

Original Article

## Seroprevalence of hepatitis B surface antigen and associated risk factors among pregnant women

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### Abstract

**Introduction:** Hepatitis B infection is a serious global public health problem. The aim of the study was to assess the seroprevalence of hepatitis B surface antigen (HBsAg), as well as the risk factors associated with hepatitis B virus (HBV) infection among pregnant women attending antenatal care clinics of the University Hospital in Antioch, Turkey.

**Methodology:** This descriptive cross-sectional study was carried out between May 2016 and December 2016. The Chi-squared was utilized to estimate the statistical significance of the association between socio-demographic variables and HBsAg status. The results were generated as proportions odds ratio (OR) with their 95% confidence intervals (CI) and calculated by using both univariate and multivariate logistic regression analysis.

**Results:** The seroprevalence of HBsAg was found to be 2.1%. A significant association was observed between age and HBsAg seropositivity ( $p = 0.027$ ). History of blood transfusion (AOR = 9.51, 95% CI = 1.92-46.80,  $p = 0.006$ ), history of hepatitis (AOR = 11.13, 95% CI = 2.02-61.28,  $p = 0.006$ ), tattooing (AOR = 13.64, 95% CI = 2.52-73.76,  $p = 0.002$ ) and a history of household/close contact (AOR = 11.10, 95% CI = 1.56-78.65,  $p = 0.016$ ) were significantly associated with the risk of HBV infection.

**Conclusions:** Data regarding the seroprevalence of HBsAg and risk factors associated with HBV infection in pregnant women plays a crucial role in evaluating the effectiveness of the public health protection policies and the strategies to control the disease.

**Key words:** hepatitis B virus; pregnant women; risk factor.

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### Introduction

Infection with hepatitis B virus (HBV) is one of the world's serious public health problems [1,2]. HBV is an enveloped DNA virus classified within the family *Hepadnaviridae* [3] which infects the liver and causes hepatocellular necrosis and liver inflammation [4]. HBV infection is just about 100 times more contagious than HIV [5,6] and comes as the ninth cause of death on the global scale [7]. Around 240 million people are estimated to be chronically infected with HBV and overall, about 650,000 deaths occur annually from the complications of chronic hepatitis B, worldwide [4].

HBV can be transmitted by transfusion of blood, infected blood and blood products, urine, semen, sweat, saliva, tears, breast milk, vaginal secretions and pathological effusions [8,9]. The virus can be transmitted perinatally from HBV-infected mother to the newborn [9]. Perinatal transmission is the most common mode of HBV infection transmission [10] and

responsible for approximately one third of chronic HBV infections [11]. Pregnant women who are positive for HBsAg have nearly 10-40% risk of transmitting HBV infection to their infants. If pregnant women are seropositive in terms of both HBsAg and HBeAg, the ratio of the risk transmitting infection increases to 70-90% to their neonates [12,13]. Perinatal transmission of HBV many times causes to serious long-term sequelae [14].

The prevalence of HBV infection and routes of transmission vary in different parts of the world. The World Health Organisation (WHO) has classified HBV prevalence into three patterns: high endemicity (>8%), intermediate (2-7%) and low endemicity (<2%) [15]. The aim of the present study was to assess the prevalence of HBV infection and risk factors associated with hepatitis B virus (HBV) infection among pregnant women attending antenatal care.

## Methodology

This cross-sectional study was carried out in antenatal clinics of the University Hospital in Antioch between May 2016 and December 2016. After obtaining informed consent from a total of 475 pregnant women, socio-demographic characteristics and data on possible risk factors for HBV infection were collected through an interview with participants using a structured questionnaire which included some information of the participants like socio-demographic characteristics and the possible risk factors (age, level of education, residential location, occupation, income, parity status, gestational age, ever been operated upon, abortion, dental extraction, blood transfusion, history of hepatitis, tattooing and history of household/close contact) for HBV infection in the present study.

The presence of hepatitis B surface antigens (HBsAg) in serum was detected using Chemiluminescent Immunoassay (CHIMA) technology according to the manufacturer's instructions (ARCHITECT HBsAg Qualitative II, Abbott, Sligo, Ireland).

