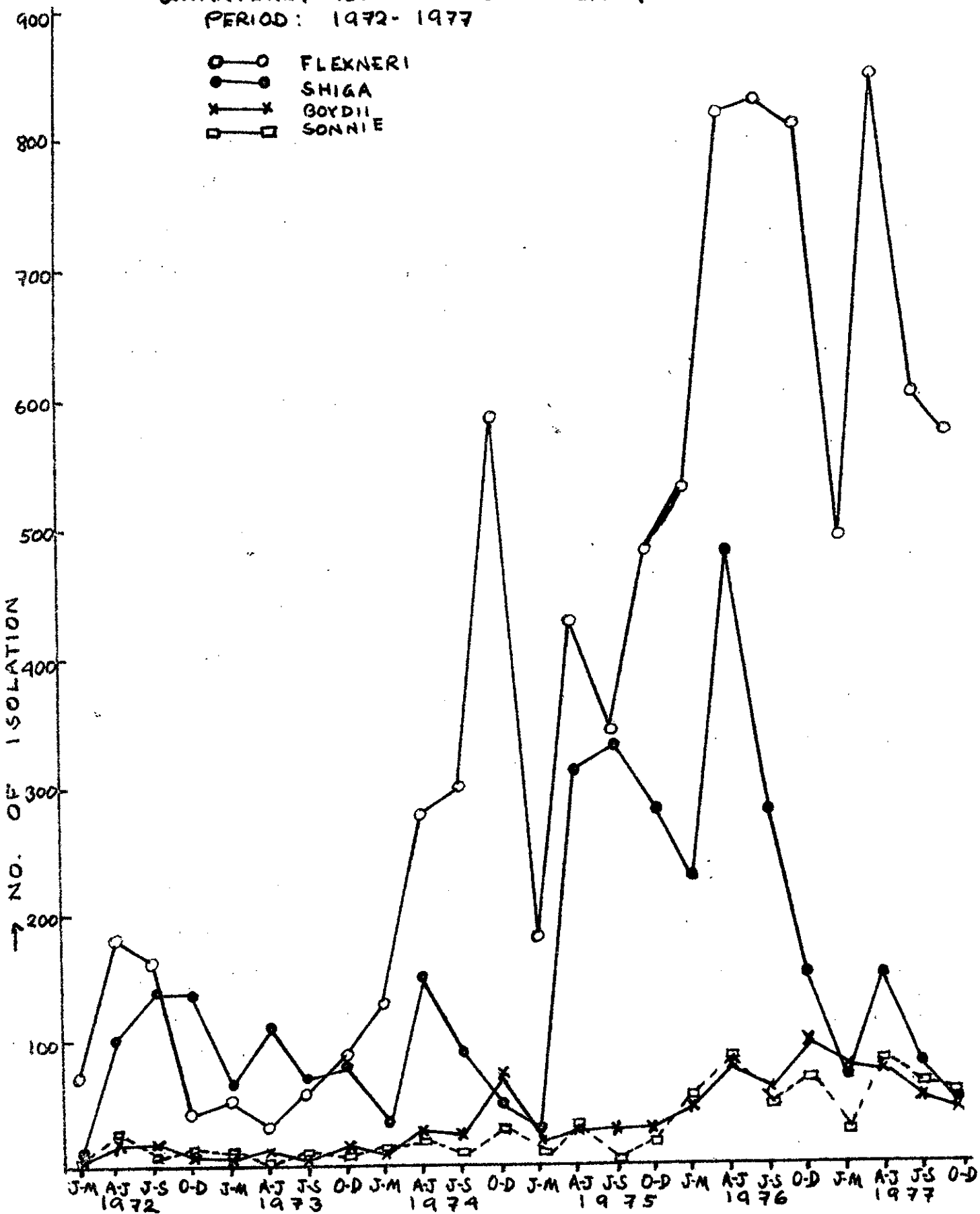


TABLE 2

SHOWS THE MONTHLY ISOLATIONS OF SHIGELLA SONNEI DURING 1969-1977 PERIOD

	January	February	March	April	May	June	July	August	September	October	November	December
1969	0	0	5	7	6	4	2	0	1	0	2	0
1970	0	0	1	0	0	1	0	1	1	0	1	0
1971	0	0	1	0	0	0	0	2	3	1	5	1
1972	2	2	3	6	19	15	9	8	0	5	0	1
1973	0	1	0	0	0	2	0	5	2	1	4	6
1974	3	5	6	9	7	5	8	2	6	23	9	2
1975	3	5	8	7	18	5	2	2	1	8	6	8
1976	17	19	20	20	25	34	30	10	7	20	27	22
1977	12	8	11	32	24	24	15	24	25	26	24	4

7 days before the onset of the index cases though she was first found to be bacteriologically positive on March 1. As can be seen from Table that though she became negative on the 6th March, S. sonnei was isolated from her R/S on two occasions on 13th April and 13th May. As she had many negative R/S in between it could not be ascertained whether she harboured the organism during the whole period or she was reinfected. From the pattern and the intermittent occurrence of the disease it could be inferred that this infection is endemic in nature and is a definite hazard to the community. The major attack occurred in infant and children which corresponds to previous findings (7). No common source could be detected and the exact nature of the spread remained unknown. But it could be ascertained that poorer housing and living condition and the use of water from shallow tubewells may have played an important part in the incidence.

The sensitivity pattern of the sonnei isolates showed marked difference from the isolates of the previous years. (Table 3.). In 1975 59.2% and 39.4% of the isolates of Shigella sonnei was resistant to streptomycin and Tetracycline respectively where all the isolates of this study were resistant to Streptomycin and Tetracycline.

Abnormal clinical picture has been observed in the index case. Parveen died of severe shock and convulsion associated with hypoglycaemia. The patient was moderately acidotic. Though

TABLE 3

SENSITIVITY PATTERN OF THE SHIGELLA SONNEI ISOLATED DURING
1973-1977 PERIOD AND ALSO THE EPIDEMIC STRAIN

Y E A R	No. of isolates tested	% of isolates sensitive to									
		Te.	Cm	Sm.	Amp.	K	Fx.	Sxt.	Fm	Gm	ST
1973	13	100	100	50.0	100	100	100	100	100	100	15.4
1974	38	84.1	96.1	53.5	96.1	100	100	100	100	100	29.0
1975	46	40.6	100	40.8	100	100	100	100	100	100	17.6
1976	64	32.8	100	30.0	100	100	100	100	100	100	0
1977	78	28.2	96.2	0	100	100	100	100	100	100	0
Epidemic Strains	15	0	100	0	100	100	100	100	100	100	0

Abbreviation

Te. - Tetracycline	K. - Kanamycin	Fm. - Furadantin
Cm. - Chloramphenicol	Fx. - Furoxone	Gm. - Gentamycin
Sm. - Streptomycin	Sxt. - Septrin	St. - Sulphathiazole

septaemic cases with acute monocytic syndromes in neonates has been reported earlier, convulsion associated with hypoglycaemia seemed to be of importance and might be the cause of death.

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