HEPATITIS C ANTIBODY PREVALENCE AND RISK FACTORS OF SOME FEMALE SEX WORKERS IN THAILAND

Pipat Luksamijarulkul[1] and Atiporn Deangbubpha[2]

[1]Department of Microbiology, Faculty of Public Health, Mahidol University Bangkok 10400, Thailand;
[2]Provincial Health Office, Sukhothai Province, 64000, Thailand

Abstract. One high risk group for hepatitis C virus (HCV) infection is female sex workers (FSWs). A study of HCV antibody prevalence and group risk factors was conducted in 200 FSWs in Ratchaburi Province, Thailand, during June to December 1995. FSWs were interviewed and their blood specimens were collected for determining HCV antibody by second generation EIA (ABBOTT). After the laboratory results, the FSWs were divided into 2 groups, anti-HCV positive and anti-HCV negative. The variables obtained from interviews were analysed by X^2-test and Odds Ratio. Prevalence of HCV antibody positives was 9.5%. It tended to be increased by the longer duration of working in the sex trade. The anti-HCV prevalence of FSWs working 9 years or more in the sex trade was significantly higher than that of FSWs working 4 years or less by about 3.5 times (23.08% *vs* 6.67%, p = 0.008). The anti-HCV positive FSWs had a higher percentage of anti-HIV positivity, but it was not of statistical significance (p = 0.078). The factors associated with high risk for HCV infection in this group were (a) Domicile (Northeast) : OR = 3.07, (p = 0.0182), (b) Duration of working (≥ 4 years) : OR = 3.13 (p = 0.0216), (c) Having a tattoo: OR = 4.12 (p = 0.0406), and (d) Having a history of STDs in the last 4 years : OR = 3.46 (p = 0.0165).

INTRODUCTION

Hepatitis C virus (HCV) infection is a major cause of post-transfusion hepatitis (Alter *et al*, 1990; Choo *et al*, 1990; Feinstone, 1990). It is a public health problem in many countries including Thailand (Esteban *et al*, 1989; Chen *et al*, 1991; Hishioka 1991; Donahue *et al*, 1991; Chanuvati *et al*, 1991; Hadziyannis *et al*, 1993). Complications frequently occur, *ie* 40% will develop chronic active hepatitis and gradual progression to liver cirrhosis and hepatocellular carcinoma (Kiyasawa *et al*, 1991; Albert *et al*, 1992; Hadziyannis *et al*, 1993). A previous study (Chen *et al*, 1990) showed that if the HCV patients are also infected with hepatitis B virus or human immunodeficiency virus, they will develop liver cirrhosis or liver carcinoma in a shorter time than with HCV infection only. Additionally, alcohol has a harmful effect on persistent HCV infection (Tanikawa, 1994).

HCV is transmitted not only via parenteral route but also via sexual contact (Steven and Taylor, 1990; Isaranurug *et al*; 1996). One of the high risk groups are injecting drug users with 83-95% of infection (Louisirirotchanakul *et al*, 1992; Luksamijarulkul and Plucktaweesak, 1996). They may transmit the infection to other persons, especially female sex workers (FSWs), because about 70% of them have a history of extramarital relations with FSWs without using condoms (Luksamijarulkul *et al*, 1995). The FSWs may contact the virus and transmit the infection to other men. This study is an attempt to investigate HCV antibody prevalence and to analyse some risk factors in a group of FSWs which may be valuable for preventing and controlling its transmission.

MATERIALS AND METHODS

Study design and methods of collecting data

A cross-sectional analytic study was conducted in 200 female sex workers (FSWs) seeking examination for sexually transmitted diseases (STDs) at the Venereal Diseases and AIDS Center, Amphoe Muang and Venereal Diseases and AIDS Unit, Ban Pong, Ratchaburi Province, Thailand during June to December 1995. All studied FSWs were interviewed about socio-economic factors and health behaviors, including the history of STDs, sexual intercourse frequency, and condom use. Their blood specimens were collected for determining anti-HCV antibody by an enzyme immunoassay (EIA), the second generation method (ABBOTT). The cut-off value for anti-HCV positive followed the ABBOTT

kit's recommentation (cut-off value = mean OD of negative control + 0.25 of mean OD of positive control). In this study, the cut-off value for anti-HCV positive was optical density greater than 0.36.

