

Typhoid fever and Salmonellosis in Indonesia

S1-5

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Abstrak

Demam tifoid (DT) masih merupakan penyakit yang sangat endemis di Indonesia. Penyakit ini terjadi sepanjang tahun di seluruh Indonesia. Angka morbiditas untuk daerah semi pedesaan adalah 157/100.000 penduduk dan angka ini meningkat mencapai 810/100.000 penduduk untuk daerah perkotaan, disertai kecenderungan peningkatan karena program vaksinasi untuk penyakit ini telah dihentikan sejak tahun 1980. Sebagian besar kasus terjadi pada kelompok umur 3-19 tahun yang dianggap sebagai kelompok yang mudah terpapar. Angka kematian kasus (CFR) adalah 1,6-3%, tetapi dengan adanya perbaikan fasilitas kesehatan angka ini telah menunjukkan adanya penurunan. Terjadi manifestasi yang lebih berat pada kelompok anak besar dan dewasa muda. Jenis kuman penyebab Salmonellosis pada manusia yang sering ditemukan di Indonesia adalah *S. oranienberg*, *S. kreveld*, *S. paratyphi B*, *S. lexington*, *S. weltevreden* dan *S. New port*. Kuman penyebab demam tifoid (*S. typhi* dan *S. paratyphi A*) yang diisolasi ternyata masih sensitif terhadap ampisilin, kloramfenikol dan kotrimoksazol, tetapi kuman *S. paratyphi B*, *S. paratyphi C* serta jenis *Salmonellae* non tifoidal lainnya telah menunjukkan resistensi sedang dan tinggi terhadap ampisilin, kloramfenikol, kotrimoksazol dan tetrasiklin. Jenis faga *S. typhi* yang sering dijumpai adalah D2, A, B1, D6 dan E1.

Abstract

Typhoid fever is highly endemic in Indonesia. It occurs perennially all over the country with the annual morbidity of 357/100,000 population in semi rural area and 810/100,000 population in urban area and tends to increase over time, because there is no vaccination program for this disease since 1980. Most of the cases were found in the age group of 3-19 year old, who were considered to be the vulnerable group. The case fatality rate (CFR) was 1.6-3.0%. In the older children and young adults, the disease was found to be more severe than in younger children. Because of improvement in health care and facility the CFR has been decreasing overtime. The most common non typhoid *Salmonella* in Indonesia in human are *S. oranienberg*, *S. kreveld*, *S. paratyphi B*, *S. typhimurium*, *S. lexington*, *S. weltevreden* and *S. New port*. Typhoid fever (*S. typhi* and *S. paratyphi A*) is still sensitive to ampicillin, chloramphenicol and co-trimoxazole, however *S. paratyphi B* and *S. paratyphi C* and other non typhoid *Salmonellae* has develop a moderate and high resistance to ampicillin, chloramphenicol, co-trimoxazole and tetracycline. The most common phage types of *S. typhi* in sequence are D2, A, B1, D6 and E1.

Introduction

Infectious diseases continue to be the major cause of death in most of developing countries and in this context, typhoid fever continues to be a major health problem. It was estimated 12.5 million cases annually, of which more than 62 % of the cases occurred in Asia.

In Indonesia, typhoid is highly endemic and is a serious public health problem. The incidence is relatively perennial along the year or even increasing from time to time and the incidence of this disease in Indonesia is considered to be the highest in the world¹. Typhoid fever frequently strikes young adults, the population group in whom society has invested most and from whom the society has received the least. These young adults are just finishing or have just finished school,

have recently entered the work force and frequently have very young children. Their deaths exact a social and economic toll far beyond what mortality statistics would suggest. While patients with diarrhoea spend an average of 3 days in hospital and are ready to return to school or work within a week, typhoid patients frequently spend 2 - 3 weeks in the hospital and often can not return to school or work for a month. Therefore, when considering the social and economic impact of this disease in the community one can not compare typhoid and other diseases case to case. The young adults of hospitalized typhoid patients tend to have internal bleeding which leads to perforation and finally some of them ended with death^{2,3}.

Reported cases

An average of 22,790 cases per year were reported during the period of 1981-1986 from hospitals and health centers in Indonesia⁴. The mean annual morbidity rate was 13.9 cases per 100,000 population and case fatality rate (CFR) 2.6 %.

