Epidemiologic Features of Domestically Contracted Shigellosis in a Tokyo Metropolitan Hospital

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Abstract

Sixty-nine Japanese patients infected with shigellosis domestically were admitted to a hospital in eastern Tokyo from January 1988 to December 1995. According to a review of their charts 92% of these patients lived in Tokyo, and 88% contracted the disease in Tokyo. Sixty-eight percent and 29% of them were infected with *Shigella sonnei* and *S. flexneri*, respectively. Of the twenty outbreaks identified, the majority occurred in homes, with as many as 50% of the patients under 10 years old infected with *S. sonnei* associated with the outbreaks in homes. It took a mean of 2.5 days to make a correct diagnosis for the symptomatic patients who initially contacted our hospital, in contrast to a mean of 5.6 days for those who initially visited other hospitals. Our results indicate that domestic shigellosis is a significant medical problem in Tokyo.

Key words: Shigellosis, Domestic infection, Japanese

Introduction

Shigellosis, a bacterial infection caused by *Shigella* spp., is a major public health problem in developing countries, particularly in tropical and subtropical areas, due to its high rates of morbidity and mortality. This bacterial disease used to be endemic in Japan, but the number of shigellosis patients has decreased due to rises in the general level of environmental and personal hygiene and the use of antibiotics. When patients infected with *Shigella* are diagnosed in Japan, hospitalization is required and the government must be notified. If such patients live or work in eastern Tokyo, it is requested that they be hospitalized at the Department of Infectious Diseases in Tokyo Metropolitan Bokutoh General Hospital. As few studies have been carried out on the characteristics of shigellosis patients domestically infected in Japan, we investigated the present characteristics of such patients hospitalized in our facility.

Patients and Methods

Domestically infected shigellosis patients were defined as shigellosis patients without a history of travel outside of Japan either from birth or in the 6 months immediately prior to admission, and an outbreak was defined as a cluster of more than 2

patients.

Four hundred fifty-nine Japanese patients with shigellosis, all bacteriologically confirmed, were admitted to the Department of Infectious Diseases at the Tokyo Metropolitan Bokutoh General Hospital in Sumida City, Tokyo from January 1988 to December 1995, and 69 of them were domestically infected. The charts of these domestically infected patients were reviewed.

Results

Table 1 shows the number of patients and subgroups of *Shigella* by year. Patients infected with *S. sonnei* and *S. flexneri* accounted for 68% and 29% of all patients, respectively. Broken down by residence, the numbers of patients infected with *S. sonnei* were as follows: Tokyo 49 (Ohta City 12, Edogawa City 9, Minato City 7, Kohtoh City 5, Meguro City 4, Adachi City 2, Itabashi City 1, Nakano City 1, Shinagawa City 1, Toshima City 1, and Mitaka City 1); Kanagawa Prefecture 2; Chiba Prefecture 1; and Saitama Prefecture 1. The numbers of those infected with *S. flexneri* were: Tokyo 18 (Chuo City 4, Kohtoh City 3, Shinagawa City 2, Sugunami City 2, Sumida City 2, Minato City

Table 1 Number of domestically infected shigellosis patients

Organism	Year								
	1988	1989	1990	1991	1992	1993	1994	1995	Total (%)
<i>S.dysenteriae</i>	0	0	1	0	0	0	0	0	1 (1.4)
<i>S.flexneri</i>	1	3	3	2	4	1	3	3	20 (29.0)
<i>S.boydii</i>	0	0	0	0	0	0	0	1	1 (1.4)
<i>S.sonnei</i>	3	1	1	8	25	3	4	2	47 (68.1)
Total	4	4	5	10	29	4	7	6	69 (100)

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Table 2 Presumed place of contraction

Organism	No. of patients		
	Tokyo	Chiba Pref.	Other Pref.
<i>S. sonnei</i>	41	3	3
<i>S. flexneri</i>	18	2	0
<i>S. dysenteriae</i>	1	0	0
<i>S. boydii</i>	1	0	0

1, Ohta City 1, and Shinjuku City 1) and Chiba Prefecture 2. A patient infected with *S. dysenteriae* lived in Ohta City and a patient infected with *S. boydii* lived in Arakawa City. The presumed places of contraction are shown in Table 2. Eighty-seven percent and 90% of patients infected with *S. sonnei* and *S. flexneri*, respectively, were presumed to have contracted the disease in Tokyo.