Data analysis

From EIA results, studied FSWs were divided into 2 groups, anti-HCV positive and anti-HCV negative. The data from interviews of the 2 groups were analysed by X^2-test and Odds Ratio for evaluating risk factors associated with the HCV infection in this group. The critical level of $\alpha = 0.05$ was used for statistical significance.

RESULTS

General characteristics of studied FSWs

Of the 200 FSWs, 50% were 20-25 years of age. The mean age was 25.29 years and their ages ranged from 18 to 44 years. Fifty-one per cent used to be married but are now separated. Forty-nine per cent came from the northern part of Thailand, the rest came from other parts. A majority (70%) finished primary education but 21.50% never attended school. About 27% had a monthly income of under 5,000 baht, and only 39.50% earned more than 10,000 baht per month. Almost 33% had worked in the sex trade more than 4 years. Details are shown in Table 1.

Prevalence of anti-HCV in studied FSWs

This study revealed that 19 of 200 subjects (9.50%) were positive for anti-HCV antibody. The highest prevalence (12.24%) was found in subjects aged 20 years or less. The lowest prevalence was 2.63%, found in subjects older than 30, but there was no statistically significant difference between the 2 groups, $p = 0.097$ (Table 2). When we

Table 1

General characteristics of 200 studied female sex workers.

General characteristics		No.	Percentage
Age (years)	≤ 20	49	24.50
	21 - 30	113	56.50
	31 - 40	36	18.00
	≥ 41	2	1.00
Mean ± SD = 25.29 ± 5.76 years, range = 18 - 44 years			
Marital status	Single	86	43.00
	Married	12	6.00
	Separated	102	51.00
Education	Uneducated	43	21.50
	Primary level	140	70.00
	Secondary level	15	7.50
	College/University	2	1.00
Domicile	Northern part	98	49.00
	Northeastern part	50	25.00
	Central part	41	20.50
	Other parts	11	5.50
Income per month (baht)	≤ 5,000	54	27.00
	5,001 - 10,000	67	33.50
	> 10,000	79	39.50
Duration of working (years)	< 1	30	15.00
	1 - 4	105	52.50
	5 - 8	52	26.00
	≥ 9	13	6.50

Table 2

Prevalence of anti-HCV antibody in studied female sex workers (FSWs) by age.

Age (years)	No. of tested	Anti-HCV positive No.	%
≤ 20	49	6	12.24*
21-30	113	12	10.62
≥ 31	38	1	2.63*
Total	200	19**	9.50

* There was no statistically significant difference by proportional Z test (p = 0.097)

** There were 11 FSWs with high anti-HCV titer (Optical density ≥ 2.0)

classified the prevalence by the duration of working in the sex trade, the highest prevalence (23.08%) was found in the FSWs working 9 years or more and the lowest prevalence (6.67%) was found in the FSWs working 4 years or less. There was a statistically significant difference between the 2 groups (p = 0.008), shown in Table 3. The results of HIV testing among studied FSWs were analysed. It was found that the anti-HCV positive FSWs had a higher percentage of anti-HIV positivity than the anti-HCV negative ones, but it was not significant, p = 0.078 (Table 4).

Factors associated with high risk of HCV infection in FSWs

The variables obtained from interviews of FSWs with anti-HCV and FSWs without anti-HCV were analysed by X^2-test or Fisher's exact test and Odds Ratio for evaluating some factors associated with the HCV infection in this group. The results revealed that factors associated with high risk of HCV infection in FSWs were (a) Domicile (Northeastern part) : OR = 3.07 (95% CI = 1.06-8.89, p = 0.0182), (b) Duration of working in the sex trade (≥ 4 years) : OR = 3.13 (95% CI = 1.05-10.47, p = 0.0216), (c) Having a tattoo : OR = 4.12 (95% CI = 1.00-16.56, p = 0.0406), and (d) Having a history of STDs in the last 4 years : OR = 3.46 (95% CI = 1.11-12.71, p = 0.0165). These results are shown in Table 5.

Table 3

Prevalence of anti-HCV antibody in studied female sex workers (FSWs) by duration of working.

Duration of working (years)	No. of tested	Anti-HCV No.	Positive %
< 1	30	2	6.67*
1-4	105	7	6.67*
5-8	52	7	13.46
≥ 9	13	3	23.08*
Total	200	19	9.50

* Statistically significant difference between FSWs with duration of working ≥ 9 years and FSWs with duration of working < 1 year or 1-4 years, by proportional Z test (p = 0.008)

Table 4

Results of anti-HIV positive in studied female sex workers with or without anti-HCV.