### Data analysis

The data were coded, entered and analyzed using SPSS version 21.0. The mean and proportion of socio-demographic characteristics and data on possible risk factors were estimated for the HBsAg seropositive

individuals. The Chi-squared test was used to determine the association between HBsAg seropositivity and socio-demographic characteristics. Univariate and multivariate logistic regression analyses were performed using seropositivity for HBsAg. All of the variables having with  $p$ -value  $\leq 0.25$  in the univariate analysis were calculated by multivariate logistic regression analysis. Results were presented as proportions odds ratio (OR) with their 95% confidence intervals (CI). While socio-demographic characteristics and possible risk factors were taken as independent variables, the HBsAg seropositivity was taken as dependent variable. Results were evaluated as statistically significant at  $p$  value  $< 0.05$ .

### Ethic considerations

Ethics approval was obtained from the Ethics Committee of the Medical School of Mustafa Kemal University (2015/80), Antioch, Turkey.

## Results

The mean age of the total study group (475 pregnant women) was 27.11 (SD  $\pm$  5.57) years which were between 16 and 45. The socio-demographic characteristics of the participants, regarding age, education level, residence, income, occupation parity status and gestational age are shown in Table 1.

**Table 1.** Socio-demographic characteristics of the pregnant women study participants.

Characteristics	Number (n = 475)	Percent (%)
Age group (years)	16-25	204
	26-35	234
	36-45	37
Education level	Illiterate	123
	Primary school	110
	Secondary school	120
	High school	122
Residential location	Village	118
	Country town	176
	City center	181
Occupation	Housewife	353
	Civil servant	39
	Self - employment	29
	Health professional	20
	Student	34
Income	Low income	114
	Middle income	195
	High income	166
Parity status	Primigravidas	207
	Multigravidas	268
Gestational age	First trimester	152
	Second trimester	171
	Third trimester	152

**Table 2.** The association between seroprevalence of HBsAg and socio- demographic variables of pregnant women study participants.

Variables	HBsAg negative		HBsAg positive		Chi-squared	p-value	
	(n)	(%)	(n)	(%)			
Age group (years)	16-25	200	98.0	4	2.0	7.25	0.027
	26-35	231	98.7	3	1.3		
	36-45	34	91.9	3	8.1		
Education level	Illiterate	122	99.2	1	0.8	5.24	0.155
	Primary school	105	95.5	5	4.5		
	Secondary school	117	97.5	3	2.5		
	High school	121	99.2	1	0.8		
Residential location	Village	116	98.3	2	1.7	2.42	0.297
	Country town	170	96.6	6	3.4		
	City center	179	98.9	2	1.1		
Occupation	Housewife	346	98.0	7	2.0	4.64	0.326
	Civil servant	39	100	0	0.0		
	Self - employment	27	93.1	2	6.9		
	Health professional	20	100	0	0.0		
	Student	33	97.1	1	2.9		
Income	Low income	109	95.6	5	4.4	3.83	0.147
	Middle income	192	98.5	3	1.5		
	High income	164	98.8	2	1.2		
Gestational	First trimester	149	98.0	3	2.0		
Age	Second trimester	167	97.7	4	2.3	0.07	0.965
	Third trimester	149	98.0	3	2.0		

**Table 3.** Crude and adjusted correlates of HBsAg among the pregnant women study participants.

Variable	Univariate analysis			Multivariate analysis		
	COR	95% CI	p value	AOR	95% CI	p value
<b>Ever been operated upon</b>						
No	1					
Yes	2.07	0.42-10.04	0.364			
<b>Abortion</b>						
No	1					
Yes	1.96	0.54-7.06	0.304			
<b>Dental extraction</b>						
No	1					
Yes	2.81	0.81-9.87	0.107	1.16	0.26-5.08	0.838
<b>Blood transfusion</b>						
No	1					
Yes	11.29	2.68-47.51	0.001	9.51	1.92-46.80	0.006
<b>History of hepatitis</b>						
No	1					
Yes	14.90	3.45-64.20	< 0.0001	11.13	2.02-61.28	0.006
<b>Tattooing</b>						
No	1					
Yes	10.06	2.41-41.96	0.002	13.64	2.52-73.76	0.002
<b>History of house hold/ close contact</b>						
No	1					
Yes	10.31	1.96-54.31	0.006	11.10	1.56-78.65	0.016

