Typhoid Fever outbreak in Madaya Township, Mandalay Division, Myanmar, September 2000

Tin Tin Aye MD*@, Potjaman Siriarayapon MD*

** Bureau of Epidemiology, Ministry of Public Health*
@ Department of Health, Ministry of Health, Myanmar

In September 2000, an outbreak of typhoid fever was reported in a rural village of Central Myanmar. The authors investigated the outbreak in the affected village. A suspected case was a person suffering from fever with either constipation, abdominal pain, diarrhoea / bloody diarrhoea. A probable case was a suspected case who had positive result on the diazo urine test or widal test. Based on probable cases, the authors conducted a case-control study comparing history of contact with the cases, water source, and personal hygiene. Control was a person living in the village was not ill and having a negative result for diazo urine test. Among 49 suspected cases, 33 were probable. Attack rate was 1.2%. Three cases had a positive culture for Salmonella typhi and were not drug resistant. The following risk factors were identified: drinking unboiled river water (adjusted OR 12.5, 95%CI 2.8-75.3), history of contact with other patients before the illness (adjusted OR 22, 95%CI 3.5-76.2), no hand washing with soap after defecation (adjusted OR 0.15, 95% CI 0.03 - 0.81). Environmental investigation result showed that most of the households had unsanitary latrine and some latrines were constructed near the edge of a river. The outbreak subsided quickly after intervention.

Keywords : *Typhoid fever, Outbreak, Myanmar*

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Typhoid means like typhus, a disease, the name of which means smoke in Greek. Typhoid has been described throughout the globe. In poorer countries, typhoid is associated particularly with bad sanitation, poverty, crowding, and war[1]. Worldwide, the annual incidence of typhoid fever is estimated at about 17 million cases with approximately 600,000 deaths[2]. In poorer countries, case-fatality rates in patients admitted to hospital are typically about 10 per cent, a figure close to the overall mortality of untreated typhoid. Case-fatality rates rarely exceed 1 percent in patients treated promptly with antibiotics.

In Myanmar, typhoid fever is one of the notifiable diseases and the occurrence was found to peak in June to August. The disease is most prevalent in densely populated areas. Frequent common sources of outbreaks of typhoid fever have been reported in Myanmar since 1989 and during the decade, 4 major outbreaks through contaminated water were found[3]. The authors report the results of an investigation of typhoid fever in Madaya Township where the outbreak from water contamination was demonstrated. On 27th September 2000, 31 cases of typhoid fever were reported from the Mwetaline Station Hospital in Madaya Township, Central Myanmar. These patients came from nearby villages since 9th September 2000.

The cluster of cases occurred in one of these villages namely Mweponkan village that has a 2856 population of the main occupation of the area is agriculture such as growing paddy, ground nuts and other crops. The water supply for the villagers is mainly from the Myaung River and an artesian tube well.

Material and Method

Medical records of typhoid fever treated in Mwetaline Station Hospital during the outbreak were reviewed. A suspected case was a person suffering from sustained fever (7 days and more) with one of the abdominal symptoms (constipation, abdominal

Correspondence to : Siriarayapon P, International Field Epidemiology Training Program, Bureau of Epidemiology, Ministry of Public Health, Nonthaburi 11000, Thailand.

pain, diarrhoea /bloody diarrhoea, malaena)[4] in Mweponkan village between 1st August 2000 and 30th September 2000. A probable case was a suspected case with positive Diazo Urine Test or positive widal test. A confirmed case was a case with clinical symptoms with positive culture for *S.typhi*.

Applying the suspected case definition the investigation team and local health authority carried out house to house active case finding in the community for identifying the cases in early onset, collecting the necessary information like source of drinking water, any peculiar events in the village (e.g. festival) and some information about the environment.

