

# FREQUENCY AND RISK OF HIV INFECTION AMONG MEN ATTENDING A CLINIC FOR STD IN CHIANG MAI, THAILAND

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**Abstract.** A prospective study was conducted in the Chiang Mai Sexually Transmitted Diseases Clinic to determine the frequency of HIV seroconversion among men following high risk sexual contacts and to establish risk factors for HIV infection. HIV antibodies were detected in 26 out of 150 men on the initial recruitment with a seroprevalence rate of 21%. Among 124 initial HIV negative subjects; 100, 77, 68, and 55 subjects were followed for 2, 4, 12, and 24 weeks, respectively. One subject had HIV seroconversion documented with the rate of 1.0% (1/100, 95% confidence interval [CI] = 0.03-5.4%). Logistic regression analysis found significantly independent associations of HIV prevalence with prostitute visits at least once a month (OR = 3.6, 95% CI = 1.2-10.9), and with cigarette smoking (OR = 3.5, 95% CI = 1.2-10.5). Intensive health education should be elucidated to decrease the high rate of HIV infection among this population.

## INTRODUCTION

Risk of HIV acquisition from heterosexual exposure varies greatly depending on the country and type of risk group (Johnson and Laga, 1988; Piot *et al*, 1987). Several studies have shown that a history of sexually transmitted diseases (STDs) or concomitant STDs, particularly genital ulcer diseases (GUD) are important risk factors both in homosexual and heterosexual transmission of HIV (Stamm *et al*, 1988; Latif *et al*, 1989; Greenbatt *et al*, 1988). In Thailand, the first AIDS case was identified in September 1984 (Weniger *et al*, 1991). In 1988, the explosive epidemic of HIV/AIDS was detected in intravenous drug users (IVDU) and shortly thereafter rapidly rising HIV prevalence rates were noted among female commercial sex workers (CSW), and promiscuous men. The underlying causes of this observation have been under studied (Weniger *et al*, 1991; Choopanya *et al*, 1991; Siraprasiri *et al*, 1991). We conducted a prospective study among men attending a clinic for STDs who had recent contacts with prostitutes. The aims of the study were to determine the frequency of seroconversion among men following a single high risk sexual contact and to establish risk factors for HIV infection.

## MATERIALS AND METHODS

We recruited males aged 18-60 years old who presented to the Chiang Mai STD clinic who gave a history of sexual exposure to prostitutes within 1 month. The objectives of the study and the procedures involved were explained to each patient, and verbal consent was obtained. All participating subjects received counseling regarding risks and benefits of HIV antibody testing. The study was approved by the Ethical Committees of the Thai Ministry of Public Health and of the University of Washington, Seattle, USA. A structured questionnaire was administered regarding demographic data, sexual history, history of STDs, and information on other possible risk factors for HIV. A general physical examination, including genital examination, was performed. Urethral samples were obtained for Gram stain and culture for *Neisseria gonorrhoeae*. Ulcer samples were obtained for Gram stain, dark field examination, *Haemophilus ducreyi* culture, and *Herpes simplex* virus culture. Sera were tested for syphilis using Venereal Disease Research Laboratory (VDRL) and HIV antibody using enzyme-linked immunosorbent assay (ELISA). Reactive sera were confirmed by fluorescent *Treponema* antibody-absorption assay (FTA-ABS) for syphilis and Western blot (WB) for HIV antibody. Men who had an STD were treated with the standard regimens provided in the Chiang Mai STD clinic.

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Subjects were asked to return for results of HIV antibody tests in two weeks at which time post test counseling was provided. Individuals who tested negative for HIV antibody were requested to return at 4, 12, and 24 weeks after the first visit. All men were counseled to refrain from sexual intercourse, especially during the first three months of the follow up period, and to use condoms if they had sexual intercourse at any time during the 24 week study. At each visit, they were interviewed regarding interim sexual history. A physical examination was performed and 15 ml of blood were obtained to evaluate HIV serostatus. Seroconversion was confirmed by WB and counseling was provided. Those who failed to attend a scheduled clinic visit were traced by mail. The end point for follow up was HIV seroconversion or persistent negative HIV antibody assays to 24 weeks of follow up.

