

## Seroprevalence of Antibody to Hepatitis E Virus in Voluntary Blood Donors in Northern Thailand

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**Abstract:** We report the results of seroepidemiological study of hepatitis E virus (HEV) infection in 636 voluntary blood donors in four Provinces of Northern Thailand. The average seroprevalence of anti-HEV was 8.7%, which is lower than previous reports from HEV endemic areas and even in the central Thailand. No significant differences of the prevalence were found geographically and also by age and sex. Our findings suggest that Northern Thailand belongs to an intermediate prevalence group of HEV infection between non-endemic and endemic regions and the improvement of socioeconomic and hygienic status might control the spreading of HEV infection in this area.

*key words:* Seroprevalence, hepatitis E virus, blood donors, Northern Thailand

### INTRODUCTION

Hepatitis E virus (HEV) is the main causative agent of acute non-A, non-B, non-C hepatitis and transmitted via the fecal-oral route (Balayan et al, 1983; Reyes et al., 1990; Bradley, 1990). The disease manifests usually a self-limited course, except in pregnant women, who suffer with a 15-25% fatality rate from fulminant hepatitis (Bradley, 1990; Tsega et al., 1992). Outbreaks of hepatitis E have been reported over a wide geographic area in many developing countries, especially in tropical and subtropical areas (Myint et al., 1985; Uchida, 1992; Uchida et al., 1993; Mast and Krawczynski, 1996). Anti-HEV has been detected in <5% of children under 10 years of age, increasing to 10 - 40% among adults >25 years of age in HEV endemic countries (Tsega et al., 1992; Mast and Krawczynski, 1996). Several sporadic cases of HEV infection have also been reported in industrialized countries, where almost all are imported from endemic areas by immigrants, travelers or soldiers (DeCock et al., 1987; Skidmore et al., 1991; Hino et al, 1991; Jardi et al., 1993; Bryan et al., 1994).

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Seroprevalence studies among blood donors in some non-endemic countries have found an anti-HEV prevalence of 1 - 5% (Paul et al., 1994). The prevalence of anti-HEV in a previous report were 15.7% in voluntary blood donors in Bangkok, 6.2% in children in Northeastern Thailand and 2.3% in children in Southern Thailand, respectively (Poovorawan et al., 1996). Northern Thailand is contiguous to Myanmar, where is one of the highly endemic areas of HEV infection (Myint et al., 1985; Uchida et al., 1993). The aim of present study was to determine the prevalence of HEV infection in voluntary blood donors in Northern Thailand.

#### MATERIALS AND METHODS

During the period of July 1998 and July 1999, 636 serum samples were collected from voluntary blood donors (446 males and 190 females, 17 to 60 years old) in Chiang Mai, Chiang Rai, Lampang and Lamphun Provinces in Northern Thailand (Fig. 1) and tested for the presence of anti-HEV using HEV antibody ELISA kit (*ANOGEN; Yes Biotech Laboratories Ltd., Ontario, Canada*), which employed a qualitative sandwich immunoassay. The microtiter plates provided in the kit has been pre-coated with a mixture of synthetic HEV polypeptides that correspond to highly antigenic segment of essential amino acid sequences derived from ORF-2 and ORF-3 of Chinese HEV strain. The procedures of the examination were performed strictly with instruction manuals. The samples from positive result were picked up for retest and only repeatedly reactive sera were considered positive. The statistical analysis of the results was performed using chi-square test.

