Journal of Clinical Infectious Disease and Practice

Sabsanong et al., J Clin Infect Dis Pract 2017, 2:1
DOI: 10.4172/2476-213X.1000120

Research Article OMICS International

Potential Missed Opportunities Related to the Systematic Screening for Hepatitis B Surface Antigen in Thailand

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Received date: September 07, 2017, **Accepted date:** September 21, 2017, **Published date:** September 28, 2017

Abstract

Background: In Thailand, hepatitis B surface antigen (*HBsAg*) testing is part of routine antenatal screening. We assessed the association between characteristics of pregnant women attending Samut Prakan Provincial Hospital antenatal care clinic (ANC) and their Hepatitis B virus (HBV) infection status.

Methods: This is a cross-sectional study of pregnant women ≥ 18 yrs presenting at the ANC between August 1st, 2013 and June 30th, 2015. Data on socio-demographics, general physical examination, obstetrical and medical history and knowledge of HBV status were collected. Comparisons were performed using the Wilcoxon-Mann-Whitney test or Fisher's exact test.

Results: A total of 115 pregnant women, 18 *HBsAg* positive and 97 negative, participated. The women had a median age of 27.1 yrs (interquartile range (IQR): 22.4 to 31.5) at a median 28.0 weeks gestational age (IQR: 26.1 to 29.7). Forty-five (39%) reported being born abroad. Sixteen (14%) did not receive primary education. The women's household contained a median of 3 persons (IQR: 2 to 4). None of these characteristics differed between *HBsAg* positive and negative women. *HBsAg* positive women were more likely to know their HBV status than *HBsAg* negative women [6 (33%)] *vs.* 12 [(12%), p=0.04] and their previous live offsprings' HBV status [9 (60%)] *vs.* 21 [(26%), p=0.01]. In contrast, they were less likely to know their partner's HBV status [3 (17%)] *vs.* 50 [(52%), p=0.009].

Conclusion: HBV chronic infection was not associated with any characteristics, which justifies systematic screening for *HBsAg* during antenatal care. The vast majority of women were not able to report their and their partner's *HBsAg* status, underlining potential missed opportunities to be followed for their hepatitis B infection.

Keywords:

HBsAg; hepatitis B; HBV; pregnancy; pregnant; screening; Thailand; Southeast Asia

Introduction

An estimated 257 million people are chronically infected with Hepatitis B virus (HBV) worldwide [1], of whom 100 million live in the World Health Organization Southeast Asia region [2]. Universal hepatitis B immunization, including a birth dose, was integrated into Thailand's National Expanded Program on Immunization (EPI) in 1992, but an estimated 7% of the adults born before 1992 are chronic carriers of hepatitis B surface antigen (*HBsAg*) [3].

Universal HB immunization has been shown very effective to prevent HBV infection in infants [4-7]. In addition, specific interventions are needed to prevent transmission in infants born to HBV infected mothers [8]. Thus, screening all pregnant women may be important. However, little is known as whether pregnant women are usually already aware of their HBV status, and whether they are informed of the HBV status of their relatives, which may have important implications for prevention in the family and eventually for treatment.

We investigated the knowledge of *HBsAg* status and compared characteristics according to *HBsAg* status in pregnant women attending the antenatal care clinic (ANC) of Samut Prakan Provincial Hospital, a typical provincial hospital in Thailand.

Methods

Study population and design

This is a cross-sectional study of *HBsAg* positive and negative pregnant women aged 18 yrs or more who presented at the ANC of Samut Prakan Provincial Hospital during the course of their pregnancy. All *HBsAg* positive pregnant women screened for *HBsAg*

between August 1st, 2013 and June 30th, 2015 as part of a clinical trial and all *HBsAg* negative pregnant women screened for *HBsAg* between February 1st, 2015 and April 30th, 2015 were eligible to participate in this study.

A nurse collected socio-demographics characteristics of the women and their partner (age, place of birth, education level, number of persons in household, monthly income) using a questionnaire which was completed within about 15 min. The nurse then recorded obstetrical and medical history and the results of an obstetrical and general physical examination. In addition, the women were asked whether they knew their own *HBsAg* infection status as well as that of their partner and children.

Laboratory measurements

HBsAg was detected in venous blood by an electrochemiluminescence immunoassay (Elecsys *HBsAg* II assay, Roche Diagnostics).

Statistical analysis

Characteristics are presented as medians and interquartile ranges (IQRs) for continuous and ordinal variables, and as counts and percentages for categorical variables. Characteristics were compared between *HBsAg* positive and negative pregnant women using the Wilcoxon-Mann-Whitney test for continuous and ordinal variables and Fisher's exact test for categorical variables. For characteristics significantly different according to *HBsAg* status, relative risks (RR) and their corresponding 95% confidence intervals (CI) were calculated.

Ethical considerations

All women participating in this study provided verbal informed consent before participation in this study. The study received ethical clearance from the relevant authorities of Samut Prakan Provincial Hospital.

Results

A total of 115 women, 18 (16%) *HBsAg* positive and 97 (84%) *HBsAg* negative, participated in the study.

