



# Susceptibility Patterns of *Salmonella typhi* and *Salmonella paratyphi A* to Ciprofloxacin, Levofloxacin, Chloramphenicol, Tetracycline, Ceftriaxone and Trimethoprim-Sulfamethoxazole in Jakarta, 2002-2008

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## INTRODUCTION

Enteric fever remains a global problem particularly in countries with poor hygiene. Predominant etiologies in Indonesia are *Salmonella enterica* subsp. *enterica* serovar Typhi (*S. typhi*) and *Salmonella enterica* subsp. *enterica* serovar Paratyphi A (*S. paratyphi A*). CDC Indonesia reported the prevalence of Typhoid Fever was 358-810/100,000 population in 2007, with 64% of the disease was found in people aged 3-19 years, and mortality rate varies from 3.1-10.4% among hospitalized patients (1). In the last two decades, the worldwide emergence of multidrug resistant (MDR) strains of *S. typhi* had been reported. These strains were resistant to Chloramphenicol, Trimethoprim-Sulfamethoxazole and Ampicillin. Moreover, Nalidixic acid-resistant strains exhibiting reduced susceptibility to Ciprofloxacin had become endemic in Indian subcontinent, United States, United Kingdom and also in other developed countries in 1997, reflecting the emergence of a global problem (2). This study described susceptibility patterns of *S. typhi* and *S. paratyphi A* to antibiotics generally used by clinicians to treat suspected or confirmed Typhoid Fever in the last six years in Jakarta.

## MATERIAL AND METHODS

### Specimens

All blood specimens received from hospitals, private practices, or individuals during 2002-2008 in Laboratory of Clinical Microbiology Faculty of Medicine University of Indonesia (LMK-FKUI) Jakarta.

### Cultures and susceptibility tests to antibiotics

Cultures were carried out using Bac-T Alert™ (Enseval) in 2002-2006 and Bac-tec™ 9050 (Becton Dickinson) in 2008. Positive cultures were then inoculated on appropriate media. The identification of microorganisms was determined using standard biochemical reactions and serology test

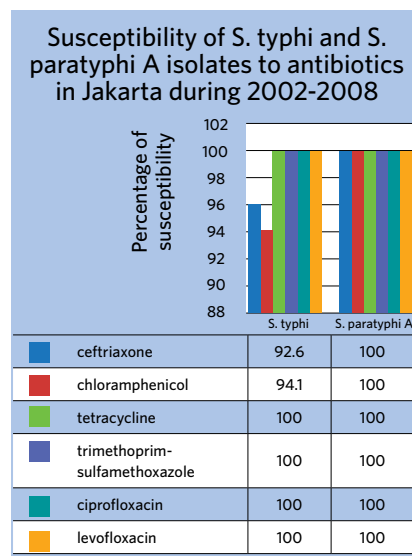


Figure 1.

(Biofarma). Disc diffusion method was used to assess susceptibility of microorganisms to antibiotics, and carried out according to Performance Standards for Antimicrobial Susceptibility Testing from Clinical and Laboratory Standards Institute (CLSI) (3) as guidelines. Antimicrobial susceptibility results were categorized in to three groups, Sensitive (S), Intermediate (I) and Resistant (R) according to CLSI (3). Antibiotic discs used were Chloramphenicol (30 µg), Ceftriaxone (30 µg), Ciprofloxacin (5 µg), Levofloxacin (5 µg), Tetracycline (30 µg), and Trimethoprim-Sulfamethoxazole.

## RESULTS

A total of 35 *S. typhi* isolates and 6 *S. paratyphi A* isolates were obtained from blood specimens during 2002-2008. Susceptibility tests to antibiotics against those isolates were evaluated (Figure 1). All *S. typhi* isolates were susceptible to Ciprofloxacin, Levofloxacin, Tetracycline and Trimethoprim-Sulfamethoxazole. Further, more than 90% of the *S. typhi* isolates were also susceptible to Chloramphenicol and Ceftriaxone. Among *S. paratyphi A* isolates, all 6 isolates

were susceptible to all antibiotics tested.

## DISCUSSION

This study showed that *S. typhi* and *S. paratyphi A* isolated during 2002-2008 were susceptible to drugs commonly used by clinicians in treating patients suspected or with Typhoid Fever. In vitro, antibiotics such as Chloramphenicol, Trimethoprim-Sulfamethoxazole, Tetracycline, Ciprofloxacin, Levofloxacin and Ceftriaxone were showing activity against the causative agents, consistent with other reports, such in Sulawesi (1). However, in several places, i.e. Mexico, India, Vietnam, Thailand, Korea and Peru, *S. typhi* had been found resistant to Chloramphenicol, Trimethoprim-Sulfamethoxazole and Ampicillin, since 2002 (2). *S. typhi* strains resistant to Ciprofloxacin and Ceftriaxone had been reported in Pakistan since 2006 (4). Fluoroquinolone has been widely used in the treatment of Typhoid Fever, and superior in term of efficacy and safety (5). However, several concerns must be taken into account because the drug is rather toxic for children, the cost, and its potential emergence of resistance (2). MDR and quinolone resistant (QDR) strains of *S. typhi* have been big regional and global issues (2,6,7). These strains have not been yet isolated thus far in Indonesia, while clinicians had reported failed empiric therapy in Typhoid Fever cases. With high mobility of people to and from Indonesia, it is possible that the MDR and QDR strains of *S. typhi* are present in Indonesia. It is strongly suggested that the diagnosis of Typhoid Fever is not only based on clinical pictures and serology tests, but also etiological. The availability of reliable surveillance data and molecular mapping of MDR and QDR *S. typhi* strains will benefit patients and communities.

This study showed that Ciprofloxacin, Levofloxacin, Tetracycline, Trimethoprim-Sulfamethoxazole, Chloramphenicol and Ceftriaxone still have good in vitro activity against *S. typhi* and *S. paratyphi A*. But clinicians should be careful in interpreting this result, because of small number of isolates tested. ■

Reference at editorial desk