

## Epidemiology of shigellosis with special reference to hospital distribution of *Shigella* strains in Tehran

Reza Ranjbar<sup>1</sup>, Mohammad Mahdi Soltan Dallal<sup>2</sup>, and Mohammad Reza Pourshafie<sup>3</sup>

1. Molecular Biology Research Center, Baqiyatallah University of Medical Sciences, Tehran, Iran.

2. Department of Pathobiology, School of Public Health and Institute of Public Health Research, Tehran University of Medical Science, Tehran, Iran.

3. Department of Microbiology, Institute Pasture of Iran, Tehran, Iran.

### ABSTRACT

**Background:** Infection caused by *Shigella* species are an important cause of diarrheal disease, in both developing and developed countries. Shigellosis is one of the major causes of morbidity in children with diarrhea in Iran. Aim of this study, was to investigate the epidemiology of shigellosis with special reference to hospital distribution of *Shigella* strains in Tehran between December 2002 and November 2003.

**Materials and methods:** Enteritis cases admitted at the Children Medial Center and Mofid, Baqiyatallah, Millad and Firozabadi hospitals in Tehran, Iran were included in this study. Fecal specimens and rectal swabs were cultured and identified for *Shigella* species using standard microbiological techniques.

**Results:** One hundred and forty one, 102, 56 and 3 *Shigella* strains were isolated from patients admitted to Children's Hospital Medial Center, Mofid, Milad, and other hospitals respectively. *Shigella* was isolated frequently from children under 5 years of age, who were accounted for 55.7% of all isolates. About 39.7 % of all isolates came from patients aged 5-12 years, and 4.3% from patients aged over 12 years of age.

**Conclusion:** Shigellosis is one of the most important infectious diseases in Iran. Results of our research have revealed that *Shigella* is still one of the most important causes of diarrhea among children in Tehran, Iran. The prevention of *Shigella* infections in children is an essential approach to control of shigellosis in the country.

**Keywords:** *Shigella* species, Epidemiology, Shigellosis.

(Iranian Journal of Clinical Infectious Diseases 2008;3(1):35-38).

### INTRODUCTION

Diarrheal diseases are the most important health problems in developing countries. Amongst the different pathogens responsible for diarrhea,

*Shigella* species (spp.) plays an important role in causing inflammatory diarrhea and dysentery (1).

Shigellosis, also known as bacillary dysentery, is caused by four *Shigella* spp. including *S. dysenteriae* (serogroup A), *S. flexneri* (serogroup B), *S. boydii* (serogroup C), and *S. sonnei* (serogroup D). Shigellosis as a global human health problem is more severe than other forms of gastroenteritis. It is endemic throughout the world

Received: 14 May 2007 Accepted: 22 December 2007

**Reprint or Correspondence:** Mohammad M Soltan-Dallal.  
Department of Pathobiology, School of Public Health and  
Institute of Public Health Research, Tehran University of  
Medical Sciences, Tehran, Iran.

**E-mail:** soltanda@sina.tums.ac.ir

and it is among the most common causes of bacterial diarrheal diseases. Globally, it is estimated that shigellosis causes about 1,100,000 deaths per year, two-thirds of the patients being children under 5 years of age (2). *Shigella sonnei* is the serogroup of *Shigella* most frequently responsible for sporadic and epidemic enteritis in developed countries, however in developing countries *S. flexneri* is the most dominant. Shigellosis is one of the major causes of morbidity in children with diarrhea in Iran. In two previous studies conducted in years 1984-85 and 2001-02, *S. flexneri* has been reported as the most prevalent species in Iran (1- 4). The current study was undertaken to investigate the epidemiology of shigellosis with special reference to hospital distribution of *Shigella* strains in Tehran, Iran.

## PATIENTS and METHODS

In the years 2002 and 2003, diarrheal cases admitted at the Children Medial Center and Mofid hospital, two large pediatric hospitals, and also three additional large hospitals - Baqiyatallah, Millad and Firozabadi - in Tehran, Iran were included in this study. Three times or more watery, bloody or soft defaecations per 24 hours were considered as diarrhea. A standardized questionnaire was used for obtaining data of onset, symptoms, medical treatment, age, sex, travel history, and residence, filled in by hospital nurses. In some cases, patients or the patient's parent was interviewed.

Fecal specimens and rectal swabs collected from the patients were cultured on *Shigella* – Salmonella (SS), Hektoen- Enteric (HE), Xylose lysin deoxycholate (XLD), and MacConkey (MC) agars (Difco Laboratoriens, Detroit, Mich). Suspected colonies were picked after incubation for 24 hours at 35° C. *Shigella* spp. and were preliminarily identified by gram stain, colony morphology, lactose fermentation, motility, as well

as by results of general biochemical tests (5). Strains were sero-grouped by using commercially-available antisera from MAST Group LTD (Mast House, Derby Road, Bootle, Merseyside , L201EA, UK).

## RESULTS

The results obtained from hospital distribution of confirmed *Shigella* isolates showed that 141 strains were isolated from patients admitted to Children's Medial Center Hospital, 102, 56 and 3 strains were isolated from patients admitted to Mofid, Milad, and other hospitals respectively.

Median age of the patients was 5 years, with a range from 1 month to 12 years. *Shigella* was isolated frequently from children under 5 years of age, who accounted for 55.7% of all isolates. About 39.7 % of all isolates came from persons aged 5-12 years, and 4.3% from persons aged over 12 years of age.

