

BACTERIAL DIARRHEA IN LAOS, A REGION WHERE CHOLERA WAS ENDEMIC

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Abstract. There were cholera outbreaks in Lao PDR since 1993. Two provinces were epidemic areas of cholera in 1993. However the area of cholera occurrence increased to 7 provinces through 1994. Then a bacterial survey had done for the purpose of public health improvement. EPEC was markedly isolated from the hospital in Vientiane. In apparent infection of *Salmonella* and non-01 *Vibrio cholerae* with soldiers stationed in the island in Mekong River belong to Vientiane were pointed out. The outbreak of diarrhea in suburban village of Vientiane, the diarrhea was not due to cholera but due to *Shigella dysenteriae* and *Aeromonas sobria*. As far as results in the capital city Vientiane and the Vientiane province go, it could say that there was no record and isolation of *V. cholerae* or non-01 *V. cholerae* 0139 in this study. On the contrary, *Vibrio cholerae* 01 serotype Eltor Ogawa was isolated although the community declared the end of the cholera outbreak. This study pointed out the importance of establishing sanitary conditions and health education systems in Lao PDR.

INTRODUCTION

Enteric disease due to cholera has been epidemic in Lao PDR from 1993. In 1994, the epidemic area of cholera was widespread, more than in 1993 (Figs 1, 2). Before 1992, there was no record of cholera outbreaks in this country. Then, as part of a project of the Japan International Cooperation Agency (JICA) for improving the public health status in Lao PDR, we carried out studies of diarrheal bacteria of ascertain source of the endemic. The main purpose of this study was isolation of *Vibrio cholerae* 01 or non-01 *V. cholerae* serotype 0139 (Rabbani *et al*, 1993). Three areas were prepared for this research: (1) the Hospital for Epidemiology in Vientiane, the capital city; (2) a suburban region of Vientiane, and (3) a village located in Khamuane Province where cholera was endemic. Both *V. cholerae* and other enteric pathogenic bacterial isolations were performed in this study.

MATERIAL AND METHODS

Research of Mahosot Hospital

To monitor the invasion of *V. cholerae* or non-01 *V. cholerae* 0139 into Vientiane, isolation of

bacteria was carried out from diarrhea feces samples at the Mahosot Hospital in Vientiane. All samples assayed for pathogens, including parasites, by the invic system as Midorikawa *et al*



Fig 1-Cholera outbreak in Lao PDR 1993.



Fig 2-Cholera outbreak in Lao PDR 1994.

(1987) reported in the northeastern region of Thailand.

Studies on Dong Chan Island

Dong Chan Island, located in the middle of the Mekong River, belongs to Vientiane City. There was a troop of Lao PDR soldiers stationed there.

The quality of drinking water in the island was tested. The number of coliforms was counted after 1 ml of the drinking water was incubated overnight on the test paper (Shibata Factorial Chemical, Tokyo, Japan) according to the method of Aung Myo Han *et al* (1989).

Twenty soldiers staying in this island were subjected to fecal examination. The isolation of the bacteria was done by means of inoculation on DHL and TCBS agars (Doyle, 1989).

Studies in Ban (village) Sok Nyai

We had received information that there were outbreaks of diarrheal disease resembling cholera in the village named Ban Sok Nyai, located in the suburbs of Vientiane. Feces samples were collected from the villagers, and the pathogens were identified.

Identification of cholera in Khammuane Province

There was an outbreak of cholera in Khammuane Province since 1993. Fecal samples were collected at a village in the Nong Bok region in this province, to look for cholera carriers.

RESULTS AND DISCUSSION

Data from Mahosot Hospital in Vientiane

The number of patients who suffered from diarrhea or stomach pain was 39. However, detec-

Table 1
Results of the study at Mahosot Hospital in Vientiane (21th July-12th September 1994).

| Organisms | Isolated No. | Species (isolated No.) |
|-------------------|--------------|--|
| <i>Vibrio</i> | 1 | <i>Vibrio</i> sp |
| <i>Salmonella</i> | 0 | |
| EPEC | 5 | |
| <i>Shigella</i> | 3 | <i>flexneri</i> (2), <i>sonnei</i> (1) |
| <i>Aeromonas</i> | 0 | |
| Rotavirus | 3 | |
| Fungi | 1 | <i>Candida albicans</i> 1 |
| Parasites | 3 | <i>Ascaris lumbricoides</i> (1), <i>Trichomonas hominis</i> (1), <i>Entamoeba coli</i> (1) |
| Polymicrobial | 2 | |
| No isolate | 26 | |
| Total | 39 | |