Although typhoid cases were increasing (36%) from 19,596 cases in 1981 to 26,606 cases in 1986, the CFR was decreasing from 3.4% in 1981 to 2.0% in 1986.

Again, Table 1 revealed that morbidity of typhoid fever increased from 93.4 cases per 100,000 population in 1990 to 157.0 cases per 100,000 population in 1992.

Table 1. Morbidity, Mortality and Case Fatality Rate (CFR) of typhoid fever reported from Hospital and Health Center in Indonesia, 1990-92

Item	year		
	1990	1991	1992
Population (10 ³)	179,830	183,693	187,557
Morbidity			
Total rate(10 ⁻⁵)	168,045 93.4	249,168 135.6	294,450 157.0
Mortality			
Total CFR (10 ⁻³)	500 3.0	556 2.2	464 1.6

The relatively consistent increase of the morbidity from time to time was affected by many factors. One most important factor was the improvement of the recording and reporting system. The conventional par-enteral vaccine of typhoid has been used for a number of years in the vaccination program of infants in Indonesia. However, this vaccine is associated with unpleasant side effects and relatively short periods of protection^{5,6}. Therefore, since 1970's the vaccination program of this particular disease has been abandoned. Since then the morbidity of typhoid fever is increasing in all over the country. On the contrary, because of the improvement of medical care and treatment the CFR decreased from 3.0% in 1990 to 1.6% in 1992.

It was also noted that the inpatients in the hospital were dominated by older children and young adults, while the out patients were slightly higher in younger children (Table 2). This fact gives a clue to lead us to conclusion that typhoid fever is more severe in older children and young adults than in younger children.

In IDH (Infectious Disease Hospital), Jakarta male patients of typhoid fever were significantly higher

Table 2. In and out patient of typhoid fever in Hospitals in Indonesia, 1990-92 (per 10⁻⁵)

Age group	Year								
	1990			1991			1992		
	in-patient	out-patient	Total	in-patient	out-patient	Total	in-patient	out-patient	Total
0 - 4	12.0	6.4	18.4	13.2	19.4	32.6	13.7	23.4	37.1
5 - 14	23.9	8.3	32.2	18.6	18.1	36.7	21.7	19.0	40.7
15 - 44	19.7	6.9	26.6	18.8	16.8	35.6	20.2	16.6	36.8
≥ 45	3.0	4.8	8.5	9.4	12.4	21.8	14.0	13.6	27.6
Total	16.6	6.6	23.2	16.5	6.7	33.2	18.7	17.5	36.2

Table 3. Typhoid fever cases at IDH Hospital, Jakarta in(1989- 1991)

Age Group	Year								
	1989			1990			1991		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
< 1	3	4	7	6	9	15	3	0	3
1 - 4	11	1	12	14	4	18	5	4	9
5 - 14	17	11	28	57	32	89	63	68	131
15 - 24	15	18	33	85	45	130	113	105	218
25 - 44	16	9	25	50	32	82	120	57	177
45 - 64	6	5	11	10	7	17	19	18	37
≥ 65	0	1	1	1	5	6	5	4	9

than female (Table 3). This strongly suggests that male, who usually have their lunch in the place of work, out side the home, which permits the possibility of more exposure to the disease for infection.

Epidemiological study in the population

There were no study of epidemiology of typhoid in the population before 1986. Since then there were only 2 epidemiological studies of the typhoid fever.

One study was conducted at Paseh District, a semi rural area, in West Java in 1986. The study was conducted on purpose to search an ideal area to perform an oral vaccine trial of Ty21a.

This district with the total population of 62,636 was selected to perform an epidemiological study with a 3 months intensive blood culture study⁷. Five ml of venous blood was obtained from every patient with more than 3 days of febrile illness presenting to the health facilities in the District (1 hospital, 1 health center, 5 subhealth centers, 7 clinics). The health facilities surrounding Paseh were also asked for collecting venous blood from patients living in Paseh who presented to that particular health facilities.

This study revealed that the incidence of *S. typhi* was 357.6 cases per 100,000 population per year, *S. paratyphi A* 14.7 per 100,000 population and *S. paratyphi B*, 12.8 cases per 100,000 population per year (Table 4). Most of the cases were found in older children and young adults (3 - 19 year old). Only 14.3% of the cases needed hospitalization and they were the older children and adults.