Tables 3 and 4 show the age and sex distributions of the patients with *S. flexneri* and *S. sonnei*, respectively. Patients infected with *S. flexneri* were most commonly in their 20s, 40s or 50s, while the majority of those who were infected with *S. sonnei* were under 10 years of age.

Table 5 shows the numbers of patients infected with *S. flexneri* and *S. sonnei* per month. Patients were infected in all seasons.

Instances of outbreaks of domestically contracted shigellosis are shown in Table 6. Thirteen of the 14 patients infected with *S. sonnei* under 10 years old were involved in outbreaks, 7 of which were outbreaks in the home. The source of two of these

outbreaks was a family member who was infected with the disease outside of Japan.

Among the 31 symptomatic patients who were diagnosed correctly at other hospitals and referred to our hospital, it took 2 to 20 days (mean 5.6 days) to make the diagnosis. In contrast, for the 21 symptomatic patients who were diagnosed correctly at our hospital, it took 2 to 5 days (mean 2.5) to make the diagnosis.

Discussion

Among the shigella strains isolated from Japanese shigellosis patients who contract the disease outside of Japan (usually in other Asian countries), it is well known that *S. sonnei* and *S. flexneri* are the first and second most predominate subgroups, respectively¹⁾. In our study, *S. sonnei* and *S. flexneri* were the first and second most common subgroups, respectively, of the organisms isolated from the shigellosis patients infected domestically in Tokyo. It is conceivable that some of the *Shigella* spp. isolated from patients infected domestically in Tokyo may have originated from other Asian countries or other parts of the world.

Some Japanese physicians think that shigellosis is a disease that occurs during hot seasons, but patients were identified in every month in our study.

While outbreaks were identified in all seasons, the numbers of outbreaks were greater in summer and autumn than in spring and winter. This implies that temperature is an important factor governing the multiplication of *Shigella*. Outbreaks in the home

Table 3 Age and sex distribution of patients domestically infected with *S. flexneri*

Year	Age (years)	0-9		10-19		20-29		30-39		40-49		50-59		60-69		70-79		80-		Total	
	Sex	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
1988		0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
1989		0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	1	2
1990		0	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	1	2
1991		1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0
1992		0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
1993		0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
1994		0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	2
1995		0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	3
Total		1	1	2	0	3	1	0	0	2	2	2	2	1	2	0	0	0	1	11	9

Table 4 Age and sex distribution of patients domestically infected with *S. sonnei*

Year	Age (years)	0-9		10-19		20-29		30-39		40-49		50-59		60-69		70-79		80-		Total	
	Sex	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
1988		0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	3
1989		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
1990		1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
1991		2	1	1	1	0	2	0	0	1	0	0	0	0	0	0	0	0	0	4	4
1992		4	4	1	5	0	2	1	0	2	2	2	0	0	0	0	0	1	1	11	14
1993		1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	2	1
1994		1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1
1995		0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Total		9	5	2	7	4	6	2	2	3	2	2	1	0	0	0	0	1	1	23	24

Table 5 Number of shigellosis patients domestically infected by month

Organism	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
<i>S. flexneri</i>	0	1	4	1	1	2	0	4	1	3	2	1	20
<i>S. sonnei</i>	1	0	0	3	2	2	3	9	4	16	4	3	47

