

Prevalence of Hepatitis B Surface Antigen in Pregnant Women in Beheshti Hospital of Kashan, Isfahan

Hasan Afzali¹; Mansooreh Momen Heravi^{1,*}; Seyyed Alireza Moravveji²; Maryam Poorrahnama³

¹Department of Infectious Disease, Faculty of Medicine, Kashan University of Medical Sciences, Kashan, IR Iran

²Department of Medicine Community, Faculty of Medicine, Kashan University of Medical Sciences, Kashan, IR Iran

³Kashan University of Medical Sciences, Kashan, IR Iran

*Corresponding Author: Mansooreh Momen Heravi, Department of Infectious Disease, Faculty of Medicine, Kashan University of Medical Sciences, P. O. Box: 8715985131, Kashan, IR Iran. Tel: +98-9133611017, E-mail: momenheravi_m@kaums.ac.ir; mansoreheravi@yahoo.com

Received: May 24, 2014; Revised: November 28, 2014; Accepted: May 15, 2015

Background: The transmission of hepatitis B virus (HBV) is parenteral, sexual and prenatal. Prevention of vertical transmission of HBV is extremely important, because HBV infection in early life usually results in a chronic carrier state. There has been so much debate about hepatitis B surface antigen (HBsAg) screening in pregnant women.

Objectives: The aim of this study was to determine the prevalence of HBsAg+ among pregnant women referred to Beheshti hospital in Kashan in 2012.

Patients and Methods: This descriptive study was carried out on 768 pregnant women, hospitalized in Beheshti Hospital of Kashan in 2012. After obtaining consent forms, the questionnaires including demographic and HBV infection-associated risk factors were filled through interview and then 5 mL blood was taken from each patient and HBsAg was examined by the enzyme-linked immunosorbent assay (ELISA) method. These data were analyzed by statistical package for the social science (SPSS) software.

Results: A total of 12 (1.56%) out of 768 pregnant women were HBsAg+. The mean age of HBsAg+ cases was 24.5 ± 4 years. Most of the HBsAg+ cases (66.6%) were uneducated; 17.7% of the pregnant women were not Iranian, of which 7.4% were HBsAg+. There was no high-risk job, recent dentistry interruption or skin tattoo among the HBsAg+ cases.

Conclusions: In this study, 1.56% of pregnant women were HBsAg+, which was higher than the previous studies. This increasing prevalence may be due to the increase of non-Iranians' migrations to Iran. Control of migration and screening and vaccination of these groups should be considered by health policy makers.

Keywords: Prevalence; Hepatitis B Virus; Hepatitis B Surface Antigen; Pregnant Women

1. Background

Hepatitis B virus (HBV) is a double-stranded DNA virus belonging to the *Hepadnaviridae* family. Hepatitis B is a potentially life-threatening liver disease caused by HBV. It is a major global health problem and the most serious type of viral hepatitis. It can cause chronic liver disease and put people at high risk of death from cirrhosis of liver and liver cancer (1).

Perinatal transmission is one of the most common routes of HBV transmission worldwide (2). Routine screening of pregnant women for hepatitis B surface antigen (HBsAg) is recommended by the World Health Organization (3).

Chronic HBV infection affects approximately 350 million people worldwide, half of whom acquire the infection from perinatal transmission or in early childhood (4). The prenatal transmission of HBV leads to severe long-term sequelae. Children born to HBsAg+ and HBeAg+ mothers have 70-90% chance of prenatal acquisition of HBV infection and over 85-90% of them will eventually

become chronic carriers of the disease. Chronic carriers of HBV are main reservoirs for continued transmission of HBV and have a higher risk of hepatocellular carcinoma and liver cirrhosis. Many of them eventually become mothers themselves; thus, they perpetuate the cycle (5). The screening of antenatal clinic attenders for HBV is a relatively routine practice in most health settings in Iran. Some studies have evaluated the prevalence of HBV among antenatal pregnant women. The prevalence rate of HBV among rural and urban pregnant women in Cameroon was reported 5.4% and 7.85%, respectively (6, 7).

Autoimmune hepatitis is a form of chronic hepatitis which affects the patients who have lost their immunological tolerance to liver-specific antigens and is more frequent in females and it may mimic chronic HBV (8).

