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Original Article

Prevalence of Hepatitis B Virus among Pregnant Women Attending Antenatal Care in Alexandria

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Abstract

Background & Hepatitis B infection is a very serious public health problem. Perinatal vertical transmission is a common mode of transmission. Infants infected from their mothers will have a very high risk of developing chronic liver disease.

Objective(s): To determine the prevalence of hepatitis B virus (HBV) infection and associated risk factors among pregnant females in Alexandria.

Methods: A cross sectional study was conducted on 354 pregnant females attending the antenatal care clinics of two gynecology and obstetrics governmental hospitals (with high attendees) in Alexandria. This study was carried out from May 2016 through February 2017. A predesigned questionnaire was used to collect sociodemographic characteristics and possible risk factors. All pregnant women were screened for hepatitis B surface antigen (HBsAg). Samples positive for HBsAg were subjected to hepatitis B e antigen (HBeAg); both were carried out via enzyme linked immunosorbent assay (ELISA).

Results: The prevalence of HBsAg was 3.39% (12/354) among studied pregnant females. All HBsAg positive subjects were HBeAg negative. There was no significant statistical association between HBsAg positivity and age, gestational age, history of blood transfusion, previous operation or contact with viral hepatitis infected patients.

Conclusion: The prevalence of HBV infection among pregnant women in this study setting is intermediate (3.39%) according to the WHO criteria. HBsAg positivity was not significantly associated with the sociodemographic variables or the studied risk factors. Increasing awareness of HBV transmission and regular screening of pregnant women for HBsAg are recommended.

Keywords: HBV, HBsAg, risk factors, pregnant women, antenatal care

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INTRODUCTION

Hepatitis B is a potential life threatening hepatic infection caused by hepatitis B virus (HBV). About one third of the world's population (about 2 billion people) showed a current or past HBV infection. According to the Centers for Disease Control and Prevention (CDC), there are about 257 million chronic HBV infections worldwide. Every year up to 700,000 of HBV carriers die due to complications including liver cirrhosis and hepatocellular carcinoma.(1)

Hepatitis B surface antigen (HBsAg) detection serves as a marker for active HBV infection and infectivity. It is the main marker indicating prevalence as well as endemicity of HBV infection in the general population of a particular geographical area. (2) On the basis of the carrier rate of this marker, the world health organization (WHO) categorized countries of the world into 3 regions of high (>8 %), medium (2–7 %) and low endemicity (<2%).(3) Egypt belongs to intermediate endemicity areas where HBV prevalence is about 4.0 %.(4)

Hepatitis B is transmitted via blood, and some other body fluids such as semen and vaginal fluids through sexual contact; percutaneous and permucosal exposure; sharing drug-injection equipment such as syringes or needles; or from mother to her infant (perinatal transmission). The age of first exposure to HBV plays a very important role in the evolution of infection. Children born to mothers with active hepatitis B are at high risk of infection at birth or during early childhood and of becoming chronic carriers.(5) A rate of maternofetal transmission of 51.8% was reported among HBsAg-positive women in Egypt. (6) High maternal viral load and maternal serum hepatitis B e antigen (HBeAg) positivity

increase the risk for perinatal transmission.[7] The risk of acquiring HBV was reduced by 90% when infants born to mothers known to carry HBV were given hepatitis B immunoglobulin and the first dose of HBV vaccine within 12–24 hours of birth.[8] Therefore, prevention of mother-to-child transmission requires screening for HBsAg in pregnant females.[9]

The aim of this study was to determine the prevalence of HBV infection among pregnant females in Alexandria through detection of HBsAg in their blood and to determine the rate of infectivity according to the state of HBeAg among those positive for HBsAg.

METHODS

This cross sectional study was carried out from May 2016 through February 2017. It was conducted on pregnant females attending the antenatal care clinics of two gynecology and obstetrics governmental hospitals (with high attendees) in Alexandria.

Using GPower program (version 3.1.9.2)[10], a sample size of 318 pregnant females was the required sample to detect a prevalence of 12.5%[11] of the primary outcome (prevalence of hepatitis B among pregnant women), at a confidence level of 90%, degree of precision 3%.[12] This was increased to 354. Consecutive sampling was adopted till reaching the required sample size.

Centrifugation was performed at 5000 rpm to separate the serum. Sera were stored at -20ºC until used for detection of HBsAg by enzyme linked immunosorbent assay (ELISA) (HBsAg test kit, Ref Z00360, Dialab, Austria). [13] Positive samples for HBsAg were subjected to HBeAg ELISA testing. (HBeAg test kit, LS-F10247, LifeSpan BioSciences, Inc., North America). All laboratory work was carried out at the Microbiology Laboratory at HIPH.