Results of anti-HCV	No. of tested	Results of anti-HIV positive No.	%
Positive	19	11	57.89*
Negative	181	68	37.57*
Total	200	79	39.50

* There was no statistically significant difference by proportional Z test (p = 0.078).

DISCUSSION

Presence of HCV antibody is one of the indica-

Table 5

Factors associated with high risk of HCV infection in studied female sex workers.

Risk factors	Odds ratio (OR)	95% CI	p-value*
Socio-economic factors			
Age (≤ 30 years)	4.63	0.68-197.83	0.0885
Marital status (single)	0.66	0.20-1.95	0.4139
Education (≤ primary level)	1.75	0.24-77.21	0.5024
Income (≤ 5,000 baht/month)	1.28	0.38-3.85	0.6373
Domicile (Northeast)	3.07	1.06-8.89	0.0182**
Duration of working (≥ 4 years)	3.13	1.05-10.47	0.0216**
Health behaviors			
History of closing with jaundice patients	1.82	0.18-9.40	0.3558
Having a tattoo	4.12	1.00-16.56	0.0406**
Alcohol drinking	0.91	0.32-2.62	0.8442
Having a history of STDs within last 4 years	3.46	1.11-12.71	0.0165**
Anti-HIV positivity	2.40	0.84-6.93	0.0685
Sexual intercourse without using a condom	2.36	0.82-6.75	0.0733
Number of customers/night (≥ 4 persons)	1.8	0.47-5.79	0.2203

*From X^2 - test or Fisher's exact test

**Statistical significance at $\alpha = 0.05$

tors of HCV infection. The second generation EIA is considered useful for screening of HCV antibody due to the high sensitivity and specificity of the test (Poovorawan *et al*, 1994). However, it is not possible to know whether an anti-HCV positive individual is a virus carrier or has recovered from a past infection. A previous study, which examined in anti-HCV positive injecting drug users, showed that most of them were asymptomatic (83%), but almost 90% of these cases had abnormal liver histology (Farrell *et al*, 1995). Another study showed that the prevalence of HCV carriers in anti-HCV positive individuals ranged from 25.9% in HCV antibody-positive blood donors to 92% in HCV antibody-positive hemophiliacs.

This study found that 9.5% of studied FSWs were anti-HCV positive. This was significantly higher than the prevalence in Thai blood donors, of which only 1.5-2.1% were anti-HCV positive during the same period of time (Boonmar *et al*, 1995). The infection rate tended to be increased with a longer duration of working in the sex trade. This evidence suggests that sexual transmission may play an important role in the spread of HCV infection.

The factors associated with high risk of HCV infection in this group of FSWs were domicile (Northeastern part of Thailand), duration of working in the sex trade (≥ 4 years), having a tattoo and having a history of STDs in the last 4 years. The domicile factor may depend on the prevalence of HCV infection and health behavior in various parts of Thailand. The duration of working in the sex trade was one of the risk factors in sexually transmitted diseases. Longer duration means higher exposure. This factor was supported by the factor of having a history of STDs in the last 4 years found in this study. A tattoo was an important risk factor in diseases transmitted by parenteral route like hepatitis B virus infection (Limentani *et al*, 1979).

At present, there is no effective vaccine or drug for HCV infection. Information and education for reducing the risk factors should be emphasized and integrated into the AIDS/HIV education program, because most FSWs are more afraid of AIDS than viral hepatitis and they have often sought out AIDS/HIV information.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge all studied FSWs and the directors of the Venereal Diseases and AIDS Center and the Venereal Diseases and AIDS Unit, Ratchaburi Province for their kindly help during specimen collection. Finally, our grateful appreciation extends to Mahidol University for the financial support for this work.

REFERENCES

Albert J, Czaja AJ, Howard F, *et al.* Duration and specificity of antibodies to hepatitis C virus in chronic active hepatitis. *Gastroenterology* 1992; 102 : 1675-9.

Alter HJ, Jett BW, Polito AJ, *et al.* Analysis of the role of hepatitis C virus in transfusion-associated hepatitis. In: Hollinger FB, Stanley ML, Margolis HS, eds. The 1990 International Symposium on Viral Hepatitis and Liver Disease, 1990. Baltimore : Williams and Wilkins 1990: 396-41.

Boonmar S, Sawanpanyalert P, Miyamura T. Risk factors for hepatitis C virus infection among blood donors in an HIV-epidemic area in Thailand. 13th National Seminar on Epidemiology, Bangkok, Thailand, 1995: 146-7.

