

HEPATITIS B VIRUS SERO-MARKERS, HEPATITIS C VIRUS ANTIBODY AND RISK BEHAVIORS AMONG MIDDLE AGE AND OLDER THAI MALES

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Abstract. A cross-sectional study of 1,069 Thai males over 40 years of age was carried out to assess risk behaviors towards hepatitis B and C. All studied participants who voluntarily participated and signed informed consents were interviewed. One hundred eighty-seven volunteers participated in blood screening for hepatitis B virus (HBV) sero-markers and anti-hepatitis C virus (anti-HCV). The results reveal of 1,069 subjects, 21.3% had tattoos, 18.4% had a history of regular alcohol consumption (drinking alcohol ≥ 5 days/week), and 16.4% had a history of extramarital sex without using condoms during the previous year. Results from blood screening showed 93.1% were positive for HBV sero-markers, 4.3% had a positive HBsAg, 58.8% had a positive anti-HBs, and 0.5% had a positive anti-HCV antibody. Nine subjects were positive for HBsAg or anti-HCV, most (7/9) had at least one risk behavior.

INTRODUCTION

Hepatitis B and C are major causes of sexually transmitted and blood-borne hepatitis and are important public health problems in many countries, including Thailand (Nur *et al*, 2000; Luksamijarulkul *et al*, 2002a; Lavanchy, 2004). More than 350 million HBsAg carriers and approximately 170 million HCV infected people are estimated worldwide (Cohen, 1999; Brian *et al*, 2004; Lavanchy, 2004). The complications of both infections are serious: 10-40% will develop chronic hepatitis and gradual progression to liver cirrhosis and hepatocellular carcinoma (HCC) (Lee, 1997; Cohen, 1999). Both sexual and parenteral routes are the predominant modes of HBV transmission, while the major route of HCV transmission is the parenteral route;

sexual transmission is a minor route in the spread of HCV (Stary *et al*, 1992; Mahoney and Kane, 1999; Luksamijarulkul *et al*, 2000). Several studies have shown the high risk groups for HBV and HCV infection are injecting drug users (IDUs) and female sex workers (FSWs) (Luksamijarulkul and Plucktaweesak, 1996a; Luksamijarulkul *et al*, 1997; Gilson *et al*, 1998; Hershov *et al*, 1998). Those who have sex with IDUs and FSWs have an increased chance of acquiring infection if they do not use condoms. Previous studies support the role of sexual transmission of HBV and HCV among married couples and the clients of FSWs (Hershov *et al*, 1998; Feldman *et al*, 2000; Luksamijarulkul *et al*, 2002b). Population aging is occurring more rapidly in Asia than in Western countries (Goh, 2005). A recent study of sex life in an urban population of men aged 30-70 years old found that 25.7% of men wanted to have more frequent sex than women (5.4%), but were unable to fulfill their desire (Goh *et al*, 2004). Some had extramarital sexual relations and were at increased risk

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for sexually transmitted and blood-borne infections, including HBV and HCV infections. This study investigated risk behaviors and the sero-prevalence of HBV markers and HCV antibody among middle age and older Thai males. The study should be valuable for epidemiological surveillance and for integrating a health promotion program to improve the health and well-being of this group.

MATERIALS AND METHODS

Study design and participants

This study was a cross-sectional study conducted in 1,069 males aged more than 40 years. The study was carried out between October 2004 and September 2005. The subjects met the following criteria: general good health and no signs or symptoms of any diseases during the month screened by the clinician. This study excluded participants who had a history of immunotherapy or other immunodeficiency disorders and cancer therapy. Approximately 170 males were selected from 6 provinces represented in several regions in Thailand, including Chiang Mai, Khon Kaen, Pathum Thani, Suphan Buri, Phuket, and Bangkok and used multi-stage sampling. The first step was province selection by regions using a simple random technique, except for Bangkok for which we used purposive sampling. The second step was district selection using stratified sampling. Each selected province included a Mueang district and an outer Mueang district. After that, 2 sub-districts in each selected district were randomly selected (2 sub-districts from the Mueang district and 2 sub-districts from the outer Maeung district in each selected province) and 2 villages in each selected sub-district were randomly selected (2 x 2 villages from each Mueang district and 2 x 2 villages from each outer Mueang district in each selected province). Finally, approximately 21 individuals were selected from each village

by voluntary participation (approximately 21 x 4 x 2 individuals from each selected province). All studied participants were interviewed using structured questionnaires. Information regarding socio-demographic characteristics and risk behaviors for sexually transmitted and blood-borne hepatitis, especially HBV and HCV infections was included. One hundred eighty-seven participants voluntarily participated in blood screening. Before interviews and blood screening, the participants received information regarding the study and signed consent forms. The response rate for blood testing was 17.5% of the participants. Most participants stated they did not want to know about any factors found from the testing that might affect their family life.

