Seroepidemiological Survey of Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) Infections among The Hill Tribes in Northern Thailand

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Abstract: We report the results of seroepidemiological survey of Human immunodeficiency virus (HIV), Hepatitis B virus (HBV) and Hepatitis C virus (HCV) infections among the Karen, La-Wah and Lahu-Na, designated as the hill tribes, in northern Thailand. Some of these hill tribes are living in the remote and isolated mountain areas, settling their own communities. Anti-HIV seropositive cases were found only in the Lahu-Na (2.6%). The highest incidence of Hepatitis B surface antigen (HBs-Ag) positive was found in the Karen (13.2%), followed by the Lahu-Na (2.6%) and the La-Wah (1.7%). The highest incidence of anti-Hepatitis C virus antibody (anti-HCV) positive was found in the La-Wah (3.3%), followed by the Karen and the Lahu-Na (2.6%, respectively). Two out of nine anti-HCV positive cases were from seven and 11 year-old Karenean girls, who had no previous history of surgery, blood transfusion, intravenous medication, vaccination and dental therapy. These results suggest that HIV infections have not yet reached to the hill tribes, except the Lahu-Na. One of the possible transmission routes of HCV infection is a vertical or intrahhousehold infection among the hill tribes in northern Thailand.

Key words: HIV, HBV, HCV, Hill Tribes, Northern Thailand

INTRODUCTION

The population of anti-HIV seropositive individuals is increasing in northern Thailand (Nopkeson et al., 1993; Nelson et al., 1994)). It is also well known that there is a high prevalenve of other blood-borne virus infections such as HBV and HCV among HIV positive individuals (Esteban et al., 1989; Sherman et al., 1991; Quan et al., 1991; Eysler et al., 1993;

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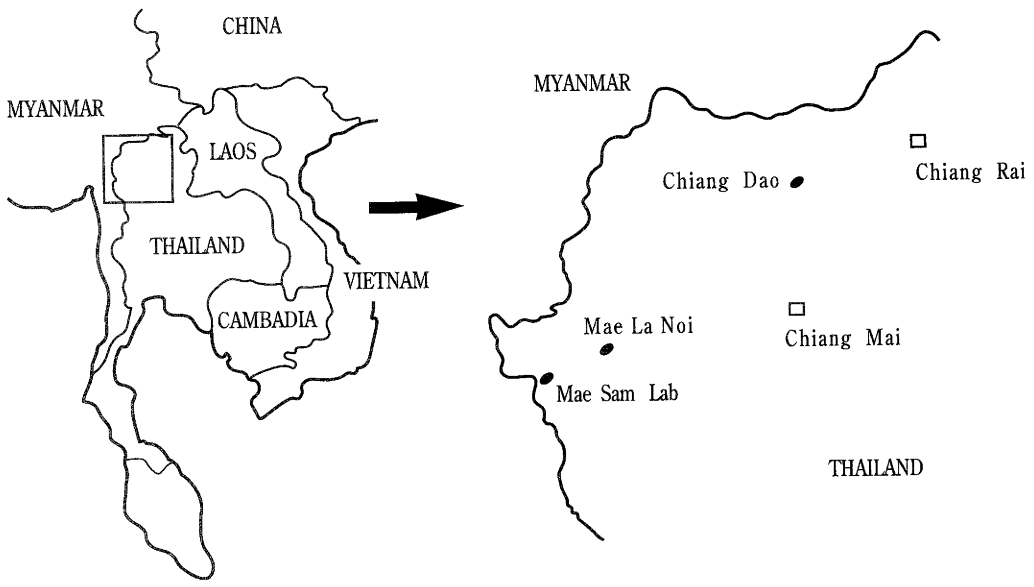
Botti et al., 1993; Bryan et al., 1993; Yousukh et al., 1996). However, no seroepidemiological survey on HIV, HBV and HCV infections have been done among the hill tribes of northen Thailand. The urban life in Thailand has changed almost out of recognition in the last two decades, and it is one of the main reasons for the rapid spreading of HIV infection (Weniger et al., 1991; Nelson et al., 1994). However, the life style of the hill tribes that live in the remote and isolated mountain areas, settling in their own communities, have changed a little. The purpose of this study is to describe the prevalence and incidence of HIV, HBV and HCV infections among the hill tribes of northern Thailand who are living in the semi-rural or rural areas and compare it with those living in the urban areas and also, to evaluate other risk factors associated with HIV, HBV and HCV infections.