Based on the probable case definition, the authors conducted a case-control study to identify the potential vehicle of the outbreak. A control was defined as a person living in the Mweponkan village and not showing any signs and symptoms of typhoid fever and having a negative result for diazo urine test. A control was selected after house to house visits. Cases and controls were interviewed about their consumption of food and water, including personal hygiene before the outbreak. Diazo urine test, single/ paired widal test, hemo-culture and drug sensitivity were performed on all suspected cases. The situation of latrine and environment were inspected and water from the Myaung River and Sedawgyi, a canals running across the paddy fields, were tested for faecal contamination. Adjusted odds ratio and 95% CI were used to calculate the possible risk factors by using multiple logistic regression, with STATA software.

Results

From 31 typhoid fever cases admitted to Mwetaline Station Hospital from 9th-30th September, 25 cases were from Mweponkan village and 6 cases were from nearby villages. In Mweponkan village after active case finding, a total of 49 cases of typhoid fever met suspected case definition. Among them, 33 were probable and 3 were confirmed cases.

The epidemic peaked during the 2nd week of September and then receded somewhat over the next 2 weeks. This was pattern similar to person to person transmission but could not exclude some degree of mixing with a continuous common source.

Based on probable cases, the overall attack rate at Mweponkan village was 1.2% but when the authors stratified by area all cases were found to occur in the south part of the village and caused the attack rate of the southern part equal to 2.9 % (33/1102). The highest attack rate was among people of working age group (15-49 years), which was 4.5 %. Male to female ratio was 1:1.5.

The main signs and symptoms of cases were fever (100%), headache (58%), constipation (52%), chills (48%), coated tongue (42%), diarrhoea (30%), passing black stools (27%), abdominal pain (21%), vomiting (15%) and bloody diarrhoea (12%). The dura-

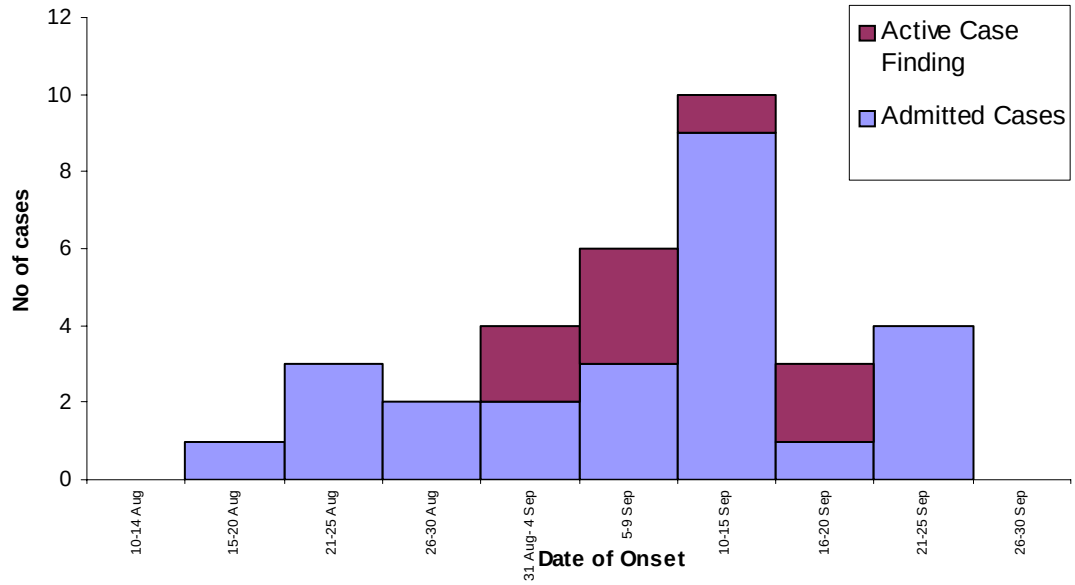

Fig. 1 Date of onset of probable typhoid fever cases in the Mweponkan village, 20th August to 25 September 2000

tion of fever lasted from 7-30 days. Mean duration of staying in hospital was 10 days. Regarding the outcome of the patients, only one (3%) had complications of intestinal perforation. At the end of the outbreak, all cases were completely recovered.