Hepatitis B vaccine was introduced via National Immunization Program (NIP) in Iran in 1993. Recombinant hepatitis B vaccines are available at primary care centers free

of charge to any applicant. This program entails vaccination of all neonates at birth and routine immunization of high-risk groups. However, there continues to be little focus on the adult population and immigrant peoples (9).

Since HBV is one of the leading causes of hepatocellular carcinoma (HCC), it is important to assess whether there has been a shift in the epidemiology of this condition over time. This will help the Ministry of Health for better policy making.

2. Objectives

The aim of this study was to determine the prevalence of HBsAg among pregnant women attending Beheshti Hospital of Kashan, Iran in 2012.

3. Patients and Methods

This was a cross-sectional study on pregnant women, hospitalized in the Obstetric Ward from December 2011 to January 2012 in Beheshti Teaching Hospital in Kashan-Iran. Kashan is a small city in Isfahan province. Ethical approval to conduct this study was obtained from the ethical committee of the Research Deputy of Kashan University of Medical Sciences with code No. 1679. The study recruited 768 pregnant women attending to the Obstetric Ward of Beheshti Hospital due to any cases during the one year of the study.

Beheshti Hospital is a major general hospital with all types of specialists and sub-specialists, except for ear, nose and throat (ENT) and ophthalmology ward, with 12 wards and 500 beds.

The sample size was calculated using the standard formula for sample size calculation: $N = z^2pq/d^2$ (where z = the standard normal deviation at 1.96 (which corresponds to a 95% confidence interval), p = the prevalence of hepatitis B in general Iranian population, $q = 1 - p$; d = the degree of precision expected to be 0.05).

Sampling was systematically randomized by using the list of patients attending to obstetric and prenatal care clinics of Beheshti Hospital, the information of whom were recorded in Health Information System (HIS) of the hospital. All the cases were visited by a gynecologist and then referred to an infectious disease specialist. Clinical variables were measured through history taking and clinical examination by an intern observer.

The inclusion criteria were positive pregnancy test and written informed consent. Each woman who refused to give consent was excluded. After obtaining the consents, all the participants were interviewed by an interviewer. According to the inclusion criteria, 800 subjects were included and then 32 were excluded. At first, the advantages of the test were explained for the participants and the consent forms were obtained.

A questionnaire including socio-demographic information and HBV infection-associated risk factors, such as a previous history of blood transfusion, history of previous jaundice, a history of tattooing, contact with a person

with known history of hepatitis B infection or jaundice, was filled. Afterwards, 5 mL blood was aseptically taken from each patient and the blood specimens were transmitted to a laboratory. At the laboratory, after plasma separation, test for HBsAg using the Monalisa HBsAg ultra ELISA kit was performed. We used statistical package for social sciences (SPSS) version 16.0 software. Simple descriptive statistics such as mean and standard deviation were used to describe the data, as appropriate. We tested the associations between categorical variables using the chi-squared, ANOVA and *t*-test, and Fisher's exact tests, reporting the corresponding *P* values.

4. Results

Among the 768 patients, the ages varied between 15 and 45 years with a mean of 24.65 ± 4.03 years (min = 21 and max = 39). The majority of cases were in the age group of 20-28 years. The statistical test for comparing the age between the two groups showed no significant difference ($P = 0.23$). HBsAg was detected in the plasma of 12 women, giving an overall HBsAg prevalence of 1.56%. The mean age among the pregnant women who were HBsAg+ was 26.9 years. The prevalence of HBsAg was the highest among the 25 - 29-year-old group (Table 1). There was no statistically significant association between the socio-demographic characteristics evaluated and the HBsAg status.

5. Discussion

The results of our study indicated that the prevalence of HBsAg among pregnant women was 1.56%. Our results were however higher than earlier reports of HBsAg prevalence among pregnant women in Kashan by Tabbassi et al. who reported 0.35% HBsAg+ prevalence (seven HBsAg+ case out of 2000 pregnant women) in ten years (10).

Studies in other countries have reported different rates of prevalence of HBsAg among pregnant women. The HBsAg prevalence among pregnant women was reported 8.3% by Luka et al. (11) and Eke et al. (12) in Nigeria. They are comparable with the 6.4% HBsAg prevalence reported in Ghana (13), the 6.5% in Congo (14), the 9.3% in Kenya (15), the 10.7% in Burkina Faso (16), and the 7.7% in Cameroon (5). All these countries are generally considered the areas of hyperendemicity for hepatitis B infection (prevalence > 8%).