Method of blood screening

Blood specimens were screened for HBV seromarkers and anti-HCV using immunochromatography and immunocomb ELISA kits (Pacific Biotech and Organics Immuno Comb II, Bangkok, Thailand) with 96-100% sensitivity and specificity when compared to ELISA and RIA (Caldwell and Barret, 1977). In the case of HBsAg and anti-HCV, a specimen was considered positive if the immunochromatography and immunocomb ELISA were positive together.

Data analysis

Data from interviews and blood screening were analyzed and presented by descriptive statistics including percentage, mean and standard deviation. The Chi-square test was used to test for homogeneity of the distribution of the HBV seromarker prevalence classified by some socio-demographic variables. The critical level of $\alpha = 0.05$ was considered to indicate statistical significance.

Ethical approval

The study protocol was approved by the Ethics Committee of Mahidol University and the Ministry of Public Health, Thailand.

RESULTS

Socio-demographic characteristics of the studied participants

Of 1,069 middle age and older males, 51.8% were 41-50 years of age and 16.8% were more than 60 years. The mean \pm standard deviation (SD) for age was 51.1 ± 8.7 years, ranging from 41 to 90 years. About 85% were married. Approximately 62% had completed a primary education and only 12.2% completed vocational level or undergraduate study. In regards to occupation, 35.1% were laborers, 23.9% were governmental officers and 19.3% were farmers. Nearly 76% had a low family income ($\leq 10,000$ baht/month). The mean \pm SD of family income was $9,574.8 \pm 9,216.4$ baht/month, ranging from 600 to 74,390 baht/month. Details are presented in Table 1.

Risk behaviors towards sexually transmitted and blood-borne hepatitis

Of the studied participants, 21.3% had tattoos, 18.4% had a history of regular alcohol consumption (≥ 5 days/week), 16.4% had a history of extramarital sex without using condoms in the previous year and 7% had a history of sex service. Subjects aged 41-50 years old had a relatively higher percentage of risk behaviors than the older age group, except a history of injection drug use. Details are shown in Table 2.

Results from blood screening

Results revealed that 93.1% of subjects had positive HBV seromarkers, 4.3% were positive for HBsAg, 58.8% were positive for anti-HBs and 29.9% were positive for anti-HBc. The overall prevalence of HBV seromarkers by age group and by studied province showed no

Table 1
Socio-demographic characteristics of participants (N = 1,069).

| Socio-demographic characteristics | Number | Percentage |
|---|--------|------------|
| Age (years) : | | |
| 41-50 | 554 | 51.8 |
| 51-60 | 336 | 31.4 |
| 61-70 | 141 | 13.2 |
| > 70 | 38 | 3.6 |
| $\bar{X} \pm SD = 51.1 \pm 8.7$ years (Min = 40, Max =90) | | |
| Marital status : | | |
| Single | 32 | 3.0 |
| Married | 910 | 85.1 |
| Widowed/Divorced | 127 | 11.9 |
| Education : | | |
| Illiterate | 14 | 1.3 |
| Primary level | 665 | 62.2 |
| Secondary level | 260 | 24.3 |
| Vocational and undergraduate | 130 | 12.2 |
| Occupation : | | |
| Laborer | 375 | 35.1 |
| Government officer | 255 | 23.9 |
| Farmers | 206 | 19.3 |
| Private business | 174 | 16.3 |
| Others | 59 | 5.5 |
| Family income (baht/month) : | | |
| $\leq 5,000$ | 453 | 42.4 |
| 5,001-10,000 | 358 | 33.5 |
| $\geq 10,001$ | 178 | 16.7 |
| $\bar{X} \pm SD = 9,574.8 \pm 9,216.4$ baht/month (Min = 600 , Max = 74,390 baht/month) | | |

Table 2
Percentage of participants with risk behaviors for sexually transmitted and blood-borne hepatitis by age group (One could answer more than 1 item).

| Risk behaviors (n=554) | 40-49 years (n=336) | 50-59 years (n=189) | ≥ 60 years (n=1,069) | Total |
|--|------------------------|------------------------|-------------------------|-------|
| History of receiving blood and/or having hemodialysis | 9.8 | 9.2 | 8.8 | 9.5 |
| History of contact with blood or blood products | 8.7 | 8.0 | 3.7 | 7.7 |
| History of tattooing | 23.7 | 19.4 | 16.9 | 21.3 |
| History of injecting drug use | 1.9 | 3.3 | 2.1 | 2.3 |
| History of jaundice | 10.7 | 9.8 | 7.4 | 9.9 |
| History of STDs in the previous year | 2.2 | 2.4 | 1.6 | 2.2 |
| History of regular alcohol consumption ^a | 23.7 | 14.0 | 10.1 | 18.4 |
| History of extramarital sexual relations without using condom in the previous year | 19.0 | 16.1 | 8.5 | 16.4 |
| History of sex service | 7.7 | 7.2 | 4.8 | 7.0 |

