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Hepatitis B virus seromarkers and epidemiological characteristics in husbands of HBsAg-positive and HBsAg-negative postpartum women

Pipat Luksamijarulkul* Atchara Mooktaragosa*
Chukiat Viwatwongkasem** Sunee Singhanati***

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Objective : *To compare the prevalence of hepatitis B virus (HBV) seromarkers and some epidemiological characteristics between husbands of HBsAg-positive and HBsAg-negative postpartum women*

Design : *A cross-sectional study*

Setting : *Rajvithi Hospital, Bangkok*

Subjects/ Methods : *80 HBsAg-positive and 87 HBsAg-negative postpartum women and their husbands who had no history of HBV vaccination were interviewed using structured questionnaires that consisted of questions on socio-demographic variables with histories of HBV exposure.Their blood specimens were collected to determine HBsAg, anti-HBs, and anti-HBc by ELISA methods. The HBV seromarker prevalence and data from the interviews of the two groups were compared using the Chi-square test.*

Results : *The results revealed that socio-demographic variables between two groups of postpartum women and their husbands were not significantly different ($p>0.05$). The histories of HBV exposure between husbands of the two*

* Department of Microbiology, Faculty of Public Health, Mahidol University

** Department of Biostatistics, Faculty of Public Health, Mahidol University

***Rajvithi Hospital, Ministry of Public Health

groups were not significantly different ($p > 0.05$), also. The overall HBV seromarker positivity among husbands of HBsAg-positive postpartum women was 77.50 %, HBsAg positive was 15 %, anti-HBs positive was 48.75 %, and anti-HBc positive alone was 13.75 %. The corresponding seromarker positivities among husbands of HBsAg-negative postpartum women were 49.43 %, 10.34 %, 35.63 % and 3.45 %, respectively. HBV seromarker prevalences among husbands of HBsAg-positive postpartum women were significantly higher than those among husbands of HBsAg-negative ones, $p < 0.001$.

Conclusion : *This study revealed that socio-demographic variables and histories of HBV exposure between husbands of HBsAg-positive and HBsAg-negative postpartum women were not significantly different ($p > 0.05$), whereas HBV seromarker prevalences in the positive group were significantly higher than those in the negative group ($p < 0.001$).*

Key words : *HBV seromarkers, Epidemiological characteristics, Husbands of postpartum women.*

Reprint request : Luksamijarulkul P, Department of Microbiology, Faculty of Public Health, Mahidol University, Bangkok 10400,Thailand.

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พิพัฒน์ ลักษมีจรัลกุล, อัจฉรา มุขธระโกษา, ชูเกียรติ วิวัฒน์วงศ์เกษม, สุณี สิงหะเนติ. เครื่องหมายทางน้ำเหลืองของไวรัสตับอักเสบ บี และลักษณะทางวิทยาการระบาดในสามีของหญิงหลังคลอดที่มีและไม่มีแอนติเจนเอสไวรัสตับอักเสบ บี. จุฬาลงกรณ์เวชสาร 2545 ม.ค; 46(1): 35 – 44

วัตถุประสงค์ : *เพื่อเปรียบเทียบความชุกของเครื่องหมายทางน้ำเหลืองของไวรัสตับอักเสบ บี และลักษณะทางวิทยาการระบาดระหว่างสามีของหญิงหลังคลอดที่มี และไม่มีแอนติเจนเอสไวรัสตับอักเสบ บี (HBsAg)*

รูปแบบการวิจัย : *การศึกษาภาคตัดขวาง*

สถานที่ : *โรงพยาบาลราชวิถี กรุงเทพมหานคร*

ผู้เข้าร่วมการศึกษา/วิธีดำเนินการวิจัย : *ศึกษาในหญิงหลังคลอดที่มี และไม่มีแอนติเจนเอสไวรัสตับอักเสบ บี (HBsAg) จำนวน 80 ราย และ 87 ราย ตามลำดับ และสามีของหญิงดังกล่าว ทั้ง 2 กลุ่ม มีประวัติไม่เคยได้รับวัคซีนไวรัสตับอักเสบ บี มาก่อน เก็บรวบรวมข้อมูลลักษณะทางวิทยาการระบาดที่เกี่ยวข้องกับการติดเชื้อไวรัสตับอักเสบบี (ข้อมูลด้านสังคมประชากรและประวัติการสัมผัสโรค) โดยใช้แบบสอบถาม พร้อมทั้งเก็บโลหิตตรวจหาเครื่องหมายทางน้ำเหลืองของไวรัสตับอักเสบบี โดยใช้วิธี ELISA นำข้อมูลที่ได้ทั้ง 2 กลุ่ม มาวิเคราะห์โดยใช้ Chi-square test*