Laboratory result of the 49 suspected cases is shown in Table 1. For 3 cases that were positive for *S.typhi*, all of them were sensitive for ampicillin, choloramphenicol, septrin, ciprofloxacin, ceftazidime and gentamycin.

Mweponkan village was divided into 3 parts. Eastern part of the village was divided by Myaung river from north and south parts. North and South parts were divided by a small bridge. All 3 parts had the same sources of water (Myaung river and artesian tube well), geographical area, occupation pattern and people living in the village communicated with each other daily.

Most of the households had latrines but they were unsanitary and some latrines were constructed near the edge of the river. Water from two reservoirs that were tested for fecal contamination and found to have E.coli. There was no food shop in the village.

Two weeks before the outbreak, there was a pagoda festival in the village and people from nearby villages visited Mweponkan village for an overnight stay. Some visitors came from Singaing township where a typhoid fever outbreak occurred in August 2001. However, they did not share common food at the festival and the people who became ill did not consume the same food from the same source.

In the present case-control study, there was no significant difference between the sociodemographic characteristics of cases and controls. The results of the case-control study are shown in Table 2. Each exposure appears to be strongly and statistically significantly associated with having typhoid fever after adjusting other exposure status and demographic characteristics.

Discussion

Typhoid was the one of the endemic diseases in Myanmar and sporadic outbreaks frequently occurred from 1989 to 2000. Recently before the present outbreak, a typhoid fever outbreak was also occurred in Singaing township of Mandalay Division that is very near Madaya township and people from these townships communicate with each other daily. The outbreak of typhoid fever in Madaya township was caused by *Salmonella typhi*, sensitive to most of the first line antibiotics. Most of the patients drank water from the Myaung River and there was no treatment of drinking water like boiling or chlorination and most of the latrines in the village were unsanitary and constructed near the river. Due to heavy rain, there was flooding and it caused contamination of the river water. A cluster of cases occurred south of the village and this explains that the Myaung river was runs from north to south and the water source at the northern part of the village was probably free from contamination.

The results of the analytical study showed people who drank water from the Myaung river without treatment were associated with a higher risk of illness than people who drank water from the artificial deep wells. Laboratory results for this water source also showed contamination and it was unsatisfactory

Table 1. Laboratory result of suspected typhoid fever cases in Mweponkan village, Myanmar

Test	Number tested	Positive	Remarks
Diazo urine	26	18	All positive for widal test
Widal test	32	32	All had 4-fold rise or initially high positive result
Culture and Sensitivity	22	3	All were positive for Diazo urine test and widal test

Table 2. Risk factor of having typhoid fever* in Mweponkan village, Myanmar

Risk factor	Case (33)	Control (52)	Odds ratio	Adjusted OR
Drink untreated river water	30	27	9.26(2.5-34.2)	12.5(2.8-75.3)
Contact with typhoid patient	10	2	10.9(2.0-79.7)	22(3.5-76.2)
Hand washing with soap	2	16	0.15(0.03-0.75)	0.15(0.03-0.81)
Travel to other place	19	22	1.9(0.8-4.5)	2.0 (0.8.-5.2)

* Adjusted for all risk factors in this table

for drinking and cooking purposes. History of contact with patients was also associated with a higher risk of illness indicated that infection was transmitted by personal contact. Most of the cases had poor personnel hygiene and they didn't use soap before eating and after defecation. Hand washing practice with soap after defecation would be a protective factor.

Although the duration of the outbreak was longer than one incubation period and the distribution of cases by time of onset in the early period of the outbreak was not in an explosive manner, this outbreak should have a common source, from the Myaung river. However, the person to person transmission, that was shown by the case-control result for poor personal hygiene and the history of contact with other typhoid cases, should also play an important role in the outbreak.