^a Drinking alcohol ≥ 5 days/week

Table 3
Prevalence of HBV seromarkers and anti-HCV among studied participants by age group and domicile (n=187).

| Variables | No. of tested | HBV seromarker positive | | | | Anti-HCV positive |
|--------------|---------------|-------------------------|---------------------|---------------|------------------------|-------------------|
| | | HBsAg + Anti-HBc | Anti-HBs + Anti-HBc | Anti-HBc only | Any HBV markers | |
| Age (years) | | | | | | |
| 41-50 | 81 | 3 (3.7) | 48 (59.3) | 24 (29.6) | 75 (92.6) ^a | 1 (1.2) |
| 51-60 | 69 | 3 (4.3) | 40 (58.0) | 21 (30.4) | 64 (92.8) ^a | 0 (0.0) |
| > 60 | 37 | 2 (5.4) | 22 (59.5) | 11 (29.7) | 35 (94.6) ^a | 0 (0.0) |
| Domicile | | | | | | |
| Chiang Mai | 32 | 1 (3.1) | 22 (68.8) | 7 (21.9) | 30 (93.8) | 0 (0.0) |
| Khon Kaen | 30 | 1 (3.3) | 15 (50.0) | 12 (40.0) | 28 (93.3) | 1 (3.3) |
| Pathum Thani | 32 | 2 (6.3) | 18 (56.3) | 11 (34.4) | 31 (96.9) | 0 (0.0) |
| Suphan Buri | 30 | 2 (6.3) | 16 (53.3) | 10 (33.3) | 28 (93.3) | 0 (0.0) |
| Phuket | 32 | 1 (3.1) | 18 (56.3) | 10 (31.3) | 29 (90.6) | 0 (0.0) |
| Bangkok | 31 | 1 (3.2) | 21 (67.7) | 6 (19.4) | 28 (90.3) | 0 (0.0) |
| Total | 187 | 8 (4.3) | 110 (58.8) | 56 (29.9) | 174 (93.1) | 1 (0.5) |

^aNo statistically significant difference by χ^2 -test at $\alpha = 0.05$

significant differences ($p > 0.05$). In addition, 0.5% (1/187 participants) were positive for anti-HCV (Table 3). There were 8 subjects positive for HBsAg and 1 positive for anti-HCV. Seven had a history of risk behavior in at least 1 item and 2 had no risk factors. Details are shown in Table 4.

DISCUSSION

HBV and HCV infections occur throughout the world. HBV transmission includes the parenteral route, vertical transmission and sexual contact. In adults, transmission is mainly from person-to-person via sexual con-

Table 4

Some epidemiological characteristics of 8 HBsAg positive and 1 anti-HCV positive males.

| Age (years) | Marital status | Domicile | Education | Occupation | Risk behaviors | Result of blood screening |
|-------------|----------------|--------------|-----------|-------------|----------------|---------------------------|
| 47 | Married | Pathum Thani | Secondary | Home-work | No history | HBsAg |
| 54 | Married | Phuket | Secondary | Home-work | No history | HBsAg |
| 46 | Married | Bangkok | Primary | Labor | Tat + Alc | HBsAg |
| 41 | Married | Pathum Thani | Secondary | Gov Officer | BI + Cont + J | HBsAg |
| 68 | Widowed | Suphan Buri | Secondary | Agriculture | Alc+Cont+Tat | HBsAg |
| 58 | Married | Suphan Buri | Primary | Agriculture | Alc | HBsAg |
| 61 | Married | Chiang Mai | Primary | Agriculture | Alc + Tat | HBsAg |
| 52 | Married | Khon Kaen | Primary | Labor | Alc + J | HBsAg |
| 42 | Married | Khon Kaen | Secondary | Labor | IDU + J | Anti-HCV |

Tat = History of tattooing, Alc = History of regular alcohol consumption, BI = History of receiving blood, Cont = History of contact with blood, J = History of jaundice, IDU = History of injecting drug use

tact (Moradpour and Wands, 1995; Lee, 1997; Holland *et al*, 2000; Luksamijarulkul *et al*, 2002b). While the major route for HCV transmission is parenteral, a minority is via sexual contact (Stary *et al*, 1992; Hershov *et al*, 1998; Luksamijarulkul *et al*, 2000). Known risk behaviors for acquiring HBV infection, such as tattooing, ear piercing in females, sharing scissors for haircutting, direct contact with wounds, blood or blood products from other persons, sharing toothbrushes and sexual activities have been previously reported (Luksamijarulkul *et al*, 1995; Moradpour and Wands, 1995). A history of jaundice in a husband was a significant risk factor for HBsAg positivity among their wives (Luksamijarulkul *et al*, 2002b). Sexual contact with HBV carriers increased the risk of HBV transmission due to the rate of exposure to semen (Maheus, 1995).