Univariate and bivariate analyses were performed using EPI-INFO Version 5 (Centers for Disease Control, Atlanta, USA, and World Health Organization, Geneva, Switzerland). Categorical variables were compared using chi square statistics or Fisher's exact tests. The two sample *t*-test was used for continuous variables. Multivariate analyses were performed to control for confounding using EGRET (Statistics and Epidemiology Research Corporation, Seattle, USA).

## RESULTS

During the seven month period from September 7, 1992 to March 11, 1993; 150 subjects were recruited for HIV serology screening. HIV antibodies were detected in twenty-six subjects for a seroprevalence rate of 21%.

Table 1 shows characteristics of the participating subjects comparing HIV positive and HIV negative serostatus at the initial visit. The mean age, education and marital status were similar between HIV positive and negative subjects. The common reasons brought subjects to the clinic were urethral discharge and dysuria.

One hundred and twenty-four initially seronegative subjects were eligible for the follow-up study. One hundred (81%), 77 (62%), 68 (55%), and 55 (44%) subjects completed the 2, 4, 12, 24 week period of follow-up visits. The average number of follow-up visits was 2.0 times. The average

Table 1  
Characteristics of the study population.

Variables	HIV (-) n = 124	HIV (+) n = 26
Mean age (years)	28.8 ± 8.4	28.5 ± 8.4
Education		
Primary school	69 (55.6%)	14 (53.8%)
Secondary school	8 (6.5%)	5 (19.2%)
High/technical school	31 (25%)	6 (23.1%)
College/university	16 (12.9%)	1 (3.8%)
Mean (year)	8.2 ± 4.0	7.3 ± 3.1
Marital status		
Single	68 (54.8%)	15 (57.7%)
Married	40 (32.2%)	6 (23.1%)
Widowed/Separated	16 (12.9%)	5 (19.2%)
Reason for visit		
Urethral discharge	40 (32.2%)	6 (23.1%)
Dysuria	33 (26.6%)	6 (23.1%)
Genital ulcer	17 (13.7%)	4 (15.4%)
Inguinal mass	10 (8.1%)	2 (7.7%)
Lesion on genital area	14 (11.3%)	5 (19.2%)
Blood testing	22 (17.7%)	3 (11.5%)

follow-up period were 16 weeks from the initial visit and 18 weeks from the last sexual exposure to prostitutes.

One subject had HIV seroconversion documented during follow-up. The HIV seroconversion rate was 1% (1/100; 95%CI = 0.03-5.4%). The seroconverted case presented to the STD clinic with genital ulcers which later were diagnosed as genital herpes. He had one unprotected vaginal intercourse with a brothel prostitute 15 days before the visit to the STD clinic. He had more than twenty sexual contacts with prostitutes during the last year using condoms more than 50% of times. He had a history of one episode of genital vesicles 4-5 months ago. He had no history of blood transfusion, intravenous drug use or injection by traditional healers. The first serum was negative for HIV antibody and VDRL. The second serum was obtained 24 weeks after the first visit and was positive for HIV antibody by ELISA and WB. He did not have any symptoms associated with acute HIV infection during 24 weeks of follow-up. After the first blood test, he did not have any sexual contacts with

prostitutes or other women except his wife. We could not contact his wife for HIV antibody test.

Bivariate analysis of risk and behavioral factors

for HIV infection is presented in Table 2. History of bubo, frequency of prostitute visits, current diagnosis of genital herpes and genital warts, and cigarette smoking were significantly associated with

Table 2

Bivariate analysis of risk and behavioral factors for HIV infection in participating subjects.