In the present study, since not all of the cases and controls had positive culture and the diagnosis for typhoid fever mainly depends on the widal test and Diazo urine test, there was a possible misclassification of cases and controls. However, this kind of bias should cause the OR toward unity, therefore the real OR should be higher than this.

After the recognition of the outbreak, a Disease Control Implementing Committee was held to implement the following control measures. 1) Active case finding among the community. 2) Established emergency treatment post in affected villages for early treatment. 3) Instruction on chlorinated water. 4) Educate the community about the disease and how to prevent the illness. 5) Distribute the necessary drugs (chloramphenicol, ORS, etc.). 6) Inspect the latrines and repair unsanitary latrines in the village. 7) Inform neighboring villages about the occurrence of typhoid fever in this village. 8) Improve the surveillance system for early detection of unusual events.

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การระบาดของไข้ไทฟอยด์ในหมู่บ้านแห่งหนึ่งในเมืองมะดายา รัฐมัณฑะเลย์ ประเทศพม่า, เดือนกันยายน 2543

Tin Tin Aye, ***พจมาน ศิริอารยาภรณ์***

ในเดือนกันยายน 2543 มีรายงานการระบาดของไข้ไทฟอยด์ในหมู่บ้านแถบชนบท ซึ่งตั้งอยู่ในภาคกลางของประเทศพม่า คณะสอบสวนโรคได้ดำเนินการศึกษาในหมู่บ้านแห่งหนึ่งซึ่งมีจำนวนผู้ป่วยมากที่สุด โดยใช้นิยามผู้ป่วยคือ ผู้ป่วยที่สงสัยไทฟอยด์ (Suspected case) ได้แก่ ผู้ที่มีไข้นานตั้งแต่ 7 วันขึ้นไปร่วมกับมีอาการอย่างหนึ่งอย่างใดต่อไปนี้คือ ท้องผูก ปวดท้อง ถ่ายเหลว หรือ ถ่ายเป็นเลือด ผู้ที่น่าจะเป็นไทฟอยด์ (Probable case) คือ ผู้ป่วยที่สงสัยไทฟอยด์ และให้ผลบวกโดยการตรวจ Diazo urine test หรือ widal test คณะผู้สอบสวนโรคได้ทำการศึกษาแบบ case-control โดยศึกษาเฉพาะผู้ป่วยที่น่าจะเป็นไทฟอยด์ กลุ่มควบคุมคือผู้ที่อาศัยอยู่ในหมู่บ้านแห่งนั้น และไม่มีอาการผิดปกติ ร่วมกับผลการตรวจ Diazo urine test ให้ผลลบ ผลการศึกษาพบว่ามีผู้ที่เข้าได้กับนิยามผู้ป่วยที่สงสัยไทฟอยด์ 49 ราย และผู้ที่น่าจะเป็นไทฟอยด์ 33 ราย คิดเป็นอัตราป่วย 1.2% ในจำนวนนี้สามารถเพาะเชื้อขึ้น Salmonella Typhi 3 ราย ทั้งหมดไม่ดื้อต่อยาปฏิชีวนะ สำหรับปัจจัยเสี่ยงของการป่วยครั้งนี้ได้แก่ การดื่มน้ำจากแม่น้ำโดยไม่ต้ม (adjusted OR 12.5, 95%CI 2.8-75.3) การมีประวัติคลุกคลีกับผู้ป่วยไข้ไทฟอยด์รายอื่นๆ (adjusted OR 22, 95%CI 3.5-76.2) การไม่ล้างมือโดยใช้สบู่ภายหลังเข้าท้องน้ำ (adjusted OR 0.15, 95% CI 0.03-0.81) การสำรวจทางสิ่งแวดล้อมพบว่าบ้านส่วนใหญ่มีส้วมที่ไม่ถูกสุขลักษณะ นอกจากนี้ส้วมของบางครอบครัวสร้างอยู่ติดริมแม่น้ำ จำนวนผู้ป่วยลดลงอย่างรวดเร็วภายหลังการดำเนินการควบคุมโรค