This study found that 21.3% of middle age and older Thai males had tattoos, 18.4% had a history of regular alcohol consumption (drinking alcohol ≥ 5 days/week), 16.4% had a history of extramarital sexual relations without using condoms in the previous year, 9.5% had a history of receiving blood transfusion or having hemodialysis and 7% had a history of sex

service. Most risk behaviors were significant risk factors for HBV and HCV infections demonstrated in previous studies (Stary *et al*, 1992; Luksamijarulkul and Plucktweesak, 1996b; Gilson *et al*, 1998; Mahoney and Kane, 1999; Luksamijarulkul *et al*, 2000; Luksamijarulkul *et al*, 2001). A tattoo is an important risk factor for HBV infection (Limentani *et al*, 1979). There is no doubt that sexual activity is an important risk factor for HBV transmission, but it seems to play a minor role in the spread of HCV (Hershov *et al*, 1998). Alcohol consumption is an indirect risk factor for HBV and HIV infections, because after consumption, the subject was more likely to have extramarital sexual relations without using a condom (Luksamijarulkul and Plucktweesak, 1996b, Gilson *et al*, 1998). In addition, 2.3% of participants had a history of injection drug use, which is an important risk factor for HBV, HIV and HCV infections (Luksamijarulkul and Plucktweesak, 1996a; Lee, 1997; Cohen, 1999).

The prevalence of HBsAg among studied males was 4.3% and 93.1% were positive for prior HBV infection. The HBsAg positive rate was similar to previous studies in Thai blood donors (2.5-4.6%) (Tanprasert *et al*, 1993; Luksamijarulkul *et al*, 2002a). A recent

study in the Thai general population found 4% were HBsAg positive and 72.1% were positive for prior HBV infection (Chongsrisawat *et al*, 2006). Five point one percent of participants aged more than 40 years were positive for HBsAg and 90% of this age group were positive for prior HBV infection (any HBV seromarker positive). Only 0.5% in this study were positive for anti-HCV, which is lower than that of previous studies of Thai blood donors ranging from 0.98% (Verachai *et al*, 2002) to 2.9% (Luksamijarulkul *et al*, 2002a). The positive anti-HCV subjects was a 42-year old male with a history of injection drug use which is an important risk factor for HCV infection. Generally, the prevalence of both these infections varies in different geographic areas, as well as in different population subgroups. Previous studies demonstrated the HBsAg carrier rate varied from approximately 1.9% in Europe and America to 8-15% in Asian countries (Ko *et al*, 1991; Assateerawatt *et al*, 1992; Chunsuttiwat *et al*, 1997; Lee, 1997; Nur *et al*, 2000). While the anti-HCV prevalence ranged from 0.2-1% in Europe and North America to 0.3-3.1% in Asia (Cohen, 1999; Nur *et al*, 2000; Luksamijarulkul *et al*, 20002a).

Data from this study showed no HBV and HCV coinfections. Several studies have shown that if HCV patients are also infected with HBV or HIV, they develop liver cirrhosis or liver carcinoma in a shorter time than those who are infected with HCV alone (Chen *et al*, 1990; Giordano *et al*, 2004). Additionally, alcohol has a harmful effect on chronic HCV infection (Tanikawa, 1994). Focusing on these 9 HBsAg or anti-HCV positive individuals, only 2 had no history of risk behavior. The other cases had a history of risk behaviors of at least 1 item. All had relatively low education (only primary and secondary education) and 6 were laborers or agriculture workers. This supports previous findings that persons with low education or low socioeconomic states have greater risk behaviors, such as, tattooing, injecting

drug use and extramarital sexual relations without condom use (Gilson *et al*, 1998; Luksamijarulkul *et al*, 2004). To reduce their risk behaviors, integrated preventive programs, such as, a 100% condom use policy, life skills education, mental health support and health promoting activities should be emphasized in this group.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the health care personnel of the studied areas. We also wish to extend our deep appreciation to all the participants in this study.

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