ผลการศึกษา : *พบว่า ลักษณะทางสังคมประชากรของหญิงหลังคลอดทั้ง 2 กลุ่ม และสามีของทั้ง 2 กลุ่ม ไม่แตกต่างกันอย่างมีนัยสำคัญทางสถิติ ($p > 0.05$) ประวัติการสัมผัสโรคไวรัสตับอักเสบ บี ของสามีของหญิงหลังคลอดทั้ง 2 กลุ่ม ไม่แตกต่างกันอย่างมีนัยสำคัญทางสถิติ ($p > 0.05$) ในขณะที่ความชุกของการติดเชื้อ พาหะ (HBsAg บวก) Anti-HBs และ Anti-HBc ในสามีของหญิงหลังคลอดที่มีแอนติเจนเอส (HBsAg) สูงกว่า ความชุกดังกล่าวในสามีของหญิงหลังคลอดที่ไม่มี แอนติเจนเอส อย่างมีนัยสำคัญทางสถิติ (ร้อยละ 77.50, 15.00, 48.75 และ 13.75 เปรียบเทียบกับ ร้อยละ 49.43, 10.34, 35.63 และ 3.45 ตามลำดับ, $p < 0.001$)*

สรุป : *การศึกษานี้ พบว่า ลักษณะทางสังคมประชากรและประวัติการสัมผัสโรคไวรัสตับอักเสบ บี ของสามีของหญิงหลังคลอดที่มีและไม่มีแอนติเจนเอส (HBsAg) ไม่แตกต่างกันอย่างมีนัยสำคัญทางสถิติ, $p > 0.05$ ในขณะที่ความชุกของเครื่องหมายทางน้ำเหลืองของไวรัสตับอักเสบ บี (ความชุกของการติดเชื้อ, พาหะ, Anti-HBs และ Anti-HBc) ในสามีของหญิงหลังคลอดที่มีแอนติเจนเอส (HBsAg) สูงกว่าความชุกดังกล่าวในสามีของหญิงหลังคลอดที่ไม่มีแอนติเจนเอส อย่างมีนัยสำคัญทางสถิติ, $p < 0.001$*

Hepatitis B virus (HBV) infection is one of important public health problems throughout the world. Its long-term complications include chronic hepatitis, cirrhosis and hepatocellular carcinoma.[1] By the year 2000 more than 2,000 million people had been infected with HBV and approximately 400 million of them were HBsAg carriers.[2] Almost one third of the carriers develop cirrhosis or hepatocellular carcinoma, which is one of the world most common cancers.[3,4] The life-time risk for a HBsAg-positive carrier dying from either cirrhosis or its complications is calculated about 50%, whereas the risk is less than 2 % in a HBsAg-negative individual. A prospective study of 22,707 men in Taiwan showed that the relative risk of primary hepatocellular carcinoma for a HBV carrier compared to non-carrier was 223.[5] Approximately 500,000 to 1million people die annually owing to HBV-related liver diseases.[6]

HBV infection is highly endemic in countries of Asia and Southeast Asia where 75 % of the carriers are located.[5,7,8] Previous studies in Thailand showed 5 -10 % of HBsAg-positive carriers,[8,9] but the trend has been decreasing during recent years.[10,11] The transmission routes for HBV includes blood transfusion, intravenous drug use, sexual contact, neonatal exposure and others.[12-14] Although, the mother-to-child transmission has been considered the most common route for HBV infection,[13,15] most of infants born from carrier mothers are preventable with hepatitis B immunoglobulin (HBIG) and HBV vaccine. In older children and adults, however, the transmission is mainly from person-to-person or horizontal transmission.[12,14,16] The spouses of chronic carriers may acquire HBV from their carrier spouses and they may spread HBV to others. The study of HBV seromarker prevalence and some epidemiological characteristics of this group are valuable for prevention and control of HBV transmission among married couples.

