



Seroprevalences of HBsAg and Anti-HCV among pregnant women in Turkey

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ABSTRACT

Background

The epidemiology of viral hepatitis during pregnancy is important for health planners as hepatitis B and hepatitis C virus infections are serious public health problems worldwide. This study was carried out to determine seroprevalences of HBsAg and anti-HCV among pregnant women in Turkey, to assess protective immunity to HBV in pregnant women and to compare our findings with that of previous reports.

Methods

A total of 5470 pregnant women were included in this study. Serum samples of participants were screened for HBsAg and anti-HCV by using chemiluminescent microparticle immunoassay method with 4th generation commercial diagnostic kits according to manufacturer's recommendations.

Results

104 (1.9%) of 5470 pregnant women were positive for HBsAg, 9 (0.2%) of them were positive for anti-HCV. 843 (15.4%) of 5470 women were tested for anti-HBs, and 242 (28.8%) of them were positive, 601 (71.2%) of them were negative for anti-HBs. Age group of 26-30 had the highest seropositivity rate for both HBsAg and anti-HCV. Age-associated seropositivity to HBsAg was found to decrease with increasing age especially after the age of 35 years and there was a statistically significant association between age groups and HBsAg seropositivity. There were no anti-HCV positive pregnant women at age group of 15-20 and 41-above. There was not a statistically significant association between age groups and anti-HCV seropositivity.

Conclusion

Low rates of seroprevalences for HBsAg and anti-HCV were found as compared to previous reports. Routine screening of all pregnant women for HBV and HCV is essential for detecting neonates at risk of transmission and HBV vaccine should be administered to women of childbearing age to reduce risk of vertical transmission.

Keywords: Anti-HCV, HBsAg, Pregnancy, Seroprevalence, Turkey

INTRODUCTION

Viral hepatitis caused by Hepatitis B virus (HBV) and Hepatitis C virus (HCV) is life-threatening liver disease and major public health problem worldwide.^{1,2} HBV is a DNA virus with partially double-stranded DNA and a member of Hepadna

viridae family. It has a core antigen surrounded by a shell containing surface antigen. This antigenic structure was first discovered as "Australia antigen", later named as hepatitis B surface antigen (HBsAg).^{3, 4} HCV is a single-stranded RNA virus and a member of Flaviviridae family. Humans and chimpanzees are the only species susceptible to HCV infection.⁵

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Apart from being detected in blood, HBV and HCV have also been detected in another body fluids like semen and saliva. The transmission of these infections from person to person is through unprotected sexual relation with an infected person, sharing infected needles among drug abusers, exposure to needle stick accidents among healthcare workers, receiving blood transfusions, undergoing dialysis, tattooing or piercing with unsterile equipment. On the other hand, viral hepatitis during pregnancy is associated with a high rate of vertical transmission if the mother has had acute Hepatitis B infection during pregnancy or if the mother is a chronic HBsAg carrier.⁵⁻⁷ Three possible routes of transmission of HBV and HCV from infected mothers to infants are; transplacental-in utero, during delivery or postnatal period during infants care or through breastmilk.⁸

Serological tests are usually used for the diagnosis of HBV and HCV infection. HBsAg is the first serological marker to appear in acute HBV infection and persistence of HBsAg for more than six months suggests chronic HBV infection.⁹ The diagnostic screening test for HCV infection is the detection of anti-HCV antibodies. The presence of anti-HCV demonstrates prior exposure to HCV and does not indicate immunity. While anti-HCV exists in only 40% of patients with acute HCV infection, it is positive in more than 95% of patients with chronic infection.¹⁰ The investigation of HBsAg and anti-HCV seroprevalence in pregnancy is needed to prevent vertical transmission as seroprevalence of these infections among pregnant women may be a good indicator of general population prevalence and a determinant of vaccination policy.¹¹

This retrospective study was carried out to determine seroprevalence of HBsAg and anti-HCV among pregnant women in Turkey, to evaluate the protective immunity to HBV in pregnant women and to compare our findings with that of previous reports to contribute to the existing data.

MATERIAL AND METHODS

A total of 5470 women in any trimester of pregnancy attending the antenatal clinics of Konya Dr. Ali Kemal Belviranlı Gynecology and Children Hospital between

September 2015-July 2016 were included in this retrospective study. This study was approved by the local institutional ethics committee of Konya Dr. Ali Kemal Belviranlı Gynecology and Children Hospital (Ref No 26067690; 2016 June 28).

A sample of 5 ml of venous blood was taken from each pregnant woman by veno puncture for the routine antenatal check-up, centrifuged to remove the serum and kept at -20°C until used. The serum samples were screened for the presence of HBsAg and anti-HCV by using chemiluminescent microparticle immunoassay method with 4th generation commercial diagnostic kits (Architect® i2000SR, Abbott, USA) according to the manufacturer's recommendations. HBsAg and anti-HCV values equal to or greater than 1 S/Co were classified as positive while values between ≥ 0.9 S/Co and < 1 S/Co indicated equivocal. Values lower than < 0.9 S/Co were accepted as negative. Samples with negative results considered to be negative for HBsAg and anti-HCV and did not need further testing. Anti-HCV seropositive results were approved by confirmation tests.

