HEPATITIS B CARRIER AMONG MARRIED HILLTRIBE WOMEN IN NORTHERN THAILAND

Natchaporn Pichainarong[1], Wisit Chaveepojnkamjorn[1], Pipat Luksamijarulkul[2], Dusit Sujirarat[1] and Tawatchai Keereecamsuk[3]

[1]Department of Epidemiology, [2]Department of Microbiology, Faculty of Public Health, Mahidol University, Bangkok; [3]Mae Suai District Health Office, Mae Suai District, Chiang Rai, Thailand

Abstract. A cross-sectional study of 540 married Akha and Lisaw women of reproductive age was conducted in Chiang Rai Province, Thailand, between June 1st and August 31st, 1999, in order to determine the seroprevalence of HBsAg and identify the risk factors for chronic HBsAg carriage. HBsAg was detected by the reverse passive hemagglutination technique (RPHA). Data were obtained by questionnaires and serological testing. There were 164 Lisaws and 376 Akhas: most were illiterate (88.71%) and the annual family income was ≤ 9,999 baht (50.93%). The seroprevalence of HBsAg was 8.15%. Logistic regression analysis, controlling for possible confounding factors, revealed that one to five injections in the year prior to the study increased the risk of HBsAg carriage by a factor of 4.84 (95% CI = 1.42-16.49); more than six injections increased the risk by a factor of 5.84 (95% CI = 1.47-23.18).

INTRODUCTION

Hepatitis B virus (HBV) infection is recognized as one of the world's leading causes of hepatitis; a substantial number of HBV infections are chronic. HBV infection causes a wide spectrum of clinical disease, ranging from asymptomatic infection to fulminant fatal hepatitis (WHO, 1997). It was estimated that about 8-15% of the population of Southeast Asia, China, and Africa may serve as HBV carriers (Kane *et al*, 1990). Recent reports in Thailand revealed that the approximate rate of HbsAg carriage ranged from 3.50% (Bodhiphala *et al*, 1999) to 3.64% (Luksamijarulkul *et al*, 1995). Several studies of HBV infection in Thailand reported that HBV infection and persistent HBV carriage were associated with hepatocellular carcinoma (HCC) (Phornphutkul and Peerakome, 1982; Yeoh, 1990). The viral hepatitis morbidity rate of Thai hospital in-patients has been reported as 8.5/100,000 population; the highest rate being found in the Central region, followed by the Northern, North-Eastern and Southern regions (11.0, 10.4, 6.6 and 6.5/100,000 population respectively) (Office of the Permanent Secretary, Ministry of Public Health, 2001). In 1996, Chiang Rai Province reported that 95 of 235 hepatitis cases (40.4%) were infected with HBV. Chiang Rai is similar to other provinces in Northern Thailand, which have many hilltribes. These tribes migrated from Tibet and Southern China over 100 years ago (Burupat, 1985); they are now scattered across Chiang Rai. There have been relatively few studies of HBV infection among the hilltribes of Thailand, and particularly of their lifestyle, socioeconomic status and some cultural factors, such as multiple sex partners and multiple marriages. Multiple sex partners is a factor that plays a role in the transmission of HBV (Bunyadai, 1995) and may result in the transmission of HBV from other provinces or countries. These variables have not, however, been subjected to study. The aims of this study were to assess the rate of HBsAg carriage and to examine the possible

Correspondence: Natchaporn Pichainarong, Department of Epidemiology, Faculty of Public Health, Mahidol University, 420/1 Rajvithi Road, Bangkok 10400, Thailand.
Tel: 66 (0) 2248-5554
E-mail: phnpc@mahidol.ac.th

risk factors of HBsAg carriage. The study focused on women of reproductive age in order to prevent the spread of HBV within the community and to newborn babies.