Chainuvati T, Poovorawan Y, Luengrojanakul P. The prevalence of hepatitis C virus antibody in high risk group of Thai children and adults. *Gastroenterol Japonica* 1991; 26 (suppl 3) : 176-8.

Chen DS, Kuo GC, Sung JL, *et al.* Hepatitis C virus infection in an area hyperendemic for hepatitis B and chronic liver disease : The Taiwan experience. *J Infect Dis* 1990; 162 : 817-22.

Chen DS, Wang JT, Chen PJ, *et al.* Hepatitis C virus infection in Taiwan. *Gastroenterol Japonica* 1991; 26 (suppl 3) : 164-6.

Choo QL, Weiner AJ, Overby LR, *et al.* Hepatitis C virus : the major causative agent of viral non-A, non-B hepatitis. *Br Med Bull* 1990; 46 : 423-41.

Donahue JG, Nelson KE, Munoz A, *et al.* Antibody to hepatitis C virus among cardiac surgery patients, homosexual men, and intravenous drug users in Baltimore, Maryland. *Am J Epidemiol* 1991; 134 : 1206-11.

Esteban JI, Esteban R, Viladomiu L, *et al.* Hepatitis C virus antibodies among risk groups in Spain. *Lancet* 1989; 5 : 294-7.

Farrell RJ, Khan I, Maloney M, *et al.* Correlation between symptoms, aminotransferases and liver histology in IVDA hepatitis C patients. *Gastroenterology* 1995; 108 (suppl) : A 1064.

Feinstone SM. Bloodborne non-A non-B hepatitis. In: Belshe RB, ed. Textbook of Human Virology. St Louis : Mosby-Year Book 1990 : 767-80.

Francois M, Dubois F, Brand D, *et al.* Prevalence and significance of hepatitis C virus (HCV) viremia in HCV antibody-positive subjects from various populations. *J Clin Microbiol* 1993; 31 : 1189-93.

Hadziyannis SJ, Giannoulis G, Hadziyannis E, *et al.* Hepatitis C virus infection in Greece and its role in chronic liver disease and hepatocellular carcinoma. *J Hepatol* 1993; 17 (suppl 3) : 572-7.

Hishioka K. Hepatitis C virus infection in Japan. *Gastroenterol Japonica* 1991; 26 (suppl 3) : 152-5.

Isaranurug S, Plucktaweesak S, Luksamijarulkul P. Qualitative study on factors affecting the hepatitis C infection among blood donors. *J Public Health* 1996; 26 : 93-104.

Kiyosawa K, Sodeyama T, Tanaka E, *et al.* Interrelationship of blood transfusion non-A non-B hepatitis and hepatocellular carcinoma : Analysis by detection of antibody to hepatitis C virus. *Hepatology* 1991; 12 : 671-5.

Limentani AE, Elliott LM, Noah ND, Lamborn JR. An outbreak of hepatitis B from tattooing. *Lancet* 1979; 2 : 86-8.

Louisirirotchanakul S, Thongput A, Wasi C, Thongcharoen P. Comparison of six anti-HCV second generation assays. *Asian Pacific J Allergy Immunology* 1992; 10 (suppl) : POM-105.

Luksamijarulkul P, Plucktaweesak S, Isaranurug S, Sinsomboon R. Health behavior, knowledge, and attitude toward viral hepatitis among some groups of intravenous drug abusers. *Chula Med J* 1995; 39: 511-20.

Luksamijarulkul P, Plucktaweesak S. High hepatitis C sero-prevalence in some Thai intravenous drug abusers and qualitative risk analysis. *Southeast Asian J Trop Med Public Health* 1996; 27 : 654-8.

Poovorawan Y, Theamboonlers A, Chumdermpadetsuk

S, *et al*. Comparative results in detection of HCV antibodies by using a rapid HCV test, ELISA and immunoblot. *Southeast Asian J Trop Med Public Health* 1994; 25 : 647-9.

Steven CE, Taylor PE. Perinatal and sexual transmission of hepatitis C virus : A preliminary report. In: Hollinger FB, Stanley ML, Margolis HS, eds. The 1990 International Symposium on Viral Hepatitis and Liver disease. Baltimore: Williams and Wilkins, 1990 : 420-1.

Tanikawa K. Relationship between hepatitis C and alcoholic liver disease. *Asian Med J* 1994; 37 : 165-70.