The sero-positivity of HBsAg was detected in 10 (2.1%) among the 475 pregnant women enrolled in the present study. The highest prevalence of HBsAg ratio (8.1%) was found in the age category of 36-46 years. The results showed that age categories were significantly associated with HBsAg seropositivity ( $p = 0.027$ ). Regarding the gestation age, the prevalence of HBsAg was 2% in both the first trimester and the third trimester. In the second trimester, this ratio was 2.3% in our study. On the other hand, the prevalence of HBsAg and gestation age, showed no statistical significance. The statistical significance of association between socio-demographic variables and HBsAg status was estimated via Chi-squared test (Table 2).

Firstly, univariate analysis was conducted to find the relationship between HBV infection and risk factors in the present study. History of blood transfusion (COR = 11.29, 95% CI = 2.68-47.51,  $p = 0.001$ ), history of hepatitis (COR = 14.90, 95% CI = 3.45-64.20,  $p < 0.0001$ ), tattooing (COR = 10.06, 95% CI = 2.41-41.96,  $p = 0.002$ ) and history of household/close contact (COR = 10.31, 95% CI = 1.96-54.31,  $p = 0.006$ ) were found statistically significant for HBV infection. The other risk factors (ever been operated, abortion, dental extraction) were not significantly associated with HBV infection in our study. In the present study, participants having history of blood transfusion were 11.29 times more likely to develop HBV infection than (COR = 11.29, 95% CI = 2.68-47.51) those who did not have history of blood transfusion. Similarly, participants who had history of tattooing were 10.06 times more likely to develop HBV infection than (COR = 10.06, 95% CI = 2.41-41.96) their counterparts. Participants having history of household/close contact were 10.31 times more likely to have HBV infection (COR = 10.31, 95% CI = 1.96-54.31) than those had no history of household/close contact. Having history of hepatitis were 14.90 times more likely to develop HBV infection (COR = 14.90, 95% CI = 3.45-64.20) than their counterparts.

The results of the variables of  $p$ -value  $\leq 0.25$  in univariate analysis were analysed in multivariate analysis. According to multivariate analysis, risk factors for history of blood transfusion (AOR = 9.51, 95% CI = 1.92-46.80,  $p = 0.006$ ), history of hepatitis (AOR = 11.13, 95% CI = 2.02-61.28,  $p = 0.006$ ), tattooing (AOR = 13.64, 95% CI = 2.52-73.76,  $p = 0.002$ ) and history of household/close contact (AOR = 11.10, 95% CI = 1.56-78.65,  $p = 0.016$ ) were also recorded statistically significant for HBV infection in participants. Crude and adjusted correlates of HBsAg

among the pregnant women study participants are presented in Table 3.

## Discussion

In the present study, we investigated the seroprevalence of HBsAg and potential risk factors associated with HBV infection among pregnant women living at Antioch in Southern Turkey. The study shows that the seroprevalence of HBsAg among pregnant women was 2.1% in our study. According to the classification of the WHO, the seroprevalence of HBsAg among pregnant women in this study could be classified as moderate endemicity (2-7%) [16].

The prevalence of HBsAg in our study is alike in the studies reported in Libya 1.5%, in Algeria 1.6% [17], in Mexico 1.65% [18], in Amritsar (India) 1.19% [19], in Isfahan (Iran) (1.56%) [20] and in Bulgaria 2.26% [21]. However, the prevalence of HBsAg in the present study is higher than the studies reported in Lorestan West of Iran (0.7%) [22], in India (0.9%) [23], in Punjab (Northern India) (1.1%) [24], and in Peshawar, Pakistan (1.16%) [25]. On the other hand, higher prevalence rates were reported in Bahir Dar (Northwest of Ethiopia) (3.8%) [26], in Mayotte Indian Ocean (France) (3.4%) [27], in Southwestern Nigeria (7.1%) [28], in Cameroon (9.7%) [29], in Eastern Ethiopia (6.9%) [30], in Southern Ethiopia (7.8%) [31], in Bahir Dar (Northwest Ethiopia) once again (4.4%) [32], and in Sana'a Yemen (10.8%) [33]. These discrepancies in ratio of prevalence may be attributed to geographical variations, varieties in socio-cultural practices, sexual behavioral, medical exposure, differences in the diagnostic test methods.