Factors	HIV (-) n = 124	HIV (+) n = 26	p-value
<b>History of STDs</b>			
Any STDs	80 (64.5%)	21 (80.8%)	0.11
Urethral discharge	70 (64.5%)	18 (69.2%)	0.22
Genital ulcer	32 (25.8%)	7 (26.9%)	0.91
Genital vesicle	10 (8.1%)	3 (11.5%)	0.70
Genital warts	10 (8.1%)	4 (15.4%)	0.27
Bubo	20 (16.1%)	9 (34.6%)	0.03
<b>Frequency of sex with CSW last year</b>			
Single	31 (25%)	2 (7.7%)	0.003
2-4 times	28 (22.6%)	5 (19.2%)	
5-11 times	44 (35.5%)	7 (26.9%)	
at least once a month	21 (16.9%)	12 (46.1%)	
<b>Sex with men last year</b>			
Yes	2 (1.6%)	1 (3.8%)	0.44
<b>Current diagnosis</b>			
No abnormality detection	28 (22.6%)	3 (11.5%)	0.21
GC urethritis	20 (16.1%)	5 (19.2%)	0.77
Non-GC urethritis	14 (11.3%)	0 (0%)	0.13
Chancroid	1 (0.8%)	0 (0%)	1.0
Syphilis	0 (0%)	1 (3.8%)	0.17
Lymphogranuloma venereum	2 (1.6%)	0 (0%)	1.0
Genital herpes	8 (6.4%)	6 (23.1%)	0.008
Genital warts	2 (1.6%)	3 (11.5%)	0.01
Dysuria	23 (18.5%)	5 (19.5%)	1.0
Unspecified penile ulcers	5 (4.0%)	2 (7.7%)	0.35
Others	23 (18.5%)	3 (11.5%)	0.57
<b>Reported condom use last year</b>			
None	9 (9.7%)	1 (4.2%)	0.62
Sometimes	18 (19.4%)	7 (29.1%)	
most of times	20 (21.5%)	4 (16.7%)	
every time	46 (49.5%)	12 (50.0%)	
<b>Former/Current IVDU</b>			
Yes	4 (3.2%)	0 (0%)	0.35
<b>Had blood transfusion last 5 years</b>			
Yes	3 (2.4%)	0 (0%)	0.42
<b>Cigarette smoking</b>			
Yes	59 (47.6%)	20 (76.9%)	0.006
<b>Alcohol drinking</b>			
Yes	46 (37.1%)	7 (26.9%)	0.32
<b>Circumcision</b>			
Yes	2 (1.6%)	1 (3.8%)	0.45

HIV infection at the initial visit. Those variables were transformed to dichotomous variables and entered into a logistic regression model. Sexual contact with prostitutes at least once a month (OR 3.3, 95%CI 1.1-9.7), and smoking (OR 3.4, 95% CI 1.2-9.9) were independently significantly associated with HIV prevalence in multivariate analysis (Table 3). Adjusted for age, educational level, and marital status do not alter the risk estimates of the interest variables in the model.

Table 3  
Multivariate analysis of risk factors for HIV prevalence in participating subjects.

Variables	Crude OR (95%CI)	Adjusted OR* (95%CI)
Frequency of sex with CSW		
At least once a month	4.5 (1.8-11.0)	3.6 (1.2-10.9)
Smoking		
Yes	3.7 (1.3-11.0)	3.5 (1.2-10.5)
History of bubo		
Yes	2.8 (1.0-7.7)	1.8 (0.95-7.8)
Current genital warts		
Yes	8.0 (1.0-98.1)	3.4 (0.4-28.1)
Current genital herpes		
Yes	4.3 (1.2-15.9)	3.0 (0.8-12.3)

## DISCUSSION

This study found a frequency of 1.0% (1/100) for HIV seroconversion after a single sexual exposure to prostitutes. The estimated of HIV seroprevalence among prostitutes in Chiang Mai at the time this study was conducted was 48%. Thirty three percents of the patients reported condom use properly. If we assume that only half of the men were sexually exposed to an HIV infected prostitutes with 100% efficacy of condom protection, the true HIV seroconversion rate following a single sexual intercourse would be 6.2%. The study in STD males conducted in Bangkok in 1989-1991 found 5% (5/100) HIV seroconversion after a 12 weeks follow up with 2.7% condom use but without knowledge of HIV prevalence in prostitutes (Suwagoon et al, 1992). The Nairobi study reported a frequency of 8.2% (24/293) after sexual exposure to prostitute with a HIV prevalence of 85% [Cameron et al, 1989]. The precise risk of HIV transmission

from a single act of heterosexual intercourse is not known. The World Health Organization (WHO) has suggested that the risk is generally less than one infection per hundred exposures (World Health Organization, 1990). In situations with high prevalence of risk factors as in Africa and Thailand, the heterosexual transmission rate may exceed the WHO estimate.