Statistical analysis

Data were collected and entered to the computer using SPSS (Statistical Package for Social Science) program for statistical analysis (version 21). [14] Categorical variables were described using frequency and percentage. Chi-square test was used to test association between qualitative variables. Monte Carlo and Yate's (continuity) correction were carried out when indicated. An alpha level was set to 5% with a significance level of 95%, and a beta error accepted up to 20% with a power of study of 80%. [15]

Ethical considerations

The study was approved by the Ethics committee of High Institute of Public Health (HIPH) as well as by the Ethics committee of the Ministry of Health and Population. After obtaining an informed consent from each pregnant woman, a pre-designed questionnaire sheet was completed for each participant including an inquiry about personal data, medical history and obstetric history and five ml of blood were drawn from all selected pregnant women. We informed their obstetricians with the results to carry out the appropriate measures.

RESULTS

Seroprevalence of HBsAg and socio-demographic criteria

Twelve out of the 354 screened pregnant women were positive for HBsAg giving the overall prevalence rate of 3.39%; all of whom were negative for HBeAg. The age of the studied subjects ranged from 16-47 years with a mean age of 27.64 years and a standard deviation of ±5.388 years. Out of the 228 females within age category under 30 years, only 7 patients (3.07%) were HBsAg positive. Similarly, within the age category ≥ 30 years, only 5 patients (3.97%) were positive for this marker. It was shown also that out of the 140 urban resident patients, 2.14% were HBsAg positive, while among the 214 rural dwellers, 4.21% were HBsAg positive. These results were not statistically significant (Table 1). **Associated factors of HBV infection**

In table 2, out of the 28 pregnant women who had history of blood transfusion, only one patient (3.57%) was HBsAg positive while 8 females (4.32%) of those having history of previous operations were HBsAg positive. Ten patients (3.83%) within the 261 pregnant women in the third trimester were HBsAg positive. Only one patient (3.32%) had a contact with hepatic viral infection. These results were not statistically significant.

Table 1: HBsAg among pregnant women in relation to socio-demographic data

	HBsAg (n=354)			Test of significance *p* value
	Negative (n=342) n (%)	Positive (n=12) n (%)	Total (n=354) n (%)	
Age				
<30 years	221 (96.93)	7 (3.07)	228 (100.00)	$\chi^2_{(Y)}$=0.020
≥30years	121 (96.03)	5 (3.97)	126 (100.00)	*p*=0.888
Residence				
Urban	137 (97.86)	3 (2.14)	140 (100.00)	$\chi^2_{(Y)}$=0.560
Rural	205 (95.79)	9 (4.21)	214 (100.00)	*p*=0.454

χ^2: Pearson Chi-Square test
Y: Continuity (Yates) correction for Pearson Chi-Square test and its p value

Table 2: HBsAg among pregnant women in relation to history of blood transfusion, previous operations, gestational age and contact with hepatic viral infection

	HBsAg (n=354)			Test of significance p value
	Negative (n=342) No. (%)	Positive (n=12) No. (%)	Total (n=354) No. (%)	
Blood transfusion				
No	315 (96.63)	11 (3.37)	326 (100.00)	$X^2_{(Y)}$= 0.000
Yes	27 (96.43)	1 (3.57)	28 (100.00)	*p*=1.000
Previous operation				
No	165 (97.63)	4 (2.37)	169 (100.00)	$X^2_{(Y)}$=1.033
Yes	177 (95.68)	8 (4.32)	185 (100.00)	*p*=0.309
Gestational age				
First trimester	18 (94.74)	1 (5.26)	19 (100.00)	X^2 =1.298
Second trimester	73 (98.65)	1 (1.35)	74 (100.00)	$p_{(MC)}$=0.454
Third trimester	251 (96.17)	10 (3.83)	261 (100.00)	
Contact with hepatic viral infection				
No	312 (96.59)	11 (3.41)	323 (100.00)	$X^2_{(Y)}$=0.000
Yes	30 (96.77)	1 (3.23)	31 (100.00)	*p*=1.000

χ^2: Pearson Chi-Square test
Y: Continuity (Yates) correction for Pearson Chi-Square test and its *p* value
MC: Monte Carlo corrected p value of Pearson Chi-Square test

DISCUSSION

In this study, the prevalence rate of HBsAg among pregnant women in Alexandria Governorate was 3.39%. This sero-prevalence rate categorizes this study setting as intermediately endemic for HBV according to WHO classification.[16] A similar study carried out in Assiut, Egypt showed that the seroprevalence of HBsAg was 4.8%. [17] In 2015, a study conducted in one urban and 3 rural areas in Nile Delta found HBsAg in 1.2% of the study population.[18] In 2017, a study carried out in Benha University Hospital reported 1.56% HBsAg seropositivity.[19] However, more recently Elkhateeb and Hassan (2018) found a much lower HBsAg seroprevalence of 0.364% in their study done in Minia Governorate.[20]This difference may be explained by different sample sizes and sociodemographic characteristics of the studied females.