Data analyses were performed by Statistical Package for the Social Sciences (SPSS version 19.0). The relationship between test results and variables were evaluated by Chi-Square Monte Carlo exact test. Also, Mann-Whitney U and Kruskal-Wallis analysis methods were used for comparison of test results and age variables. The results were considered significant at $p < 0.05$.

RESULTS

A total of 5470 women were included in this retrospective study. The mean age of them was $25,4 \pm 6,1$ years (age interval: min:15-max:45years). 104 (1.9%) of 5470 pregnant women were positive for HBsAg, 9 (0.2%) of them were positive for anti-HCV. 843 (15.4%) of 5470 women were tested for anti-HBs, and 242 (28.8%) of them were positive, 601 (71.2%) of them were negative for anti-HBs.

Age-associated seropositivity to HBsAg was found to decrease with increasing age especially after the age of 35 years, and there was a statistically significant association between age groups and HBsAg

seropositivity ($p < 0.05$). Age group of 26-30 had the highest seropositivity rate for both HBsAg and anti-HCV as shown in Table 1 and 2. The lowest HBsAg seropositivity rate (4.8%) was detected in the age group of 41 and above. There were no anti-HCV positive pregnant women at the age group of 15-20

and 41 and above. The results revealed that there was not a statistically significant association between age groups and anti-HCV seropositivity ($p > 0.05$).

Table 1 Age Distribution and HBsAg Seroprevalence among Pregnant Women

HBsAg	Negative	Positive	Total	<i>P value*</i>
Age groups (Year)	n (%)	n (%)	n (%)	
15-20	1349 (25.2)	10 (9.6)	1359 (24.8)	<i>p < 0.05</i>
21-25	1724 (32.1)	26 (25)	1750 (32)	
26-30	1144 (21.3)	29 (27.9)	1173 (21.4)	
31-35	756 (14.1)	24 (23.1)	780 (14.3)	
36-40	338 (6.3)	10 (9.6)	348 (6.4)	
41-45	55 (1.0)	5 (4.8)	60 (1.1)	
Total	5366 (100)	104 (100)	5470 (100)	

* *Chi-Square Monte Carlo exact test, Mann-Whitney U and Kruskal-Wallis analysis methods*

Table 2 Age Distribution and Anti-HCV Seroprevalence among Pregnant Women

Anti-HCV	Negative	Positive	Total	<i>P value*</i>
Age groups (Year)	n (%)	n (%)	n (%)	
15-20	1359 (24.9)	0 (0)	1359 (24.8)	<i>0.214</i>
21-25	1747 (32)	3 (33.4)	1750 (32)	
26-30	1169 (21.4)	4 (44.4)	1173 (21.4)	
31-35	779 (14.2)	1 (11.1)	780 (14.3)	
36-40	347 (6.4)	1 (11.1)	348 (6.4)	
41-45	60 (1.1)	0 (0)	60 (1.1)	
Total	5461 (100)	9 (100)	5470 (100)	

* *Chi-Square Monte Carlo exact test, Mann-Whitney U and Kruskal-Wallis analysis methods*

DISCUSSION

Hepatitis B and Hepatitis C virus infections are the major concern throughout the world. Many studies have been conducted to determine seroprevalences of hepatitis B and C in different populations.^{12, 13} These studies indicated that seroprevalences of hepatitis B and C infections vary in different parts of the world from country to country and from one region to another region and from one population group to another in a country⁵. World Health Organisation (WHO) classified the countries into three regions as having low endemic rates (< 2%), intermediate endemic rates (2-8%), or high endemic rates (> 8%) for HBV.^{1, 14} Screening antenatal women for HBsAg and anti-HCV can give a reliable

prevalence of the disease in a population and provide a route for preventing vertical transmission of the virus as HBsAg detection serves as a marker for active HBV infection and infectivity whereas anti-HCV is a marker that shows someone has been exposed to HCV previously.¹⁴ In our study, ELISA method was used for analyzing the seroprevalence rates of HBsAg and anti-HCV as the same as many other studies.^{1,4,8,11,15,16} The seroprevalence of HBsAg and anti-HCV in pregnant women in our study was 1.9% and 0.2%, respectively. As similar to our findings, a cross-sectional study conducted among pregnant women in Iran reported the seroprevalence of HBsAg and anti-HCV as 0.7% and 0.2%, respectively.¹⁵ A study from Yemen reported higher seroprevalence of HBsAg and anti-HCV (10.8% and 8.5%) among

pregnant women.¹¹ Recent studies conducted among pregnant women in different countries reported seroprevalence rates for HBsAg and anti-HCV respectively; as 6.7% and 1.3% in Nigeria, 1.3% and 2.5% in Pakistan, 4% and 7% in Egypt.^{1,2,17} Comparison of our results with other studies from different countries showed variability. The differences in demographic characteristics of the study population such as socio-cultural environment, sexual practices, medical exposure and the difference in hepatitis epidemiology in these countries might explain these discrepancies.