MATERIALS AND METHODS

A total of 114 serum samples were collected from the Karen, Mae Sam Lab, Maehong Sorn province, 120 from the La-Wah, Mae La Noi, Maehong Sorn province and 76 from the Lahu-Na, Chiang Dao, Chiang Mai province in northern Thailand between January and March, 1993 (Figure 1). We have chosen the small villages of these hill tribes because of the following reasons: the village of the Karen is located in a remote mountain area, close to the border of Myanmar (Burma) and the inhabitants have few contacts with urban areas and the Thai. Contrary to this situation, the village of the Lahu-Na is located in a semi-rural area along the road between Chaing Mai and Chiang Rai and the inhabitants have commercial contacts with urban areas and the Thai. The village of the La-Wah shows an intermediate

Figure 1. Location of villages of the hill tribes in Northern Thailand



situation betweeen the Karen's and the Lahu-Na's, namely, it is located in a rural area and the inhabitants have occasional contacts with the Thai. Relevant information concerning each individual, such as, age, sex, history of surgery, blood transfusion, intravenous medication, vaccination, dental therapy and presence of tattoes were recorded as accurately as possible. Sera were stored at −20℃ until examination. Sera were tested for the presence of anti-HIV antibody (anti-HIV) by using a Particle-Agglutination method (Serodia-HIV, Fujirebio Inc., Tokyo, Japan), Hepatitis B surface antigen (HBs-Ag) was detected by Reversed Passive Hemagglutination method (Antihebscell, International Reagents Corp., Kobe, Japan), and anti-Hepatitis B surface antibody (anti-HBs) by Reverse Hemagglutination method (Seroclit-anti HBs, The Chemo-Sero-Therapeutic Research Institute, Kumamoto, Japan) and anti-Hepatitis C antibody (anti-HCV) by a second generation indirect ELISA method (HCV ELISA, Diagnostic Biotechnology Ltd., Singapore). Statistical analysis was performed using chi-square test ($p<0.05$)

RESULTS

HIV infection;

Anti-HIV positive individuals were found only in the Lahu-Na (2 cases; 2.6%), 26 and 42 year-old males, respectively (Table 1). The latter case had a previous intravenous medication, but the former had no history of such medications.

We found no individual with double infection of HIV and HBV or HIV and HCV.

Table 1. Prevalence of HIV infection in the Lahu-Na by age and sex

Age (years)	Total (n)	Men [n (%)]	Women [n (%)]
0−14	15	0/15 (0)	−
15−24	14	0/ 3 (0)	0/11 (0)
25−34	23	1/11 (9.1)	0/12 (0)
35−44	7	1/ 1 (100.0)	0/ 6 (0)
45−54	11	0/ 3 (0)	0/ 8 (0)
55−64	5	0/ 2 (0)	0/ 3 (0)
≧65	1	0/ 1 (0)	−
Total	76	2/36 (5.6)	0/40 (0)

HBV infection;

Table 2, 3 and 4 describe the age and sex prevalence of HBV infection among the hill tribes. The Karen showed the highest incidence of HBs-Ag positive (15 cases; 13.2%), followed by the Lahu-Na (2 cases; 2.6%) and the La-Wah (2 cases; 1.7%). Fourteen out of 19 (73.7%) HBs-Ag positive individuals belong to the under 14 year-old population. Although the Karen showed a higher HBs-Ag positivity among women compared to men (20.8% vs. 7.6 %), the two other tribes had no women positive cases. Anti-HBs positive cases were evenly

distributed in every age groups of the three tribes and predominantly found among females in the La-Wah (23.0% vs. 13.0%) and the Lahu-Na (10.0% vs. 5.6%), except the Karen (14.9 % vs. 14.9%). Total HBV markers were found 27.2% in the Karen, 20.9% in the La-Wah and 10.5% in the Lahu-Na. Fourteen out of 19 (73.7%) HBs-Ag positive cases had previous intravenous medication or vaccination.