Materials and Methods

Study design and study population

A cross-sectional study (two-groups comparison) was carried out at four normal postpartum wards and one infectious postpartum ward, Rajvithi Hospital, a state-run hospital in Bangkok, during July to December 1998. The study involved 167 married couples (80 HBsAg-positive and 87 HBsAg-negative postpartum women and their husbands), who voluntarily participated in the study. The inclusion criteria of the subjects were: (1) no history of HBV vaccination and, (2) no history of jaundice before marriage. The sample size was calculated by the formula:$n = [Z_{\alpha}\sqrt{2\bar{p}\bar{q}} + Z_{\beta}\sqrt{p_1q_1 + p_0q_0}]^2 /(p_1-p_0)^2$. With the proportion of HBV infection rate in normal population of 51 % ($p_0 = 0.51$) and 71 % in the risk group ($p_1 = 0.71$), $\alpha = 0.05$ and $\beta = 0.1$; the calculated sample size of each group was 72.

Data collection and laboratory testing

All the subjects were interviewed using structured questionnaires which included questions regarding epidemiological characteristics (socio-demographic variables and histories of HBV exposure). Before their blood specimens were collected, the subjects had received the study information and filled out the informed consent forms. Blood specimens of studied subjects were collected for determining HBV seromarkers including HBsAg, anti-HBs, anti-HBc and HBeAg by ELISA methods (Behring Enzygnost Test Kits) with 100 % of sensitivity and 99.8 % of specificity.

Data analysis

Data from the study were expressed by using percentage and other descriptive statistics. The chi-square test or Fisher's exact test was applied for testing the significant difference of qualitative variables between 2 groups. The critical level of $\alpha = 0.05$ was used for statistical significance.

Results

Socio-demographic characteristics of studied postpartum women

Eighty HBsAg-positive postpartum women (positive group) and 87 HBsAg-negative ones (negative group) were included. The largest age groups were 20 - 25 years old (46.25 % and 42.53 %, respectively). About 50 % of both groups finished primary education, and about 5 % did not attended school. North-eastern region was the largest domicile in the studied groups (40 % and 47.13 %, respectively). Approximately 47 % in the positive group and 46 % in the negative group had family income between 5,001-10,000 Baht per month. The distribution of socio-demographic variables between 2 groups was not significantly different ($p > 0.05$), Table 1.

Table 1. Comparison of socio-demographic characteristics between 80 HBsAg-positive postpartum women and 87 HBsAg-negative ones.

Socio-demographic Characteristics		HBsAg-positive women		HBsAg-negative women		p-value from χ^2 test
		No.	%	No.	%	
Age (years):	< 20	13	16.25	14	16.09	
	20 – 25	37	46.25	37	42.53	0.2618
	26 – 30	22	27.50	18	20.69	
	>30	8	10.00	18	20.69	
	Mean ± SD	24.38 ± 4.68		24.90 ± 5.56		
Education:	Illiterate	4	5.00	4	4.60	
	Primary level	41	51.25	46	52.87	0.9943
	Secondary level	28	35.00	29	33.33	
	College/University	7	8.75	8	9.20	
Occupation:	Labourer	28	35.00	25	28.74	
	Seller/Business	11	13.75	6	6.89	0.2871
	Housewife	39	48.75	54	62.07	
	Others	2	2.50	2	2.30	
Domicile:	North	16	20.00	10	11.49	
	North-east	32	40.00	41	47.13	0.4446
	Center	28	35.00	30	34.48	
	East and South	4	5.00	6	6.90	
Family income:	≤ 5,000	6	7.50	9	10.34	
(Baht)	5,001-10,000	38	47.50	40	45.98	0.6322
	10,000-15,000	28	35.00	25	28.74	
	≥ 15,001	8	10.00	13	14.94	

Epidemiological characteristics (socio-demographic variables and histories of HBV exposure) of husbands of HBsAg-positive and HBsAg-negative postpartum women.

