

## Prevalence of Hepatitis B Virus Markers in Medical Personnel

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ได้ทำการศึกษาความชุกของร่องรอยการติดเชื้อไวรัสตับอักเสบบีในบุคลากรของโรงพยาบาลศรีนครินทร์ คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น ด้วยวิธี ฮีแมกกลูตินเนชั่น และวิธีอีไลซ่าพบการติดเชื้อและร่องรอยการติดเชื้อไวรัสดังกล่าวในบุคลากรเป็นจำนวน 49-37% โดยมีการติดเชื้อสูงในแพทย์และบุคลากรห้องปฏิบัติการพยาบาล และคนงาน ตามลำดับ เมื่อทำการวิเคราะห์ทางสถิติด้วย multiple logistic regression เพื่อควบคุมตัวแปรระหว่างอายุและเพศแล้ว ปรากฏว่า แพทย์และบุคลากรห้องปฏิบัติการมีความเสี่ยงต่อการติดเชื้อไวรัสตับอักเสบบีสูงอย่างมีนัยสำคัญ

ในการเปรียบเทียบวิธีการตรวจระหว่าง อีไลซ่าและฮีแมกกลูตินเนชั่น อีไลซ่ามีความไวสูงกว่าอย่างมีนัยสำคัญ ในการตรวจหาแอนติบอดีต่อเชื้อไวรัสตับอักเสบบี (AntiHBs) ในขณะที่ไม่มีความแตกต่างทางสถิติ ในการตรวจหาแอนติเจนชนิดผิว (HBsAg) และแอนติบอดีต่อแกนกลางของเชื้อไวรัส (AntiHBc)

### Abstract

The prevalence of HBV markers among medical personnel at Srinagarind Hospital, Faculty of Medicine, Khon Kaen University, northeast of Thailand, was studied by hemagglutination (HA) and ELISA techniques. The overall prevalence of HBV markers was 49.37%. The highest prevalence was found in medical doctors followed by laboratory personnel, nurses and

the workers had the lowest prevalence. After control for the effect of age and sex by multiple logistic regression, the medical doctors and the laboratory personnel were found to have statistically significant higher risk of HBV infection.

ELISA was statistically more sensitive than HA in detecting antiHBs ( $p < .05$ ). The difference between ELISA and HA in detecting HBsAg and antiHBc was not statistically significant.

### Introduction

Hepatitis B viral infection is endemic in Thailand and also in many other Asian countries. The prevalence of hepatitis B surface antigen (HBsAg) carriers among Thai is about 10%<sup>(1)</sup>. About 60% of adults have hepatitis B virus (HBV) markers.<sup>(2)</sup> Chronic carriers of HBsAg are at higher risk of developing hepatocellular carcinoma<sup>(3,4,5)</sup>. HBV is a recognized hazard for medical personnel in Europe and United States.<sup>(6-11)</sup> The prevalence of HBV markers was much higher in medical personnel than in the general population in those countries. In contrast, the prevalence of HBV markers among medical personnel in Bangkok, and nearby was lower than in the general population.<sup>(12,13,14)</sup>

Although hepatitis B vaccine is efficacious and recommended for prevention of HBV infection in endemic area, the cost of the vaccine is still very expensive. Therefore more informations are needed before policy of hepatitis B vaccine immunization can be made.

The study conducted serological survey for prevalence of HBV markers including HBsAg, antibody to HBsAg (antiHBs) and antibody to core antigen (antiHBc) in medical personnel, Srinagarind Hospital, Faculty of Medicine, Khon Kaen University in the northeastern part of Thailand. The information will be used for evaluating the risk of HBV infection and justification of hepatitis B vaccination in medical personnel.

### Materials and Method

The medical personnel were stratified into 4 strata namely, medical doctors, nurses (registered and practical), laboratory personnel and workers. A simple random sampling of subjects was collected from each stratum in proportion to the total number of personnel in each stratum. A total of 577 serum specimens were obtained

during October 1986 to February 1987. Eligible subjects who have already received hepatitis B vaccination were excluded. HBV markers were examined by hemagglutination (HA) technique using reagent kit of Green Cross (Japan) and Enzyme Linked Immunoabsorbent Assay (ELISA) of Roach Diagnostica (Switzerland) reagent kits. All sera were screened for anti HBs and HBsAg by passive hemagglutination (PHA) and reversed passive hemagglutination (RPHA) techniques. Negative sera were determined for antiHBc by PHA. All negative sera by RPHA and PHA were retested by ELISA for antiHBs, HBsAg and antiHBc respectively. All positive sera by HA test were confirmed by ELISA.

The prevalence of HBV markers was calculated using standard definition. Relative risk of HBV infection was assessed by comparing the prevalence of each group with the workers. Stepwise logistic regression using BMDP programme was used to assess the relative risks and 95% confidence interval controlling for age and sex.