MATERIALS AND METHODS

A serological survey was conducted in order to establish the rate of carriage of HBsAg and to assess the risk factors that contribute to HBV carriage among 15-44 year old married ethnic women from two hilltribes in Mae Suai district, Chiang Rai Province. Serology was done by reverse passive hemagglutination (RPHA). A questionnaire was designed to elicit information on a set of independent variables that represent major factors influencing contraction of the disease consisted of four sections: general information, individual history of risk factors contact, information of husband, and the result of HbsAg by RPHA. The questionnaire was pre-tested on a sample of 60 persons with and without experience of HbsAg carriage in the same study site. The purpose of pre-test interview was to respond and to make adjustment indicated by the field testing. Between June 1st and August 31st, 1999 serological testing and interviewing were performed by home visit in Mae Suai district, Chiang Rai Province. Five hundred and forty Akha and Lisaw women were selected by voluntary participation from 625 married women of reproductive age. Details of the study were explained verbally to all the participants and informed consent was obtained in writing. The questionnaire was developed and used in Thai language since the respondent groups were from different ethnic groups and the trained interviewers translated the questionnaire into the local (Akha and Lisaw languages). The interviewers were local health workers who had been at the local health offices for a long time and were able to speak fluently these languages. The study areas were selected purposely due to the cooperation of study subjects during data collection. In addition, the interviewers were able to communicate by using both ethnic languages in order to formulate informative validity. Data collection of exposure time was asked one month before exposure experience at time of interview according to the incubation period of HBV infection (Wasee, 1987).

Sample size

The sample size was calculated by the formula: $$n = \frac{NZ^2_{\alpha/2} P (1 - P)}{d^2 (N - 1) + Z^2_{\alpha/2} P (1 - P)}$$

N = 625 (number of married hilltribe women), P= proportion of HBsAg in Thai population = 0.10 (WHO, 1997), 1- P = 0.90, $Z_{\alpha/2}$ = 1.96 at α = 0.05, d = 0.10; the calculated sample size was 540.

Blood samples

Five milliliters of blood were obtained by venipuncture by technicians and transported in cold-chain conditions. Sera were separated at the Chiang Rai Regional Medical Sciences Center. Sera were stored at -20ºC until testing.

Laboratory methods

The samples were analysed by RPHA which was prepared by the National Institute of Health (NIH). Samples positive for HBsAg were confirmed positive by re-testing.

Data analysis

The variables consisted of percutaneous exposure (*eg* history of ear-piercing, frequency of injections in the past year, history of blood transfusion, surgical and dental procedures) and non-percutaneous exposure, such as sexual contact with a husband who had worked in other provinces or overseas, sexual contact with recreational users of injected drugs, and multiple sexual partners. Possible confounding variables were education, income, religion, occupation, frequency of alcohol consumption, oral contraceptive, and non-steroidal anti-inflammatory drug use. Risk factors for HBV carriage were calculated by the logistic regression model (Wayne, 1998) for controlling possible confounding factors; a $p < 0.05$ was considered as statistically significant.

RESULTS

The majority of those studied were over 35 years of age; the average age was 32 of the 540 ethnic hilltribe women studied, 30.37% were Lisaw and 69.63% were Akha. Most of the women were illiterate (88.71%) and the annual family income was ≤ 9,999 baht (50.93%) (median 9,500 baht). The average income was 14,185.85 baht: slightly higher than the average national annual family income of 12,150 baht. Agricultural workers accounted for 96.67% of those studied; 51.29% were Buddhist. The overall rate of seropositivity of HBsAg was 8.15%. The highest seroprevalence which was classified by general characteristics, namely age 25-34 years (9.47%), and annual family income ≤ 9,999 baht (10.91%); classified by sexual behaviors, such as number of partner ≥ 2 (9.63%), sexual contact with a husband who had worked in other provinces (8.19%) and overseas (11.32%); classified by percutaneous exposures, included frequency of injection ≥ 6 (10.84%), herself blood transfusion (9.09%), her husband surgery (10.00%), ear piercing (8.59%) (Table 1). Multiple logistic regression analysis was applied for controlling confounders and for evaluating the effects of risk factors on HBsAg

Table 1
Seroprevalence of HbsAg by general characteristics and sexual behaviors.

Variables	Total	HBsAg positive	Prevalence (%)	p-value
Age (years)				0.533
15-24	98	8	8.16	
25-34	243	23	9.47	
35-44	199	13	6.53	
Annual family income (baht)				0.055
≤ 9,999	275	30	10.91	
10,000-49,999	236	12	5.09	
≥ 50,000	29	2	6.89	
Number of partners				0.468
1	405	31	7.65	
≥ 2	135	13	9.63	
Sexual contact with a husband who had worked in other provinces				0.982
No	418	34	8.13	
Yes	122	10	8.19	
Sexual contact with a husband who had worked overseas				0.254
No	487	38	7.80	
Yes	53	6	11.32	
Frequency of injection				0.063
No	125	4	3.20	
1-5	332	31	9.34	
≥ 6	83	9	10.84	
Blood transfusion				0.549[a]
No	518	42	8.11	
Yes	22	2	9.09	
Surgery (husband)				0.497[a]
No	520	42	8.08	
Yes	20	2	10.00	
Ear piercing				0.684
No	249	19	7.63	
Yes	291	25	8.59	

[a]Fisher's exact test.