Table 6 Outbreaks of domestically contracted shigellosis

Outbreak No.	Causative organism	Year/Month	Presumed place of contraction	No. of patients ^{b)}	Age of patients (years)
1	<i>S. flex.</i> ?	1991/Aug.	Home (Tokyo, Shinagawa City)	1	0
2	<i>S. flex.</i> 3a	1992/Aug.	Restaurant (Tokyo, Chuo City)	4	15, 19, 22, 22
3	<i>S. flex.</i> 2a	1995/June	Home (Tokyo, Kohtoh City)	2	63, 86
4	<i>S. sonnei</i>	1988/Aug.	Restaurant (Ishikawa Prefecture)	1	26
5	<i>S. sonnei</i>	1988/Oct.	Kindergarten (Tokyo, Nakano City)	1	38
6	<i>S. sonnei</i>	1988/Dec.	Home (Fukushima Prefecture)	1	32
7	<i>S. sonnei</i>	1991/Oct.	Home (Tokyo, Edogawa City)	3	2, 4, 29
8	<i>S. sonnei</i>	1991/Nov.	Home (Tokyo, Minato City)	3	8, 12, 44
9	<i>S. sonnei</i>	1991/Nov.	School (Tokyo, Minato City)	1	12
10	<i>S. sonnei</i>	1992/Apr.	Home (Tokyo, Meguro City)	2	80, 82
11 ^{a)}	<i>S. sonnei</i>	1992/May	Home (Tokyo, Ohta City)	1	46
12	<i>S. sonnei</i>	1992/Aug.	Restaurant (Tokyo, Kohtoh City)	4	15, 17, 45, 51
13	<i>S. sonnei</i>	1992/Aug.	Restaurant (Chiba Prefecture)	2	17, 47
14	<i>S. sonnei</i>	1992/Sep.	Home (Tokyo, Edogawa City)	3	1, 27, 36
15	<i>S. sonnei</i>	1992/Sep.	Home (Tokyo, Edogawa City)	1	3
16	<i>S. sonnei</i>	1992/Oct.	Orphanage dormitory ^{c)}	11	4, 6, 7, 8, 8, 9, 10, 10, 10, 27, 42
17	<i>S. sonnei</i>	1993/Apr.	Home (Tokyo, Meguro City)	2	2, 33
18	<i>S. sonnei</i>	1994/June	Restaurant (Tokyo, Shinagawa City)	1	23
19	<i>S. sonnei</i>	1994/July	Home (Tokyo, Adachi City)	2	8, 11
20 ^{a)}	<i>S. sonnei</i>	1995/Aug.	Home (Tokyo, Nakano City)	1	24

^{a)} Patients infected from a family member got the infection outside Japan.

^{b)} Number of Japanese patients admitted to our hospital.

^{c)} Tokyo, Ohta City.

ranked first, and 50% of the patients under 10 years old infected with *S. sonnei* were involved in outbreaks in the home. These findings are attributable to the high transmissibility of the bacteria in the home together with the increased chance of contacting children with the causative microorganisms.

The pathogenesis of shigellosis consists of multiplication in epithelial cells of the colonic mucosa²⁾. Since shigellosis ranges from asymptomatic or subclinical infections to fatal attacks of hemorrhagic dysentery, and further, since the symptoms and signs of shigellosis are the same as those of other forms of bacterial enteritis such as salmonellosis, it is very difficult to make a correct diagnosis based on signs and symptoms. Thus, confirmation of *Shigella* spp. by bacteriological identification is essential to make a correct diagnosis. The longer period required to make the correct diagnosis in other hospitals may be due to the following two reasons: (1) many small Japanese hospitals or clinics entrust stool bacterial examinations to commercial laboratories, and in such cases examination is interrupted on Saturdays,

Sundays, and other holidays; (2) many Japanese doctors do not investigate the stool bacteriologically on a patient's initial visit, waiting instead for the patient to come a second or third time. Delay in the diagnosis is an important problem not only clinically, but also in terms of public health and stopping the spread of the disease. Generally speaking, many domestically infected shigellosis patients may be misdiagnosed because stool examinations are not performed for all patients complaining of diarrhea in Japan. If more physicians begin to perform stool bacterial examinations when they encounter patients complaining of diarrhea, the number of correctly diagnosed shigellosis patients will increase.

As there are few shigellosis patients in Japan, Japanese physicians are normally unfamiliar with this bacterial infection and pay little attention to it. Despite continuing improvements in hygiene and therapy, domestically contracted shigellosis is a significant medical problem, and all residents in Tokyo face the risk of infection with *Shigella*.

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