Socio-demographics

Women's median age (27.1 yrs) was in the expected range in Thailand, and women had a median gestational age (GA) of 28.0 weeks. The first ANC visit took place at a median GA of 12.4 weeks. Sixteen women (14%) did not receive primary education at all and only 39 (34%) attended high school. Women's household had a median of 3 persons and the median monthly household income was 15,000 Baht, i.e. about 400 US dollars. None of these characteristics were significantly different between *HBsAg* positive and negative women (Table 1).

Characteristics	*HBsAg* positive (n=18) n (%) or median (IQR)	*HBsAg* negative (n=97) n (%) or median (IQR)	p1
Socio-demographics			
Woman's age, in yrs	24.4 (22.8 to 29.0)	27.2 (22.4 to 32.5)	0.31
Partner's age, in yrs	29.5 (25.0 to 32.0)	29.1 (24.2 to 34.7)	0.81
Age difference, in yrs	2.7 (-0.3 to 7.2)	1.3 (-0.4 to 3.7)	0.22
Woman's province of birth			0.83
Samut Prakan	2 (11)	13 (13)	
Other province in Thailand	10 (56)	45 (46)	
Outside Thailand	6 (33)	39 (40)	
Partner's province of birth (n=114)			0.6
Samut Prakan	5 (28)	20 (21)	
Other province in Thailand	9 (50)	43 (45)	
Outside Thailand	4 (22)	33 (34)	
Difference in province of birth (n=114)			0.48
Both from Samut Prakan	1 (6)	11 (11)	
From different provinces	13 (72)	52 (54)	
Both from outside Thailand	4 (22)	33 (34)	
Woman's highest education level (n=114)			0.64
Lower than primary school	1 (6)	15 (15)	
Primary school	6 (33)	21 (22)	
Secondary school	5 (28)	28 (29)	
High school or higher	6 (33)	33 (34)	
Partner's highest education level (n=113)			0.59
Lower than primary school	2 (12)	14 (15)	
Primary school	4 (24)	18 (19)	
Secondary school	2 (12)	25 (26)	
High school or higher	9 (53)	39 (41)	
Difference in highest education level (n=113)			0.89
Primary school or lower for both	5 (29)	26 (27)	
Different education levels	7 (41)	44 (46)	
High school or higher for both	5 (29)	26 (27)	
Number of persons in the woman's household	3 (2 to 4)	3 (2 to 5)	0.94
Monthly income of the woman's household, in Baht	16000 (10,000 to 20,000)	15000 (9,000 to 20,000)	0.14
General physical examination			

Height, in cm	160 (154 to 165)	156 (152 to 160)	0.12
Weight before pregnancy, in kg (n=114)	52 (48 to 58)	53 (48 to 58)	0.69
Weight, in kg	60 (51 to 72)	62 (55 to 67)	0.69
BMI before pregnancy, in kg/m2 (n=114)	20.3 (19.5 to 22.5)	21.9 (19.5 to 24.1)	0.16
BMI, in kg/m2	23.9 (21.7 to 25.7)	25.2 (22.5 to 27.9)	0.12
Systolic blood pressure, in mmHg	110 (104 to 117)	109 (102 to 117)	0.73
Diastolic blood pressure, in mmHg	72 (64 to 75)	71 (67 to 78)	0.57
Heart rate, in beats per minute	97 (91 to 106)	94 (87 to 105)	0.45
Obstetrical and medical history			
Number of pregnancies in the past			0.9
0	7 (39)	36 (37)	
1	7 (39)	34 (35)	
≥2	4 (22)	27 (28)	
Year of past pregnancies	2008 (2004 to 2011)	2008 (2006 to 2010)	0.77
Death of previous live offsprings (n=97 live offsprings)			1
Yes	0 (0)	2 (2)	
No	15 (100)	80 (98)	
History of significant illness/ condition			1
Yes	0 (0)	0 (0)	
No	18 (100)	97 (100)	
History of allergy			0.16
Yes	1 (6)	0 (0)	
No	17 (94)	97 (100)	
Pregnancy while using contraception			0.17
Yes	2 (11)	3 (3)	
No	16 (89)	94 (97)	
Regularity of menstrual periods			0.71
Yes	15 (83)	84 (87)	
No	3 (17)	13 (13)	
Knowledge of *HBsAg* status			
Woman's *HBsAg* status before pregnancy			0.04
Known	6 (33)	12 (12)	
Unknown	12 (67)	85 (88)	
Partner's *HBsAg* status			0.009
Known	3 (17)	50 (52)	
Unknown	15 (83)	47 (48)	
Partner's *HBsAg* status, if known (n=53)			0.11
Positive	1 (33)	1 (2)	
Negative	2 (67)	49 (98)	
Previous live offsprings' *HBsAg* status (n=97 live offsprings)			0.01
Known	9 (60)	21 (26)	
Unknown	6 (40)	61 (74)	
HBsAg status of previous live offsprings, if known (n=30 live offsprings)			0.52
Positive	1 (11)	1(5)	
Negative	8 (89)	20 (95)	
1 from Wilcoxon-Mann-Whitney test for ordinal and continuous variables and Fisher's exact test for categorical variables.			