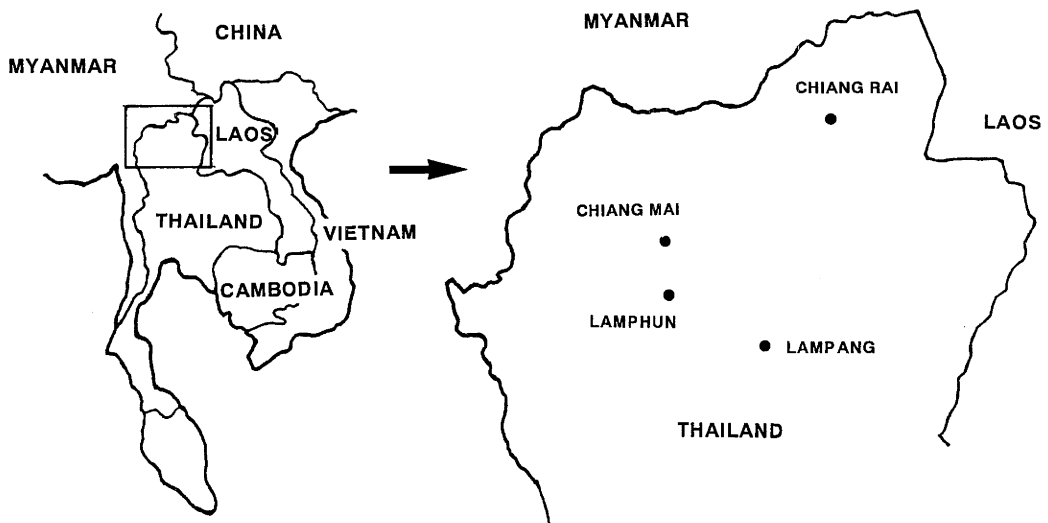


Figure 1 Map of Northern Thailand

## RESULTS

Table 1 shows prevalence of anti-HEV in voluntary blood donors in Northern Thailand by age and sex. The average prevalence of anti-HEV in 636 voluntary blood donors in Northern Thailand was 8.7%. The prevalence of anti-HEV in male (9.0%) was slightly higher than in female (7.9%). There were no significant differences of the prevalence by age and sex.

Table 2 describes geographic prevalence of anti-HEV in Chiang Mai, Chiang Rai, Lampang and Lamphun Provinces in Northern Thailand. No remarkable differences of the prevalence of anti-HEV were found among these 4 Provinces.

**Table 1.** Seroprevalence of anti-HEV in voluntary blood donors in Northern Thailand by age (years) and sex

	17-20	21-30	31-40	41-50	51-60	Total
Male	9/108 (8.4%)	10/ 98 (10.2%)	7/106 (6.6%)	12/110 (10.9%)	2/ 24 (8.4%)	40/446 (9.0%)
Female	1/ 38 (2.7%)	5/ 60 (8.4%)	6/ 56 (10.8%)	3/ 32 (9.4%)	0/ 4 (0.0%)	15/190 (7.9%)
Total	10/146 (6.9%)	15/158 (9.5%)	13/162 (8.1%)	15/142 (10.6%)	2/ 28 (7.2%)	55/636 (8.7%)

**Table 2.** Seroprevalence of anti-HEV in 4 Provinces of Northern Thailand

	Chiang Mai	Chiang Rai	Lampang	Lamphun	Total
Male	11/148 (7.5%)	13/135 (9.7%)	5/ 67 (7.5%)	11/ 96 (11.5%)	40/446 (9.0%)
Female	7/ 62 (11.3%)	3/ 38 (7.9%)	2/ 47 (4.3%)	3/ 43 (7.0%)	15/190 (7.9%)
Total	18/210 (8.6%)	16/173 (9.3%)	7/114 (6.1%)	14/139 (10.1%)	55/636 (8.7%)

## DISCUSSION

HEV infection is transmitted enterically and outbreaks are usually associated with fecal contamination of the water supply (Balayan et al, 1983; Reyes et al., 1990; Bradley, 1990; Uchida et al., 1992). HEV is prevalent in South and Southeast Asia, Africa, Middle East, Central America and the former Soviet Union (Myint et al., 1985; Uchida, 1992; Arif et al., 1994; Mast and Krawczynski, 1996). Although several sporadic cases have been reported from industrialized countries, almost all are imported from endemic countries by travelers, immigrants or soldiers (DeCock et al, 1987; Skidmore et al., 1991; Hino et al., 1991; Jardi et

al., 1993). The prevalence of anti-HEV is <5% in children under 10 years of age and increasing to 10 - 40% among adults >25 years of age in HEV endemic countries (Tsega et al., 1992; Mast and Krawczynski, 1996). Northern Thailand is contiguous to Myanmar, where is a highly endemic area of HEV infection with the historical experiences of several outbreaks of the disease (Myint et al., 1985; Uchida, 1992; Uchida et al., 1993). In our study, average seroprevalence of anti-HEV among 636 voluntary blood donors in Northern Thailand was 8.7% and there were no significant differences in each Provinces and also by age and sex. In the recent study, seroprevalence of anti-HEV in healthy blood donors was 15.7% in Bangkok and increased by age, up to 25% in the age group over 50 (Poovorawan et al., 1996). Comparing with these reports, our findings indicate that prevalence of HEV infection in Northern Thailand is lower than in the HEV endemic countries and even in the central Thailand, and suggest that Northern Thailand has not experienced hepatitis E epidemics and belongs to an intermediate prevalence region of HEV infection. Hepatitis A virus (HAV) is transmitted via the fecal-oral route, similar manner to HEV and 90% of the general population developed the anti-HAV by the age of 10 years in 1982 in Bangkok (Viranuvati et al., 1982). However, epidemiological pattern of HAV infection in Chiang Mai area is changing after the improvement of socioeconomic status and the quality of hygiene and sanitation; only 8.7% was positive for anti-HAV among children, 4 - 16 years of age, during 1998 and 1999 (Jutavijittum and Toriyama, in preparation for publication). Fortunately these environmental factors might control the spreading of hepatitis E in the same way of hepatitis A in Northern Thailand. In addition to the improvement of the quality of hygiene and sanitation, HEV vaccine, which is still under development, should be the important method to prevent and eradicate HEV infection in endemic areas.

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