Table 2. Prevalence of HBV infection in the Karen by age and sex

		HBsAg-positive [n (%)]		HBsAb-positive [n (%)]	
Age (years)	Total (n)	Men	Women	Men	Women
0−14	68	4/42 (9.5)	7/26 (27.0)	7/42 (16.7)	4/26 (15.4)
15−24	23	1/13 (7.7)	3/10 (30.0)	0/13 (0)	1/10 (10.0)
25−34	9	0/ 4 (0)	0/ 5 (0)	1/ 4 (25.0)	1/ 5 (20.0)
35−44	7	0/ 4 (0)	0/ 3 (0)	1/ 4 (25.0)	1/ 3 (0)
45−54	5	0/ 3 (0)	0/ 2 (0)	0/ 3 (0)	1/ 2 (50.0)
55−64	2	0/ 1 (0)	0/ 1 (0)	1/ 1 (100.0)	0/ 1 (0)
Total	114	5/67 (7.5)	10/47 (21.3)*	10/67 (14.9)	7/47 (14.9)

*$p<0.05$ compared with men.

Table 3. Prevalence of HBV infection in the La-Wah by age and sex

		HBsAg-positive [n (%)]		HBsAb-positive [n (%)]	
Age (years)	Total (n)	Men	Women	Men	Women
0−14	39	1/19 (5.3)	0/20 (0)	2/19 (10.5)	1/20 (5.0)
15−24	14	0/ 4 (0)	0/10 (0)	1/ 4 (25.0)	3/10 (30.0)
25−34	27	1/ 5 (20.0)	0/22 (0)	1/ 5 (20.0)	6/22 (27.3)
35−44	16	0/ 8 (0)	0/ 8 (0)	2/ 8 (25.0)	3/ 8 (37.5)
45−54	11	0/ 5 (0)	0/ 6 (0)	0/ 5 (0)	3/ 6 (50.0)
55−64	6	0/ 3 (0)	0/ 3 (0)	0/ 3 (0)	0/ 3 (0)
≧65	7	0/ 2 (0)	0/ 5 (0)	0/ 2 (0)	1/ 5 (20.0)
Total	120	2/46 (4.3)	0/74 (0)	6/46 (13.0)	17/74 (23.0)

Table 4. Prevalence of HBV infection in the Lahu-Na by age and sex

		HBsAg-positive [n (%)]		HBsAb-positive [n (%)]	
Age (years)	Total (n)	Men	Women	Men	Women
0−14	15	2/15 (13.3)	−	0/15 (0)	−
15−24	14	0/ 3 (0)	0/11 (0)	0/ 3 (0)	1/11 (9.1)
25−34	23	0/11 (0)	0/12 (0)	2/11 (18.2)	1/12 (8.3)
35−44	7	0/ 1 (0)	0/ 6 (0)	0/ 1 (0)	1/ 6 (16.7)
45−54	11	0/ 3 (0)	0/ 8 (0)	0/ 3 (0)	0/ 8 (0)
55−64	5	0/ 2 (0)	0/ 3 (0)	0/ 2 (0)	1/ 3 (33.3)
≧65	1	0/ 1 (0)	−	0/ 1 (0)	−
Total	76	2/36 (5.6)	0/40 (0)	2/36 (5.6)	4/40 (10.0)

HCV infection;

Table 5, 6 and 7 show the age and sex prevalence of HCV infection among the hill tribes. The La-Wah had the highest incidence of anti-HCV positivity (4 cases; 3.3%), followed by the Karen and the Lahu-Na (3 and 2 cases each; 2.6%, respectively). The two anti-HCV positive individuals were a seven and an 11 year-old girl from the Karen, who had no previous history of surgery, blood transfusion, intravenous medication, vaccination and dental therapy. The La-Wah showed a higher anti-HCV positivity among men compared to women (6.5% vs. 1.4%), however, the opposite was found in the Karen and the Lahu-Na (1.5% vs.

Table 5. Prevalence of HCV infection in the Karen by age and sex

Age (years)	Total (n)	Men [n (%)]	Women [n (%)]
0−14	68	0/42 (0)	2/26 (7.7)
15−24	23	0/13 (0)	0/10 (0)
25−34	9	0/ 4 (0)	0/ 5 (0)
35−44	7	0/ 4 (0)	0/ 3 (0)
45−54	5	1/ 3 (33.3)	0/ 2 (0)
55−64	2	0/ 1 (0)	0/ 1 (0)
Total	114	1/67 (1.5)	2/47 (4.3)