The seroprevalence of HBsAg in this study is similar to the 3.4% reported in a study from Amahara Northeast Ethiopia.[21] This finding is also in line with results of previous studies in different parts of Ethiopia with a prevalence rate ranging from 3.5% to 3.8%.[22-24]

Furthermore, the present result is in agreement with the findings of similar studies from two Asian countries, Saudi Arabia (4.1 %)[25] and Pakistan (4.6 %).[26] However, higher HBsAg prevalence rates ranging from 5.6 to 10.2 % were reported among similar antenatal clinic attendees in Sudan[27], Kano, Nigeria[28] , and in Far North Region of Cameroon.[29] A much higher prevalence rate was reported in upper Dolpa, Nepal (17%).[30]

In contrast to this study, other studies depicted lower prevalence rates of HBsAg in Libya (1.5 %), and Algeria (1.6%).[31] Differences in demographics, cultural practices and behavior of the study population for the risk of HBV infection might explain these discrepancies.

In the current study, the sociodemographic data (age and residence) were not significantly associated with HBsAg positivity. Similar findings were demonstrated by Obi et al., in Nigeria.[32]

In this work, age was not significantly associated with HBsAg positivity, in agreement with other studies in Ethiopia.[9, 21, 24, 32-34] Similar HBsAg positivity was demonstrated among both age groups (<30 years and ≥ 30 years old) with a percent of 3.07 and 3.97, respectively. This was in contrast with findings reported from Saudi Arabia and Ethiopia showing an increase in the HBsAg rate with age. [33, 35] The gestational age of pregnant women in this study was not significantly associated with the HBsAg prevalence rate and this was in line with the result reported by Yohanes et al., in South Ethiopia.[34]

In this study, risk factors as blood transfusion, previous surgeries, gestational age and contact with patients with hepatic viral infections were not significantly associated with positive HBsAg. Blood transfusion continues to cause hepatitis B infection in countries where blood donors are not screened. In this study, a history of blood transfusion was not significantly associated with HBsAg positivity. This finding was expected as a result of the Egyptian national screening system applied in blood banks for detection of HBV and other blood-borne viruses. Our results were in agreement with those results reported from Ethiopia[9, 21, 33, 34, 36] , Nigeria[32] and Yemen.[37] On contrary to this finding, other studies have reported that blood transfusion is an important risk factor for acquiring HBV infection.[24, 28, 29, 38, 39]

Only 8 patients (4.32%) of those having history of previous surgeries were positive for HBsAg. In the current work, this variable was not significantly associated with seroprevalence rate of HBsAg. In accordance with this result, similar results were reported in Ethiopia in Dessie[9], Adjibar Rural Health Center[21], Addis Ababa[33] and Southern Ethiopia[36], as well as in Yemen.[37] Significant association between previous surgeries and HBsAg was documented by Zenebe et al., in Bahir Dar, Ethiopia.[24] This may be explained by the lack of safety precautions being taken during surgical procedures in these areas.

Other risk factors as multiple sexual partners and history of sexually-transmitted diseases were reported as significant risk factors in some studies in Ethiopia[9, 23] yet these factors could not be investigated in this study as a result of religious and social reasons

CONCLUSION & RECOMMENDATIONS

In conclusion, the prevalence of HBV infection among pregnant women in this study area was intermediate (3.39%) according to the WHO criteria, yet all HBsAg positive subjects were negative for HBeAg. This result alerts the policy makers for the importance of HBsAg screening among pregnant women during antenatal care and provision of appropriate measures to those testing positive. There was no statistical significant association between HBsAg infection and age, gestational age, history of blood transfusion, previous operation or contact with viral hepatitis infected patients. Health education programs about the mode of transmission of HBV, high-risk behaviors and methods of prevention should be instituted at antenatal care clinics to raise the mothers' awareness

Conflict of Interest

The authors declare that they have no conflict of interest.

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