INCIDENCE OF NEW *SALMONELLA* SEROVAR (*S. RATCHABURI*) IN THAILAND

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Abstract. Eighteen strains of *Salmonella* group E from stool samples were confirmed as *Salmonella* new serovar. 3, 10 : Z_{35} : 1, 6 by Centre International des *Salmonella*, Institut Pasteur, Paris, WHO Collaborating Center for *Salmonella*, Atlanta, USA and *Salmonella*-Zentrale Hygienischen Institut, Hamburg, Germany. The name of this new serovar was proposed as *S. ratchaburi* according to the place of its first isolation in Ratchaburi province. The new serovar of *Salmonella* was sensitive to many antimicrobial agents except streptomycin and erythromycin.

INTRODUCTION

The ubiquitous occurrence of *Salmonella* spp and the high incidence of salmonellosis is a worldwide problem. In Thailand, investigation during the last decade revealed that *Salmonella* spp is one of the most common organisms causing infectious diarrheal disease (Bangtrakulnonth *et al*, 1995). The classification employed for *Salmonella* spp is based on the taxonomy scheme presented by Kauffmann (1966) and Popoff and Le Minor (1997).

In 1972, a new type of *Salmonella* serovar Bangkok was firstly found in Bangkok, Thailand. This new serovar was reported in causing diarrheal disease and contaminated in food and environment (Phan-Urai, 1995). Since then, new *Salmonella* types were not reported until June 1998, when 18 strains of *Salmonella* group E from 18 stool samples of 11 salmonellosis patients and 7 canteen staff in Ratchaburi Provincial Hospital were sent to the WHO National *Salmonella-Shigella* Center, Bangkok. After the step of serological confirmation, we found that antigenic formulas of these isolates had not appeared in Antigenic Formulas of the *Salmonella* serovars (Popoff and Le Minor, 1997). Thus, these isolates were sent to Dr MY Popoff, Centre International des *Salmonella*, Institut Pasteur, Paris for reexamination. The strains were also sent to the WHO Collaborating Center for *Salmonella*, Atlanta, USA and *Salmonella*-Zentrale Hygienischen Institut, Hamburg, Germany. All strains were confirmed as new antigenic formula of *Salmonella enterica* subspecies *enterica*. This paper is to report the biochemical and serological characteristics of this new serovar which was found in Thailand. The antimicrobial susceptibility for medical treatment of this new serovar is also reported in the paper.

MATERIALS AND METHODS

Serotyping: 18 strains of *Salmonella* group E from stool samples of 11 salmonellosis patients and 7 carrier canteen staff in Ratchaburi Provincial Hospital were identified for their antigenic structures of somatic O antigens and flagellar (H) antigens by the Gard technique (Gard, 1938; Bangtrakulnonth *et al*, 1994). Serotypes of tested strains were examined in context of the Table of *Salmonella* serotyping scheme (Ewing, 1986).

Biochemical reactions: All strains were tested for their biochemical reaction with dextrose, mannitol, citrate, lysine decarboxylase (LDC), lysine deaminase (LDA), ornitine decarboxylase (ODC), KCN, indole, motility, H_2S, gelatinase film, dulcitol, lactose, salicin, D-tartrate, mucate, malonate, sorbitol and o-nitrophenyl-B-D-galactopyranoside (ONPG).

Antimicrobial susceptibility tests: All tested strains were investigated for their antimicrobial susceptibility by agar disc diffusion test with ampicillin, cefotaxime, amoxicillin, gentamycin, kanamycin, streptomycin, amikacin, tetracycline, ofloxacin, cotrimoxazole, erythromycin, chloramphenicol, cefazoline, cephalothin and norfloxacin.

RESULTS AND DISCUSSION

Eighteen strains of *Salmonella* group E from stool samples of 11 patients and 7 canteen staffs in Ratchaburi Provincial Hospital were identified for their serological antigenic structures and biochemical reactions (Tables 1, 2). The strains were also confirmed as *Salmonella* new serovar of *S. enterica* subsp *enterica* possessing the antigenic formula

Table 1
Serological pattern of new *Salmonella* serovar.

Serological test	Result	Serological test	Result
Somatic O antigen		H antigen (phase 1)	
polyvalent antiserum group A-67	+	H : G antiserum	-
polyvalent antiserum group A-I	+	H : L antiserum	-
polyvalent antiserum group A-E	+	H : Unspecific antiserum	-
polyvalent antiserum group A	-	H : a, b, c,.....z antiserum	-
polyvalent antiserum group B	-	H : z_4 antiserum	-
polyvalent antiserum group C	-	H : z_{29} antiserum	-
polyvalent antiserum group D	-	H : z_{35} antiserum	+
polyvalent antiserum group E	+	H : z_{38} antiserum	-
polyvalent antiserum group F	-	H : z_{39} antiserum	-
O factor		H antigen (phase 2)	
O : 1 antiserum	-	H : 1, 2 antiserum	+
O : 3 antiserum	+	H : 2 antiserum	-
O : 10 antiserum	+	H : 5 antiserum	-
O : 15 antiserum	-	H : 6 antiserum	+
O : 19 antiserum	-	H : 7 antiserum	-
O : 34 antiserum	-	H : z_6 antiserum	-

+ = agglutinated with tested O and H antiserum
- = not agglutinated with tested O and H antiserum

Table 2
Biochemical pattern of new *Salmonella* serovar.

Biochemical test	Result	Biochemical test	Result
Dextrose / gas	+ / +	d-Tartrate	-
Mannitol	+	Mucate	-
Dulcitol	+	Malonate	-
Citrate	+	ONPG	-
Lactose	-	Sorbitol	+
Lysine decarboxylase (LDC)	+	Indole	-
Lysine deaminase (LDA)	-	H_2S	+
Ornithine decarboxylase (ODC)	+	Motility	+
Salicin	-	Gelatinase film	-

+ = positive result; - = negative result

3, 10 : Z_{35} : 1, 6 by Centre International des *Salmonella*, Institut Pasteur, Paris, WHO Collaborating Center for *Salmonella*, Atlanta, USA and *Salmonella*-Zentrale Hygienischen Institut, Hamburg, Germany. Thus, the Division of Clinical Pathology, Department of Medical Sciences proposed the name of this new serovar as *S. ratchaburi* according to the place of its first isolation in Ratchaburi Province. The name of this new serovar "ratchaburi" has been registered at the WHO Collaborating Center for *Salmonella* in November 1998.

Antimicrobial susceptibility test for all strains (Table 3) revealed that the new serovar of *Salmonella* was sensitive to many studied antimicrobial agents except streptomycin and erythromycin. Use of tetracycline as an antibiotic treatment for this new serovar showed an intermediate results on agar plates. Thus, when the outbreak from this new serovar were occurred, ampicillin, cefotaximine, amoxicillin, gentamycin, kanamycin, amikacin, ofloxacin, cotrimoxazole, chloramphenicol, cefazoline, cephalotin, norfloxacin and tetracycline could be used as a medi-

Table 3
Antimicrobial susceptibility test of new *Salmonella* serovar.

Antibiotic	Sensitivity	Antibiotic	Sensitivity
ampicillin	S	ofloxacin	S
cefotaxime	S	co-trimoxazole	S
amoxicillin	S	erythromycin	R
gentamycin	S	chloramphenicol	S
kanamycin	S	cefazoline	S
streptomycin	R	cephalotin	S
amikacin	S	norfloxacin	S
tetracycline	I		

S = sensitive, R = resistant, I = intermediate

cal treatment against this new *Salmonella* serovar.

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