Participant age was significantly associated with HBsAg seropositivity ( $p = 0.027$ ). Likewise, Lao *et al.* [34] have reported a positive correlation between age and prevalence ( $p = 0.006$ ) in Hong Kong. While a significant association was recorded between age and HBsAg seropositivity in the some studies [18,34], in the others [26,29,31,33,35-37] no significant difference have reported between age and HBsAg seropositivity. In the present study, the highest seroprevalence of HBsAg was among the age group 36-45 years. Similar results were obtained in Southwestern Nigeria [28] and Northwest Ethiopia [32]. Opayele *et al.* [28] and Molla *et al.* [32] found the highest age range as the age group 40-44 in Nigeria and Bahir Dar (Ethiopia) respectively. Desalegn *et al.* [35] found 30-35 years as the highest age range in Addis Ababa (Ethiopia).

In the present study, educational status, residential location, income, occupations of participants and period

of gestation were not significantly associated with the risk of HBV infection.

In this study according to multivariate analysis, history of blood transfusion, history of hepatitis, tattooing and history of household contact were statistically associated with HBV infection among pregnant women. We reported that pregnant women who had history of blood transfusion were 9.51 (AOR = 9.51, 95% CI = 1.92-46.80) times more likely to be under risk of HBV infection ( $p = 0.006$ ). This might be due to the insufficient infection prevention strategies, hence, blood transfusion safety should be improved. Similar findings were reported in Bahir Dar city, Northwest Ethiopia (AOR = 3.70, about 3.70 times increased risk of HBV) [26] and in Far North Region of Cameroon (AOR 12.59,  $p = 0.021$ ) [38].

Pregnant women who had history of hepatitis were also 11.13 times more likely to be under risk of HBV infection (AOR = 11.13, 95% CI = 2.02-61.28) than their counterparts. Likewise, El-Karakasy *et al.* [36] found similar results; meaning (OR = 3.89,  $p < 0.05$ ), as well. Pregnant women who had tattooing were 13.64 (AOR = 13.64, 95% CI = 2.52-73.76) times more likely to have HBV infection ( $p = 0.002$ ) than their counterparts. This finding correlates with that obtained from Bahir Dar, Ethiopia (AOR = 5.74, 5.7 times increased risk of HBV) [26]; and in Addis Ababa, Ethiopia ( $p = 0.033$ , AOR = 7.7 times increased risk HBsAg positivity) [35]. Moreover, pregnant women who had history of household/close contact were 11.10 (AOR = 11.10, 95% CI = 1.56-78.65) times more likely to develop HBV infection ( $p = 0.016$ ). This finding of the study was supported by a study conducted in Northwest Ethiopia (AOR = 5.475, 5.45 times increased risk of HBV,  $p = 0.011$ ) [32]. This might be due to sharing personal items between those who had history of HBV at home.

## Conclusions

In the present study, prevalence of HBV infection among pregnant women were found 2.1%. Turkey is an intermediate endemic country (2-8%) in terms of HBV infection [15,39]. Risk factors such as history of blood transfusion, history of hepatitis, tattooing and history of household/close contact were significantly associated with HBV infection among pregnant women. The limitation of the study is excluding the markers such as anti-HBs and anti-HBc, anti-HBe antibodies and HBV viral load. Moreover, it is also a cross-sectional study giving a limited range of data. In the future, such studies should be carried out by using other serological markers, molecular tests, larger samples, control group

of non-pregnant women, and community-based not hospital-based in the area studied. It could be advised that well-designed health education programs on the routes of transmission of the HBV and increasing individual and public awareness may reduce the risk of HBV infection.

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