**Table 1. Hospital distribution of *Shigella* spp strains isolated in Tehran, 2002-3**

	CMC*	Mofid	Milad	Others	Total
<b>Winter 2002</b>					
<i>S.dysenteriae</i>	0	0	0	0	0
<i>S.boydii</i>	1	0	1	0	2
<i>S. flexneri</i>	21	3	3	0	27
<i>S. sonnei</i>	1	0	2	0	3
<b>Spring 2003</b>					
<i>S.dysenteriae</i>	1	0	1	0	2
<i>S.boydii</i>	1	0	1	0	2
<i>S. flexneri</i>	23	3	1	0	27
<i>S. sonnei</i>	4	5	0	0	9
<b>Summer 2003</b>					
<i>S.dysenteriae</i>	0	0	0	0	0
<i>S.boydii</i>	1	3	0	0	4
<i>S. flexneri</i>	17	20	1	1	44
<i>S. sonnei</i>	52	44	30	1	127
<b>Fall 2003</b>					
<i>S.dysenteriae</i>	1	0	1	0	2
<i>S.boydii</i>	2	0	0	0	2
<i>S. flexneri</i>	4	7	1	0	12
<i>S. sonnei</i>	12	17	9	1	39
<b>Total</b>	141	102	56	3	302

\* Children Medial Center

## DISCUSSION

In recent years, the importance of *Shigella* as an enteric pathogen with the global impact has been increasingly recognized. Bacillary dysentery caused by this organism is particularly common in younger children living in endemic areas.

*Shigella* spp. is one of the major causes of diarrheal disease in Iran but reports regarding its prevalence are few. For many years, *S. flexneri* was considered as the predominant isolate in Iran (1, 3).

As shown in Table 1, the most strains of *Shigella* isolates belonged to *S. sonnei*. In a previous study conducted in Tehran during 1999-2001, Hosseini et al. also found *S. sonnei* as the prevalent *Shigella* species (6). More recently, Farshad et al. (2006) has also identified *S. sonnei* as the most prevalent *Shigella* species in Shiraz, Iran (7).

However in a previous study during March 1984 to August 1985 in Tehran, among 230 *Shigella* spp. strains, *S. flexneri* was the species most commonly found (61.2%) (3). Also in another study conducted during November 2001 to October 2002 in Tehran, among 123 *Shigella* isolates, *S. flexneri* (55 strains) was dominant followed by *S. sonnei* (38 strains) (1). Similar pattern of species prevalence has been reported in neighboring countries. *S. flexneri*, as the predominant species, accounted for 44.0%, 58.0%, and 65.0% of *Shigella* cases in Saudi Arabia (8), Pakistan (9) and Jordan (10), respectively.

The highest rate of infection was seen among the patients with 1 to 5 years old. The group of patients with the highest frequency of isolation of *Shigella* spp. in our study was younger compared to previous reports from Iran, where the group of 12 or more than 12 years of age had the highest frequency of isolation (1).

Results of our research have revealed that *Shigella* is still one of the most important causes of diarrhea among the Children in Tehran, Iran. The

prevention of *Shigella* infections in children is an essential approach to control the mortality of shigellosis in the country.

We hope the results obtained from current study to be useful in epidemiological investigation of *Shigella* spp. in Iran.

## ACKNOWLEDGMENTS

This research was supported in part by a grant from Tehran University of Medical Sciences. The authors would like to thank for the cooperation of Mrs. Mina Abedini from Microbiology laboratory of the Children's Medial Center.

## REFERENCES

1. Kotloff KL, Winickoff JP, Ivanoff B, Clemens JD, Swerdlow DL, Sansonetti PJ, et al. Global burden of Shigella infections: implications for vaccine development and implementation of control strategies. Bull World Health Organ 1999;77:651-66.
2. MoezArdalan K, Zali MR, Soltan- Dallal MM, Hemami MR, Salmanzadeh-Ahrabi S. Prevalence and pattern of antimicrobial resistance of *Shigella* species among patients with acute diarrhoea in Karaj, Tehran, Iran. J Health Popul Nutr 2003;21:96-102.
3. Nikkah J, Mehr-Movahead A. Antibiotic resistance among *Shigella* species isolated in Tehran, Iran. Ann Trop Med Parasitol 1988;82:481-83.
4. Ranjbar R, Aleo A, Giammanco GM, Dionisi AM, Sadeghifard N, Mamma C. Genetic relatedness among isolates of *Shigella sonnei* carrying class 2 integrons in Tehran, Iran, 2002-2003. BMC Infect Dis 2007;22:62.
5. Ewing WH. Edwards and Ewing's identification of *Enterobacteriaceae*. New York: Elsevier Science Publishing Co.; 1986: 169-81.
6. Hosseini MJ, Ranjbar R, Ghasemi H, Jalalian HR. The prevalence and antibiotic resistance of *Shigella* spp. recovered from patients admitted to Bouali hospital, Tehran, Iran during 1999-2000. Pak J Biol Sci 2007;10:2778-80.
7. Farshad S, Sheikhi R, Japoni A, Basiri E, Alborzi A. Characterization of *Shigella* strains in Iran by plasmid profile analysis and PCR amplification of ipa genes. J Clin Microbiol 2006;44:2879-83.

### 38 Epidemiology of shigellosis in Tehran

8. Kagalwalla AF, Khan SN, Kagalwalla YA, Alola S, Yaish H. Childhood shigellosis in Saudi Arabia. *Pediatr Infect Dis J* 1992;11:215–19.

9. Zafar A, Sabir N, Bhutta ZA. Frequency of isolation of *Shigella* serogroups/serotypes and their antimicrobial susceptibility pattern in children from slum areas in Karachi. *J Pak Med Assoc* 2005;55:184-88.

10. Rawashdeh MO, Ababneh AM, Shurman AA. Shigellosis in Jordanian children: A clinico-epidemiological prospective study and susceptibility to antibiotics. *J Trop Pediatr* 1994;40:355–59.

Archive of SID