A study conducted by Vipul et al, showed that the seroprevalence of HBs Ag in pregnant women as 3.07% and emphasized the screening of pregnant women for HBs Ag to identify neonates at risk of transmission and the immunization of the newborns for HBV as a preventive measure against vertical transmission.⁸ Studies from India, Pakistan and northwest Ethiopia reported the seroprevalence of HBsAg as 2.07%, 4.6% and 4.4% in line with the data obtained in the study carried out by Vipul et al.¹²⁻¹⁴

A previous study from Nigeria reported a low seroprevalence rate of anti-HBs (53.3%) among pregnant women with the history of hepatitis B vaccination and attributed this data to the fact that a complete dose of the vaccine was not received, or they were HBV carriers even before receiving the vaccine.¹⁶ The seroprevalence of chronic HBV infection in Turkish population ranges between 3% and 12.5% and transmission of the virus from HBsAg positive mothers to infants shows an important route for the spread of disease. In a study conducted in Turkey, of the participating 1084 pregnant women, 4% were seropositive for HBsAg and 7.3% were seropositive for anti-HBs.¹⁸ In our study, the anti-HBs seropositivity rate (28.8%) was found higher among 843 women tested for anti-HBs whereas the seropositivity rate for HBsAg was lower than the seroprevalence rate of chronic HBV infection in the general Turkish population. This may be due to the influence of many factors including age, vaccination status, occupation, socio-economical status, IV drug use, blood transfusion, or sexual intercourse because these factors differ from one region to another in a country.

The age of acquiring infection is the major determinant of the seroprevalence rates.¹ In our study, the highest seropositivity rate of HBsAg was among the age group of 26-30 years. The findings of our study were also in agreement with the findings of the study conducted by Oladele et al, where the majority of those that were positive for HBsAg were in the age group of 25-29 years.¹⁶ Another study from Nigeria reported a higher seroprevalence rate of 6% for HBsAg and women at the age group of 25-29 years constitute the majority with the rate of 44.8% as similar to our study.⁹ This could be explained by high-risk sexual practices which are noted to be higher among the younger age group.

Chronic HCV infection majority of which occur in Africa constitutes the 3% of the world's population according to the data obtained from WHO. Prevalence of HBV and HCV is increasing among African and Arab countries with a high rate of vertical transmission leading to neonatal hepatitis. Studies of HCV prevalence in the eastern region of Africa are controversial, with some reports showing the prevalence to be in the intermediate range (2-2.9%), while others show it in the very low range (0% to 2%) whereas the seroprevalence of HCV ranges between 0.4-23% in Arab countries. This discrepancy could be explained by sociodemographic factors such as age, education level, sexual habits of populations and the use of different tests for screening of anti-HCV.³ In studies involving pregnant women from India and northwest Ethiopia, the reported anti-HCV seroprevalence was less than 1% in line with the data obtained in our study.^{12, 14}

A study from Switzerland reported the highest seroprevalence of anti-HCV at the 25-29 age group in agreement with our study.¹⁹ A study carried out in Pakistan determined that frequency of anti-HCV more common than HBsAg and reported the highest seroprevalence rate of anti-HCV among pregnant women whose age ranged 26-35 years, a bit higher than the findings of other studies.¹³ Esan et al from Nigeria detected that age group of 15-20 and 41-above had the lowest frequency in HCV as similar to our study.¹

A study which researched literature for data on HBsAg and anti-HCV seroprevalence in European countries reported that the general population seroprevalences of chronic HBV and HCV infection vary widely among European countries. For example, Romania has high seroprevalence for both HBV and HCV. In contrast, Belgium, Sweden, Germany, and The Netherlands have the low prevalence of both infections. In the same study, the antenatal HBsAg seroprevalence was detected as lower than the general population in Spain reflecting the effect of HBV vaccination program for adolescents. The antenatal anti-HCV seroprevalence was lower in Italy and the United Kingdom but higher in Germany and Greece than the general population.²⁰ The common results which were emphasized in this study and our study are that screening of all pregnant women for HBV and HCV will be beneficial and cost-effective. Vaccination of susceptible contacts of identified HBV carriers and infants born to HBsAg-positive mothers can prevent new infections.

CONCLUSION

Low seroprevalence rates of HBsAg and anti-HCV were detected in our study. This data needs to be confirmed by other similar studies with larger sample size. Our study has some limitations due to the sample size, so our study population is not representative of our country, but it contributed to the information on the seroprevalences of HBV and HCV infection in our country. In conclusion, we emphasize that all pregnant women can only be identified against HBV and HCV through screening during pregnancy. Moreover, anti-HBs screening should be done for all antenatal patients, and those negative should be vaccinated to help them develop protective immunity to HBV infection.

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