Table 4. Age Specific Morbidity Rate of *S. Typhi* based on 3 months intensive blood culture study of fever patients in semi rural area, Paseh District, West Java.

Age Group	Total Population	<i>S. typhi</i> cases in 3 months			Morbidity 10 ⁻⁵ per year
		in patients	out patients	Total	
0 -	4,551	0	3	3	263.3
3 -	4,521	0	7	7	619.3
5 -	9,327	0	14	14	600.4
10 -	7,559	1	12	13	687.9
15 -	5,858	3	6	9	614.5
20 -	9,900	3	6	9	363.6
30 -	7,577	1	0	1	52.8
40 -	5,805	0	0	0	0.0
50 -	4,117	0	0	0	0.0
60 -	3,421	0	0	0	0.0
Total	62,636	8	48	56	357.6

The second study was done in an urban area, Plaju and Sungai Gerong, Sumatra, at the Pertamina Oil Company Compound during the trial of the oral vaccine Ty21a which was conducted in 1986-1989. The subjects were 22,001 employees and their dependents aged 3-44 years⁵.

Identification of typhoid fever cases was done by bacteriological identification of *S. typhi* from the mixture of 90 ml of ox gall and 10 ml of venous blood from every patient presenting at the Pertamina health facility with a febrile illness of more than 3 days' duration. Blood cultures were also collected from patients with less than 3 days of fever if antibiotics were to be prescribed. It was found that the incidence of typhoid fever in the placebo group was 810 cases per 100,000 population per year (Table 5). The incidence of *S. paratyphi A* was 187 cases per 100,000 population per year.

Table 5. Incidence of blood culture proven Typhoid and Paratyphoid fever by Age Group in placebo groups during the 30 month of surveillance at Plaju and Sungai Gerong

Age group (yr)	No in each age group	<i>S. typhi</i>		<i>S. paratyphi B</i>	
		Cases	Incidence (/10 ⁵ /yr)	Cases	Incidence (/10 ⁵ /yr)
3- 6	1592	52	1307	7	176
7- 9	1420	48	1352	8	225
10-14	2156	62	1150	18	334
15-19	1135	28	987	8	282
20-29	1218	8	263	2	66
30-44	2747	10	146	5	73
Total	10268	208	810	48	187

In this population, most of the typhoid cases were also found in 3 - 19 years age group, which were the preschool and school children. This age group was considered to be the vulnerable group because of their habit to eat food from street vendor. This age group has lost their immunity from their mother while acquired immunity was not adequate enough to prevent the disease.

Antibiotic resistance

The study in 1980-1985 showed that most of *S. typhi* and *S. paratyphi A* in Indonesia are still sensitive to chloramphenicol, ampicillin and cotrimoxazole⁸. On the contrary Salmonella group B and group C has developed a high resistance to chloramphenicol, tetracycline, ampicillin and cotrimoxazole.

Phage types

In 1978-1982, 2505 strains of *S. typhi* were collected from 13 provinces in Indonesia⁹⁻¹¹. The most common phage type were D2, A, B1, D6 and E1. Most of phage types found in Indonesia were frequently found in Japan. However, many of the common phage types in Europe and North America were infrequently found in Asia. For example, types B2, C, F1, T1 and 28 which are among the most common phage types in Europe have never been found in Indonesia or Japan¹².

Of particular interest is the fact that 1,169 (46.7%) of our isolates of *S. typhi* were untypable using all 96 phage preparations from the International Reference laboratory for enteric phage typing (Colindale).

Conclusions

1. Typhoid fever is highly endemic in Indonesia.
2. It occurs perennially all over the country with the morbidity of 357 (semi rural area) to 810 (urban area) cases per 100,000 population per year.
3. It seems that the morbidity is higher in urban area than in rural area.
4. The morbidity tends to increase overtime since 1981, however, the CFR was decreasing.
5. The highest age group that having the disease is 319 year of age.
6. Most of *S. typhi* strain is still sensitive to ampicillin, chloramphenicol and cotrimoxazole, however, *S. paratyphi* B and C has develop high resistance to ampicillin, chloramphenicol, cotrimoxazole and tetracycline.
7. The most common of phage types of *S. Typhi* in sequence were D2, A, B1, D6 and E1.

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