Table 2
Bacteria species isolated in Dong Chan Island.

| Organisms | Isolated No. | Species (isolated No.) |
|-------------------|--------------|---|
| <i>Vibrio</i> | 4 | non-01 <i>V. Cholerae</i> (4) |
| <i>Salmonella</i> | 4 | sero var: lexington (2), newport (1), agona (1) |
| <i>Shigella</i> | 0 | |
| <i>Aeromonas</i> | 0 | |
| Polymicrobial | 3 | |
| No isolate | 10 | |
| Total | 15 | |

Table 3
Results of bacterial isolation in Sok Nyai Village.

| Organisms | Isolated No. | Species (isolated No.) |
|-------------------|--------------|------------------------|
| <i>Vibrio</i> | 0 | |
| <i>Salmonella</i> | 0 | |
| <i>Shigella</i> | 2 | <i>dysenterii</i> (2) |
| <i>Aeromonas</i> | 1 | <i>sobria</i> (1) |
| Polymicrobial | 0 | |
| No isolate | 86 | |
| Total | 89 | |

Table 4
Record of outbreak and isolation of *V. cholerae* in villages of Khammuane Province.

(a) Record of cholera outbreak in Nong Bok Village, Khammuane

| | |
|----------------------------|------------------------|
| Village population | 495 |
| Number of patients | 30 |
| Total family | 102 |
| Family of outbreak | 18 |
| Duration of outbreak(days) | 28th Aug~ 5th Sep 1994 |

(b) Result of isolation of *Vibrio* in Nong Bok Village, Khammuane

| | |
|---------------------------|-----------------------|
| <i>V. cholerae</i> 01 | 2 (serotype Ogawa 2) |
| non-01 <i>V. cholerae</i> | 2 (not serotype 0139) |
| Total specimens | 27 |
| Date of collection | 12th Sep 1994 |

tion of pathogens in 26 samples did not succeed, in the remaining 13 it was possible to identify the enteric pathogens: *Shigella* (3), entero-pathogenic *E. coli* (5), non-O1 *Vibrio cholerae* (1), *Candida albicans* (1) and Rotavirus (3) were isolated. Three patients had parasites. The reasons for failure of isolation of the pathogen could be estimated: (1) diarrhea due to non-infectious cause; (2) patients tried therapy by themselves; As Leksomboon *et al* (1981) pointed out it is easy to get antibiotics in Lao PDR and Thai-land over the counter in non-official drug stores.

Data from Dong Chan Island

Municipal water in Vientiane is sometimes contaminated by coliforms, but usually has no coliforms. On the other hand, in Dong Chan Island, where the people living there use tube well underground water for both drinking and domestic purposes, all water samples gave a coliform positive result. This finding pointed out the possibility of enteric disease outbreaks by waterborne pathogens (Uchiyama *et al*, 1990). Soldiers in Dong Chan Island lived in the same housing, drank water from the same water source and used the same toilet room. Non-O1 *Vibrio cholerae* was isolated from 4 and *Salmonella* spp was isolated from 4 feces samples out of 15 soldiers in Dong Chan Island. Three soldiers were infected with both non-O1 *Vibrio cholerae* and *Salmonella* spp, apparently as healthy carriers.

From 2 fecal samples out of 66 from Sok Nyai Village *Shigella dysenteriae* were isolated and from one *Aeromonas sobria* was isolated. In the following treatment of the 3 cases, all of them experienced diarrhea after they offered the fecal samples. As Ashdown *et al* (1993) suggested, *Aeromonas* also appeared as a pathogen. One *Shigella dysenteriae* isolate showed multi-resistance to antibiotics. These 3 patients continued to have diarrhea for a week following diagnosis, but thereafter no pathogen was isolated from their feces, because all of them had received antibiotics.

In the village located in the Nong Bok region of Khammuane Province, 27 feces samples were collected. These samples were inoculated on to TCBS agar. The regional health office had declared the end of epidemic cholera already, but *Vibrio cholerae* O1 Eltor Ogawa was isolated from 2 individuals. These 2 persons might have had either symptomatic or inapparent cholera infection, and were potential carriers of new outbreaks of endemic cholera.

The pathogens like *Salmonella*, *Shigella* and *V. cholerae* that were isolated in this study reflect the existence of healthy carriers as Esheverria *et al* pointed out in 1983. Medical staff in Lao PDR need to know that when epidemic diarrhea occurs, they should not only treat the patients but also improve the sanitary system conditions. Sanitary conditions represent the background of epidemic cholera as Okuwaki *et al* showed in 1985.

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