ACCEPTABILITY OF ORAL TYPHOID VACCINE IN THAI CHILDREN

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Abstract. To determine the acceptability of oral typhoid vaccine to Thai children, 434 volunteers, aged 4-15 years (average age = 8.2 years), were assigned to take three capsules of oral typhoid vaccine (one capsule every other day). Success was defined as the subjects' being able to swallow all three capsules. Information concerning the subjects' level of education, eating habits, and ability to take medicines in a variety of preparations (syrups, tablets and capsules) was obtained. The overall success rate was 94.2%; the rates were 84.4%, 94.9%, and 100% in the age groups 4-6 years, 7-9 years, and 10-12 years respectively. The rates were 82%, 85.7%, 93.3%, 96.4%, 98.8%, 100% and 100% in the students of kindergarten 1, kindergarten 2, elementary grade 1, grade 2, grade 3, grade 4, and grade 5 respectively. There was a correlation between a child's prior ability to take tablets/capsules and his success in swallowing the oral typhoid vaccine.

INTRODUCTION

Typhoid fever can be prevented by good sanitation, sound hygiene and vaccination. The forms of typhoid vaccine available in Thailand include enteric-coated capsules and parenteral formulations (Pediatric Infectious Disease Society of Thailand, 2002). The administration of the enteric-coated capsules is made difficult by the fact that the children have to swallow them. In Thailand, there have been no studies concerning the optimal age of children with regards to the acceptance of the vaccine. We conducted a study in order to determine the acceptability of oral typhoid vaccine among children of various age groups; we went on to evaluate the factors that influence the acceptance of the vaccine.

MATERIALS AND METHODS

A cross-sectional study was performed in 434 students of the Prachanukool School, a kindergarten-elementary school in the Don Mueang area of Bangkok, in February 2000. The majority of the children came from families of low to middle socioeconomic status. After the parents had given written consent and completed questionnaires concerning demographic data, their children's eating habits, and their children's ability to take specific preparations of medicine (syrups, tablets, capsules), three capsules of T21a enteric-coated vaccine (Vivotif BERNA) were given with water to each child: one capsule every other day. The capsules were given at school by assistant nurses who had been trained and were supervised by the investigators. Those children who were able to swallow all three capsules without breaking them were defined as 'success'; those who were not able to swallow all three capsules and those who broke any of the capsules were defined as 'failure'. Statistical analysis included mean, range and percentage (demographic data) and chi-squared and Fisher's exact tests for variables. The level of significance was set at $p = 0.05$.

Verbal permission was obtained from Prachanukool school staff. Parents had to complete written conset befor enrollment.

RESULTS

Of the 434 students enrolled in our study, 204 were boys and 230 were girls. The mean age

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Table 1
Acceptability rate of enteric-coated Ty21a vaccine in various age groups.

Age group (years)	Success		Failure	
	Number	%	Number	%
4-6	76	84.4	14	15.6
7-9	188	94.9	10	5.1
10-12	124	100	0	0
Total	388	94.2	24	5.8

Table 2
Acceptability rate of enteric coated Ty21a vaccine by educational level.

Level	Success		Failure	
	Number	%	Number	%
Kindergarten 1	41	82	9	18
Kindergarten 2	42	85.7	7	14.3
Grade 1	70	93.3	5	6.7
Grade 2	53	96.4	2	3.6
Grade 3	79	98.8	1	1.3
Grade 4	56	100	0	0
Grade 5	47	100	0	0
Total	388	94.2	24	5.8

was 8.2 years (range 4.7 to 12.7 years). The overall success rate for the administration of the oral typhoid vaccine was 94.2%. After classifying the children into various age groups, the success rates were 84.4%, 94.9% and 100% for the age groups of 4-6 years, 7-9 years, and 10-12 years respectively (Table 1). After classifying the children into seven education levels, the success rates were 82%, 85.7%, 93.3%, 96.4%, 98.8%, 100% and 100% in kindergarten 1, kindergarten 2, and grades 1-5 respectively (Table 2).

There was no association between eating habits or taking syrup and the swallowing of oral typhoid vaccine (p-values = 0.305 and 0.592 respectively). There was a statistically significant association between the ability of children to take tablets or capsules and the swallowing of oral typhoid vaccine (p-values = 0.001 and 0.027 respectively) (Table 3).

DISCUSSION

Our data showed that the overall success rate in swallowing oral typhoid vaccines in kindergarten-elementary school children was 94.2%. The rate increased with advancing age and reached 100% at the age of ten (grade 4 or higher). A previous study in Chile showed a success rate of 84% in schoolchildren (Ferreccio *et al*, 1989). The children in our study had higher success rates, possibly due to the fact that Thai children are familiar with taking medicines. The assistance of teachers and our investigators might have helped encourage the swallowing of the capsules.

In normal circumstances, typhoid vaccine is recommended by the Pediatric Infectious Disease Society of Thailand as a vaccine for those aged 6 or over who are travelling to areas of endemic

Table 3
Correlation between acceptability rate and eating habits and ability to take specific preparations of medicine (syrups, tablets, capsules).

Eating habits/ ability to take medicines		Acceptability of vaccine		p-value
		Success (number)	Failure (number)	
Food	- good	212	10	0.305
	- poor	176	14	
Syrup	- good	315	21	0.592
	- poor	73	3	
Tablet	- good	205	4	0.001[a]
	- poor	183	20	
Capsule	- good	162	4	0.027[a]
	- poor	226	20	

[a]statistically significant ($p < 0.05$).

typhoid fever; at 6 years of age, most children can take tablets or capsules (American Academy of Pediatrics, 2000; Pediatric Infectious Disease Society of Thailand, 2002). However, our study showed that the children who were younger than 6 years old could take the vaccine. Were the oral vaccine to be indicated for children younger than 6, then it would be possible to try given it to those at kindergarten 1 level (aged 4+) since their rates of success were found to be higher than 80%. Interviewing parents about their children's ability to take tablets or capsules might help predict the likely acceptability of vaccine. In the future, a liquid formulation of Ty21a vaccine will become available in Thailand for use in very young children (Le and Hoffman, 1999).

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