Socio-demographic variables of 80 husbands of HBsAg-positive and 87 husbands of HBsAg-negative postpartum women were demonstrated in Table 2. The highest age group of the positive group was 26 -30 years (31.25 %), and that of the negative group was 20 - 25 years (41.38 %). The majority of both groups had finished only primary education (60 % and 50.58 %, respectively). Labor was a common occupation in both groups (72.5 % and 78.16 %). About 44 % and 48 % of the positive and the negative groups had Northeastern domiciles. The distribution of socio-demographic variables between the two groups was not significantly different ($p > 0.05$). Moreover, some histories of HBV exposure of husbands of the two groups were compared in Table 3. The distribution of these variables between the two groups was not significantly different ($p > 0.05$).

Table 2. Comparison of socio-demographic characteristics between 80 husbands of HBsAg-positive postpartum women and 87 husbands of HBsAg-negative ones.

Socio-demographic Characteristics		HBsAg-positive women No.	%	HBsAg-negative women No.	%	p-value from χ^2 test
Age (years):	< 20	5	6.25	5	5.75	
	20 – 25	24	30.00	36	41.38	0.4499
	26 – 30	25	31.25	25	28.74	
	>30	26	32.50	21	24.13	
	Mean ± SD	27.76 ± 6.06		27.17 ± 6.03		
Education:	Illiterate	5	6.25	2	2.30	
	Primary level	48	60.00	44	50.58	0.0594
	Secondary level	13	16.25	29	33.33	
	College / University	14	17.50	12	13.79	
Occupation:	Labourer	58	72.50	68	78.16	
	Seller / Business	17	21.25	11	12.64	0.2890
	Others	5	6.25	8	9.20	
Domicile :	North	11	13.75	10	11.49	
	North-east	35	43.75	42	48.28	0.8146
	Center	28	35.00	31	35.63	
	East and South	6	7.50	4	4.60	
Family income:	≤ 5,000	6	7.50	9	10.34	
(Baht)	5,001-10,000	38	47.50	40	45.98	0.6322
	10,000-15,000	28	35.00	25	28.74	
	≥ 15,001	8	10.00	13	14.94	

Table 3. Comparison of HBV risk exposure histories between 80 husbands of HBsAg-positive postpartum women and 87 husbands of HBsAg-negative ones

HBV risk exposure Histories		Husbands of HBsAg-Positive women		Husbands of HBsAg-Negative women		p-value from χ^2 test or Fisher's exact test
		No.	%	No.	%	
History of jaundice after marriage	Yes	5	6.25	2	2.50	0.4426
	No	75	93.75	78	97.50	
History of contact with jaundiced patients	Yes	2	2.50	3	3.40	0.5397
	No	78	97.50	84	96.60	
History of blood or blood product transfusion	Yes	4	5.00	5	5.70	0.5527
	No	76	95.00	82	94.30	
Tattooing	Yes	18	22.50	17	19.50	0.7801
	No	62	77.50	70	81.50	
Injecting drug use	Yes	1	1.25	2	2.30	0.5316
	No	79	98.75	85	97.70	
Duration of marriage (years)	≤ 4	56	70.00	66	75.86	0.4975
	> 4	24	30.00	21	24.14	
History of extramarital sex relation	Yes	23	28.80	28	32.20	0.7542
	No	57	71.30	59	67.80	
History of STDs	Yes	19	23.80	19	21.30	0.9128
	No	61	76.30	68	78.20	

***Comparison of HBV seromarker prevalence between husbands of HBsAg-* positive and HBsAg-negative postpartum women**

Blood specimens of 80 husbands of HBsAg-positive postpartum women and 87 husbands of the ones with HBsAg-negative were tested for HBsAg, anti-HBs, and anti-HBc. It was found that 15 % of the positive group were HBsAg positive ; 48.75 % were anti-HBs positive; 13.75 % were only anti-HBc positive; and 77.50 % were overall HBV seromarker positive. The corresponding prevalences of the negative group were 10.34 %, 35.63 %, 3.45 % and 49.43 %, respectively (Table 4). The prevalences of HBV seromarker in husbands of HBsAg-positive postpartum women were relatively higher than those husbands of the ones with HBsAg-negative. When the prevalence of HBV seromarker in the positive group were classified by the result of HBeAg, it was found that the prevalences of HBV seromarker in husbands of HBsAg-positive and HBeAg-positive postpartum

Table 4. Comparison of HBV seromarker prevalence between husbands of HBsAg-positive and HBsAg-negative postpartum women.