Table 6. Prevalence of HCV infection in the La-Wah by age and sex

Age (years)	Total (n)	Men [n (%)]	Women [n (%)]
0−14	39	0/19 (0)	0/20 (0)
15−24	14	1/ 4 (25.0)	0/10 (0)
25−34	27	0/ 5 (0)	1/22 (4.5)
35−44	16	1/ 8 (12.5)	0/ 8 (0)
45−54	11	1/ 5 (20.0)	0/ 6 (0)
55−64	6	0/ 3 (0)	0/ 3 (0)
≧65	7	0/ 2 (0)	0/ 5 (0)
Total	120	3/46 (6.5)	1/74 (1.4)

Table 7. Prevalence of HCV infection in the Lahu-Na by age and sex

Age (years)	Total (n)	Men [n (%)]	Women [n (%)]
0−14	15	0/15 (0)	−
15−24	14	0/ 3 (0)	0/11 (0)
25−34	23	0/11 (0)	0/12 (0)
35−44	7	0/ 1 (0)	0/ 6 (0)
45−54	11	0/ 3 (0)	2/ 8 (15.0)
55−64	5	0/ 2 (0)	0/ 3 (0)
≧65	1	0/ 1 (0)	−
Total	76	0/35 (0)	2/41 (4.9)

4.3%, 0% vs. 4.9%, respectively). Four out of nine anti-HCV positive cases (44.4%) had previous intravenous medication, and one case had a history of blood transfusion.

Discussion

The urban life of Thailand has completely changed in the past two dacades, and this could be one of the reasons why HIV infections is spreading so rapidly (Weniger et al., 1991; Nuchprayoon and Chumnijarakij, 1992). The prevalence of HIV infection in semi-rural areas of the Thai in Chiang Mai province was 4.6% (Nelson et al., 1994). Yousukh et al. (1996) reported that other blood-borne virus infections, especially, HCV infection is increasing in number accompanied with the spreading of HIV infection in Chiang Mai area. The mountainous border between Thailand and Myanmar (Burma) is home to several ethnic groups designated as the hill tribes. While their villages are scattered and located in remote and isolated areas, nearly all of them are dominated by a single ethnic group. We have done a seroepidemiological survey of HIV, HBV and HCV infections among the three hill tribes who are living in the rural or semi-rural areas to know the prevalence and incidence of these blood-borne virus infections among them.

In our study, two out of 310 (0.6%) individuals were found to be anti-HIV positive. Although HIV infection is still uncommon to the hill tribes than in urban areas, both identified cases were from the Lahu-Na, whose village is located in a semi-rural area along the road between Chiang Mai and Chiang Rai, provincial capitals of Chiang Mai and Chiang Rai provines, respectively, and they have a close and commercial contact with the urban areas and the Thai. This suggests that HIV infection can spread into the hill tribes together with the progress of cultural and commercial exchange with the urban areas (Nopkeson, et al., 1992; Nelson et al. 1993; Nelson et al., 1994).

Although the incidence of HBs-Ag positivity (13.2%) in the Karen was relatively higher than in Chiang Mai area (Yousukh et al., 1996), the Lahu-Na and the La-Wah showed lower incidence (2.6 and 1.7%, respectively). These findings are not easy to explain. Further studies will be needed to determine the usefulness of these findings. The incidence of HBs-Ag positive cases in these three hill tribes was highest among age groups between 0 and 24 years and suggests that vertical infections from HBs-Ag positive mothers and household contacts are the main transmission routes of HBV infection (Punyagupta et al., 1972; Pramoolsinsap et al, 1986; Nuchprayoon and Chumnijarakij, 1992).

Nine out of 310 (2.9%) individuals showed anti-HCV positive and this incidence is higher than Chiang Mai area (Yousukh et al., 1996). Four out of nine (44.4%) anti-HCV positive individuals had previous intravenous medications and one case had previously received a blood transfusion. Two out of nine (22.2%) anti-HCV positive individuals were from seven and 11 year-old Karenean girls, who had no previous history of surgery, blood transfusion, intravenous medication, vaccination, dental therapy and tattoes. This result suggests that one possible transmission route of HCV infection is a vertical or intra-household infection.

In conclusion, the incidence of HIV infection is low among the hill tribes compared to the residents in urban and semi-rural areas. However, this can spread to remote mountain areas due to cultural and commercial interaction with urban areas. A vertical or intra-household mode of infection can play one of the transmission of HCV infection among the hill tribes in northern Thailand.

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