Table 2
Adjusted odds ratios of various risk factors by multivariate analysis.

Variables	Odds ratio	95% CI	p-value
Age (years)			
15-24	1.00		
25-34	1.19	0.48-2.97	0.705
35-44	0.83	0.29-2.40	0.733
Ethnicity			
Lisaw	1.00		
Akha	1.69	0.68-4.22	0.255
Number of partners			
1	1.00		
≥ 2	1.44	0.70-2.97	0.321
Sexual contact with a husband who had worked in other provinces			
No	1.00		
Yes	1.13	0.40-3.18	0.818
Sexual contact with a husband who had worked overseas			
No	1.00		
Yes	1.53	0.57-4.08	0.399
Sexual contact with an IDU[a]			
No	1.00		
Yes	1.12	0.23-5.42	0.888
Liver disease			
No	1.00		
Yes	1.77	0.24-2.43	0.656
Ear-piercing			
No	1.00		
Yes	1.49	0.66-3.34	0.335
Surgery			
No	1.00		
Yes	1.17	0.25-2.07	0.541
Dental procedures			
No	1.00		
Yes	1.06	0.26-1.49	0.283
Blood transfusions			
No	1.00		
Yes	1.05	0.19-5.65	0.953
Injections			
No	1.00		
1-5	4.84	1.42-16.49	0.012[b]
≥ 6	5.84	1.47-23.18	0.012[b]

[a]IDU = intravenous drug user.
[b]Statistical significance at $\alpha = 0.05$.

carriage among the study group. Only the frequency of injections was a statistically significant predictor: one to five injections during the year prior to the study increased the risk of HbsAg carriage by a factor of 4.84; more than six injections increased the risk by a factor of 5.84. The other variables were not found to be statistically significant (Table 2).

DISCUSSION

The overall prevalence of HBsAg carriage was 8.15%: this finding was consistent with those of previous studies of the Thai population (Punyagupta *et al*, 1973; Grossman *et al*, 1975; Thongcharoen *et al*, 1976; Johnson *et al*, 1980; Wasee *et al*, 1983); the prevalence was lower than some Asian countries, *eg* 18% in Taiwan (Lu *et al*, 1997) and 10% in Hong Kong (Kwan *et al*, 1997). In contrast, it was higher than in Singapore (Goh, 1997) and India (Ramesh *et al*, 1992): 3.40% and 3.20% respectively.

This study was presented only HBsAg sera, which might cause an understimate of HBV carriers because HBsAg sera can detect HBV infection only 70%. Sometimes, some variables such as personal immune response, genetic variation and nutrition might be shared as confounders of infection. Therefore, the appropriate method for HBV detection should be combined with other markers, namely anti-HBs, anti-HBc sera and HBcAg by an enzyme immunoassay.

Only percutaneous injection was statistically significant risk for the carriage of HBsAg. The finding corresponded with those produced by studies of Egyptian tourists by Nasr *et al* (1996) and with those from a study of preschool children in Taiwan by Beasley *et al* (1982) in which the frequency of prior injections was the major factor for HBV infection. In addition, this study revealed a dose-response relation between frequency of injection and HBsAg seropositivity (Table 2). Moreover, this study indicated that injection equipment in local clinics might be sterilized inadequately. A history of needle stick during working was an important risk factor for blood-borne pathogens, espectially HIV, HBV and HCV (Luksamijarulkul *et al*, 2001). Adequate sterilization is essential if the transmission of HBV is to be reduced.

ACKNOWLEDGEMENTS

The authors are grateful to the staff of the Clinical Pathology Section, Chiang Rai Medical Science Center, for their kind assisstance during laboratory testing. The authors would like to thank all those who helped with interviewing and specimen collection and the women who participated in the study.

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