Table 1: Characteristics of pregnant women according to hepatitis B surface antigen status. Abbreviations: *HBsAg*, Hepatitis B Surface Antigen; IQR, Interquartile Range.

General physical examination

The median weight was 61 kg (before pregnancy: 53 kg), median height 157 cm, median BMI 25.0 kg/m2, median systolic blood pressure 109 mmHg, median diastolic blood pressure 72 mmHg (no women with a systolic blood pressure>140 mmHg and 2 with a diastolic blood pressure>90 mmHg) and median heart rate 95 beats per minute. No differences in weight, height, BMI, blood pressure and heart rate were found between the two groups.

Obstetrical and medical history

Seventy-two women (63%) had a total of 117 previous pregnancies, including 31 with two or more pregnancies. The 117 past pregnancies resulted in 97 live offsprings, among whom 2 (2%) died later on. None of the 115 women reported a history of significant illness/condition. One woman reported a history of allergy.

Five (4%) women became pregnant despite using contraception. Sixteen (14%) had irregular menstrual periods. There were no differences between the two groups.

Knowledge of *HBsAg* status

HBsAg positive women were more likely to know their *HBsAg* status before pregnancy than *HBsAg* negative women [6 (33%) *vs.* 12

(12%), p=0.04], with a RR of 2.7 (95% CI: 1.2 to 6.2), as well as their previous live offsprings' *HBsAg* status [9 (60%)] *vs.* 21 [(26%), p=0.01], with a RR of 2.3 (1.3 to 4.1). However, *HBsAg* positive women were less likely to know their partner's *HBsAg* status [3 (17%) *vs.* 50 (52%), p=0.009], with a RR of 0.3 (0.1 to 0.9).

Discussion

The study showed that the vast majority of women, including those who must have been tested during their previous pregnancy, were not able to report their *HBsAg* status, with only a slightly higher proportion of *HBsAg* positive women knowing their status. Similarly, the vast majority of women reported that they do not know their partner's status. This is concerning for a disease that is associated with severe complications in more than 25% of infected individuals. It seems that the opportunity to inform these women and their partner of the need to be followed for HBV infection is missed, which may weaken the public health impact of systematic *HBsAg* screening. Beyond the usefulness of testing mothers in the context of prevention of HBV perinatal transmission, this screening could be an entry point for monitoring and treatment. To our knowledge, studies looking at the effectiveness or cost-effectiveness of systematic *HBsAg* screening during pregnancy have not been conducted.

The study population living in this highly industrialized province included a high proportion of intra-country and international migrants with a low average education level. However, none of these characteristics were different between the two groups as well as GA at first ANC visit and household income, justifying systematic testing of all pregnant women.

Testing partners systematically for *HBsAg*, especially when a woman is infected, could increase the impact of Thailand's screening program. Although most pregnant women and their partner are still young and unlikely to experience immediate complications of HBV, systematic HBV testing and counseling for both would be a good potential entry point for further follow-up of HBV infection.

Although the systematic *HBsAg* screening in pregnant women is very well established in Thailand, its public health impact may be limited because the information and counseling provided to *HBsAg* positive women is insufficient and does not prompt for appropriate follow up. This may be due to healthcare workers' concerns about the impact of the information provided on the long term evolution of HBV. Of note, there is no national guideline for HBV testing and counseling.

A strength of our study was to examine the pregnant women's knowledge of their *HBsAg* status. A limitation was that our population was not representative of the overall population of pregnant women in Thailand, although practices in this hospital are probably representative of hospitals in Thailand. Also, the proportion of *HBsAg* positive women participating in this study was greater than that of *HBsAg* negative women because the interest for the study was higher in those infected. For this reason, we did not estimate the prevalence in pregnant women but we believe that this had no consequences when comparing the two populations. Another limitation is that this study did not assess pregnancy outcomes. Finally, the low number of *HBsAg* positive women did not allow to perform multivariable analyses.

Conclusion

The vast majority of women were not able to report their and their partner's *HBsAg* status. At a time when the World Health Organization and Member States have agreed to address more consistently and more broadly HBV infection and its complications [9], opportunities to contribute to the prevention of HBV complications may be missed. While antenatal care may not be an appropriate time for the evaluation of disease progression, women and their relatives could be referred during the postpartum period for appropriate evaluation and care, as this is the case for the screening of cervical cancer. This would probably require more training on HBV management to antenatal care nurses.

Acknowledgments

We thank all the women who participated in this study.

We also express our gratitude to Sampan Komrit, Director of Samut Prakan Provincial Hospital; and Akrit Boonsanguan, Head of the Obstetrics and Gynecology Department.

The following persons at the study coordination center contributed to this study: Angkana Seubmongkolchai; Anon Khanpanya; Boonyavee Ratchanee; Kunnatee Saopang; Luc Decker; Marin Inta; Paporn Mongkolwat; Sanuphong Chailoet; Satidapron Kreawsa; Siranee Suebmongkolchai; and Suriyan Tanasri.

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