HBV seromarkers of postpartum women	No.of tested	No. (%) of husbands with positive for			
		HbsAg ± Anti-HBc	Anti-HBs ± Anti-HBc	Anti-HBc only	Overall
HBsAg-positive	80	12 (15.00)	39 (48.75)	11 (13.75)	62 (77.50)[a]
HBeAg positive	43	9 (20.93)	23 (53.49	8 (18.60)	40 (93.02)[c]
HBeAg negative	37	3 (8.11)	16 (43.24)	3 (8.11)	22 (59.46)[d]
HBsAg-negative	87	9 (10.34)	31 (35.63)	3 (3.45)	43 (49.43)[b]

[a,b] Statistical significance by χ^2 test , $p < 0.001$

[c,b] Statistical significance by χ^2 test , $p < 0.001$

[d,b] No statistical significance by χ^2 test , $p > 0.05$

women were significantly higher than those in the husbands of HBsAg-positive but the ones with HBeAg-negative and those in husbands of HBsAg-negative ones, $p < 0.001$ (Table 4).

Discussion

Using ELISA for the detection of HBV seromarkers in 80 husbands of HBsAg-positive postpartum women and 87 husbands of HBsAg-negative women, showed that high prevalences of HBV infection (77.50 % of positive for one or more markers of HBsAg, anti-HBs and anti-HBc) and HBsAg (15 %) could be demonstrated in husbands of HBsAg-positive postpartum women. Moreover, 93.02 % and 20.93 % of husbands of HBsAg-and HBeAg-postive women were positive for HBV infection and HBsAg. This was significantly higher than those in husbands of the ones with HBsAg-negative (49.43 % and 10.34 %), $p < 0.001$. However, the epidemiological characteristics (socio-demographic factors and histories of HBV exposure) between the two studied groups were not significantly different ($p > 0.05$). These findings supported the theory that a high prevalence of HBV seromarkers in husbands of HBsAg-positive women should be affected by HBsAg carrier status of their wives. The HBV infection rate and HBsAg carrier rate among husbands of HBsAg-positive (especially HBeAg-positive) postpartum women were higher than those among Thai general population (estimated to be approximately 50 - 60 % positive for HBV infection and 5 -10 % positive for HBsAg.)[8] The HBV seroprevalence and HBsAg-positive rate among husbands of HBsAg-negative women (49.43 % and 10.34 %) were similar to the prevalence among Thai general Thai population. Since 1992, the Thai Ministry of Public Health has implemented a policy of immunizing all newborns against HBV infection by adding HBV vaccine into the existing Expanded Programme on Immunization (EPI Programme). Since 1992, the HBsAg carrier rate in children under 5 years of age; the infection rate fell from 5 % to only 1% in one studied province.[17] In recent years, the HBsAg carrier rate in Thai blood donors ranged from 2.5 % to 4.3 %.[10]

The high prevalence of HBV seromarkers in husbands of HBsAg-positive postpartum women, especially in HBeAg-positive together, compared with that in husbands of HBsAg-negative ones and the result of no significant difference of histories of HBV risk of exposure between the two groups indicated that sexual contact transmission should be more common than other forms of horizontal transmission among this group. HBeAg is a marker for active viral replication and infectivity. Individuals with HBeAg are therefore likely to have active disease and to be efficient transmitters of the infection.[18] These evidences were supported by the findings in this study which showed 93.02 % of HBV infection and 20.93 % of HBsAg among husbands of HBsAg and HBeAg-positive postpartum women whereas 59.46 % and 8.11 %, respectively were found in husbands of HBsAg-positive and HBeAg-negative ones, $p < 0.001$. Previous studies reported that regular sexual contacts among adults with a HBV carried were at high risk of infection and one of the risk factors of HBV infection was having two or more sexual partners.[16,19,20] A study in London showed 23 % of the attack rate of HBV infection in spouses, or sexual contacts of person with acute hepatitis B.[21]

To reduce the rate of sexual transmission of HBV, a prevention programme should be implemented. Not only a programme of HBV vaccination for pre-marriage or married couples, who have a spouse who is HBsAg positive, but also a programme to reduce sexual risk for spouses of HBV carriers and for general adult men who are sexually active. In addition the use of life skill education integrated with HIV prevention to avoid to delay premarital or extramarital sex relations should also be emphasized.

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