### Results

The prevalence of HBV markers among medical personnel at Srinagarind hospital was 49.37%. The prevalence of HBsAg, antiHBs and antiHBc only were 8.44%, 25.85% and 15.08% respectively, (Table I). The prevalence of HBV markers in various profession is also shown in Table I. The medical doctors have the highest prevalence, 81.48% followed by laboratory personnel, nurses and workers.

Table II show the relative risk of acquiring HBV infection (using any HBV markers as the indicator) of medical doctors, laboratory personnel and nurses using workers as the control. Medical doctors and laboratory personnel have a statistically significant higher risk, ( $p < 0.01$  and  $< 0.05$  respectively).

**Table I :** Prevalence of HBV markers in medical personnel.

Profession	Number	HBsAg No(%)	AntiHBs No(%)	AntiHBc No(%)	Total(%) (%)
Medical doctors	54	12(22.2)	28(51.85)	4(7.4)	44(81.48)
Laboratory personnel	66	7(9.43)	23(34.85)	10(15.15)	40(60.60)
Nurses	255	17(6.67)	47(18.43)	47(18.43)	111(43.53)
Workers	182	11(6.04)	46(25.27)	23(12.64)	80(43.96)
Total	557	47(8.44)	144(25.85)	94(15.08)	275(49.37)

**Table II :** Relative risk of HBV infection in various medical professions, control for age and sex, using any markers as the indicator and workers as the control group.

Profession	Relative Risk (RR)	p-value	95% C.I. of RR
Medical doctors	4.18	<.01	1.93, 9.08
Laboratory personnel	1.93	<.05	1.04, 3.56
Nurses	1.25	>.05	0.82, 1.90
Workers	1	-	-

**Table III :** Relative risk of HBV infection in various medical professions, control for age and sex, using HBsAg as an indicator and workers as the control group.

Profession	Relative Risk (RR)	p-value	95% C.I. of RR
Medical doctors	3.72	<.05	1.41, 9.80
Laboratory personnel	1.23	>.05	0.43, 3.56
Nurses	1.24	>.05	0.53, 2.88
Workers	1	-	-

When using only HBsAg as the indicator, only the medical doctor group has a statistically significant higher risk ( $p < 0.05$ ) Table III.

The sensitivity between HA and ELISA were shown in table (IV). HBsAg was detected in 43 out of 577 (7.45%) by RPHA and increased to 47 out of 577 (8.15%) by ELISA. AntiHBs was found in 138 of 577 (23.92%) by PHA and rose to 24.96% (144 of 577) by ELISA. For detection of antiHBc 80 sera were positive by

PHA (13.87%) while ELISA increased to be 84 out of 577 (14.56%). The sensitivity of HBsAg by RPHA is 91.5%, antiHBs by PHA is 95.8% and PHA for antiHBc is 95.2%. ELISA was more sensitive than HA for detection of any markers but not significantly difference for HBsAg and antiHBc ( $p > 0.05$ ).

For determination of antiHBs, ELISA was about 1% more sensitive but significantly different from HA ( $0.25 > p < 0.05$ ).

Table IV : HBV detection by ELISA and Hemagglutination techniques

Technique	HBV markers					
	HBsAg		AntiHBs		antiHBc	
	No+/total	%Positive	No+/total	%Positive	No+/total	%Positive
Hemagglutination	43/577	7.45	138/577	23.92	79/577	13.87
ELISA	47/577	8.15	144/577	24.96	83/577	14.56
%sensitivity of Hemagglutination	91.5		95.8		95.2	
Statistical difference* between two techniques	p>0.05		0.025< p<0.05		p>0.05	

\*Mcneemar test

### Discussion

The results from our study show that prevalence of HBsAg carriers in our medical personnel are similar to other investigations.<sup>(1,2,12,13,14)</sup> The effect of age and sex which have significant association with HBV markers were also control in our study. The result indicated that among the medical personnels, the medical doctors and the laboratory personnel are at higher risk of HBV infection which contradictory to other findings.<sup>(12,13,14)</sup> This might be due to small number of medical doctors including in the study and the nature of the sampling of the subjects in which in our study the stratified random sampling was used.

Detection of serological markers of HBV can be done by several techniques. Third generation methods including HA, radio-immunoassay (RIA) ELISA and HA are sensitive and specific.<sup>(15-19)</sup> RIA is reference method but very expensive and

required sophisticated instrument, ELISA is sensitive and reliable but time consuming and more technical involvement while HA is a rapid simple method with reasonable cost.

Although non-specific agglutination may be found in HA test occurred by interspecies antibody<sup>(20)</sup> but Green Cross reagent kits eliminated this pattern by adding solubilizer stroma and animal sera in the buffer to neutralize interspecies antibody before adding sensitized sheep cell.<sup>(21)</sup>

From this study ELISA was not significantly different from HA for HBsAg and antiHBc detection but significantly different for detection of antiHBs similar to previous study.<sup>(22)</sup> However the results show that ELISA detected about 1% more positive than HA in any markers. From our point of views hemagglutination is an appropriate technique for routine screening HBV markers in our country.

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