It is suggested that two HIV-1 strains are related to different modes of transmission in Thailand (Ou et al, 1993; Mccutchan et al, 1992). HIV-1 genotype E, which is phylogenetically related to the African strain, is predominant in heterosexual risk groups and in the northern region of Thailand. HIV-1 genotype B, which closely relate to the North America and Europe strain, is predominant in intravenous drug users. A recent study in Bangkok reported that HIV-1 genotype A had a three times increased risk of male to female heterosexual transmission compared with genotype B (Kunanusont, 1993). Our study did not determine the HIV-1 subtype but was conducted in a heterosexual population in the northern part of Thailand. It is not known how much genetic HIV-1 variant influences the rate of HIV infection in this population.

Prostitutes appears to be the main source of HIV acquisition among young adult men in Northern Thailand (Nelson et al, 1993). Our study found that more frequent sexual exposure to prostitutes was associated with higher HIV prevalence. Intravenous drug use was low among these patients. Four men admitted intravenous drug use were not positive for HIV antibody.

Two studies conducted in homosexual males have found strong association between HSV-2 seroconversion and HIV-1 seroconversion (Stamm et al, 1988; Holmberg et al, 1988). Current genital herpes is statistically significantly associated with the HIV prevalence by univariate analysis in our study. It is also noteworthy that the only man who had HIV seroconversion presented to the clinic with genital herpes at the initial visit. He also had one episode of genital herpes about 6 months before the initial visit. He had unprotected vaginal sexual intercourse with a prostitute 15 days before the first blood test. Genital herpes is the most common cause of genital ulcers in this population. Prevention of herpes infection will get more attributable protection for HIV acquisition than other ulcerative STDs.

We found that current genital warts was statistically significantly associated with HIV infection but history of genital warts was not associated with HIV infection in bivariate analysis. Other studies also have found the same association (Quinn *et al*, 1988; Kiviat *et al*, 1990). However, the more frequent finding of genital warts in HIV positive persons may be the result of immunosuppression due to HIV infection.

History of bubo was the only STD history found statistically significantly associated with HIV infection on univariate analysis. Many ulcerative STDs can cause bubo, including chancroid, lymphogranuloma venereum, syphilis, and genital herpes.

Cigarette smoking has been reported as a risk factor associated with HIV infection or rapid progression to AIDS in three studies (Halsey *et al*, 1992; Nieman *et al*, 1993; Royce *et al*, 1990). Some studies suggest that smoking is associated with high risk behavior and lower socioeconomic status (Burns *et al*, 1991; Willmott *et al*, 1992). Our study found independent association of smoking and HIV infection despite important confounders which were controlled using logistic regression. Biological effects of smoking have been postulated to increase the risk of HIV acquisition. Cigarette smoking alters the immune system. It increases the absolute number of lymphocytes, particularly CD4+, but decreases the number and proportion of natural killer cells (Petitti *et al*, 1986; Hughes *et al*, 1985; Tollerud *et al*, 1989).

Lack of circumcision has been associated with increased risk of four major STDs - herpes genitalis, candidiasis, gonorrhoea, and syphilis in a study conducted in Australia (Parker *et al*, 1989). The Nairobi study found 8 times increased risk of HIV acquisition for uncircumcised men (Cameron *et al*, 1989). Most of male STD patients in Chiang Mai were uncircumcised. To demonstrate whether lack of circumcision is the risk factor for HIV infection in Thai population, a difference design study should be conducted.

In conclusion, the risk of HIV transmission from a single sexual contact is considerably higher in the presence of risk factors. Further studies in the Thai population should examine the roles of cigarette smoking and circumcision on risk of HIV infection.

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STD AND HIV IN THAILAND

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