The prevalence of HBsAg among pregnant women reported in other areas is as follows: Indonesia 4.7% (17), France 7.2% (18), Peru 9.38% (19), Israel 0.88% (20), Turkey 2.1% (21), Eastern China 6.71% (22), and 2.3% in Kerman, Iran (23). Our findings were significantly lower than the prevalence of HBsAg reported by the abovementioned studies. On the contrary, our results were higher than the 0.35% HBsAg prevalence reported in a previous study among antenatal clinic attendants in Kashan (10). Our results were comparable with the 1.5% prevalence in Tripoli, Libya (24), but were higher than the 0.5% HBsAg prevalence reported in Isfahan and 1% in Gorgan, Iran (25, 26).

Table 1. Socio-Demographic Characteristics and Hepatitis B Virus Infection-Related 148 Risk Factors of Pregnant Women ^{a,b}

Characteristic	Total	HBsAg+ ^a	HBsAg- ^a	Statistical Test
Level of education				0.01
Under high school diploma	134 (17.44)	8 (1)	126 (16.44)	
High school diploma and higher	634 (8.55)	4 (0.5)	630 (82.05)	
Residence				0.59
Urban	632 (82.29)	8 (1)	624 (81.29)	
Rural	136 (17.7)	4 (0.5)	132 (17.2)	
Nationality				0.001
Iranian	632 (82.29)	2 (0.26)	630 (82)	
Non-Iranian	136 (17.7)	10 (1.3)	126 (16.4)	
Job				P > 0.999
High-risk	16 (2)	0	16 (2)	
Other	752 (98)	12 (1.5)	740 (96.5)	
Gestational age				P > 0.999
First trimester	-	-	-	
Second trimester	4 (0.5)	0	4 (0.5)	
Third trimester	764 (99.5)	12 (1.5)	752 (98)	
History of abortion				0.056
Yes	160 (20.83)	6 (0.78)	144 (20)	
No	608 (79.16)	6 (0.78)	602 (78.3)	
History of tattooing				P > 0.999
Yes	44 (5.72)	0	44 (5.72)	
No	724 (94.27)	12 (1.5)	712 (92.77)	
History of hepatitis or jaundice				P > 0.999
Yes	44 (5.72)	0	44 (5.72)	
No	724 (94.27)	12 (1.5)	712 (92.77)	
History of transfusion				0.01
Yes	68 (8.8)	6 (0.78)	62 (8)	
No	700(91.14)	6 (0.78)	694 (90.3)	
History of dentistry procedure				P > 0.999
Yes	68(8.8)	0	68(8.8)	
No	700 (91.14)	12 (1.5)	688 (89.64)	
HBV vaccination of husband				0.01
Yes	732 (82.29)	4 (0.5)	628 (81.8)	
No	136 (17.7)	8 (1)	128 (16.7)	
HBsAg of husband				0.001
Positive	8(1)	8(1)	0	
Negative	760 (99)	4 (0.5)	756 (98.5)	

^a Abbreviations: HBV, hepatitis B virus; HBsAg, hepatitis B surface antigen.

^b Values are presented as No (%).

These differences of prevalence in different nationalities and minorities are related to the route of transmission more than genetic factors. The highest numbers of HBV-infected pregnant women in our study were immigrants from neighbor countries.

In our study, the mean age of HBsAg positivity was 24.65 ± 4.03 years and HBsAg was the highest among the 20 - 28-year-old group. In the study of Vasquez et al. and Fomulu et al. (5, 19), also, the average age of women infected with hepatitis B virus was 26 years. Our findings

were somewhat in contrary with those of Ndumbe et al. in Cameroon (6), and Eke et al. in Nigeria (12) who found the highest prevalence of HBsAg among the 10 - 19-year-old age group (10.4%), and the 15 - 19-year-old age group (16.7%), respectively.

A possible reason for the slightly higher HBsAg prevalence in the 25 - 29-year-old age group is the fact that between these ages, many females are likely to get married and become pregnant. They are therefore likely to attend antenatal care centers for the first time, and thus, can be easily picked up by screening.

Other socio-demographic characteristics were evaluated to determine whether these were associated with a risk of HBV acquisition. These included the gestational age, job, history of transfusion, tattooing, jaundice and dentistry procedures. We did not find a statistically significant association between job, history of tattooing, jaundice, dentistry procedure, gestational age and the risk of HBV infection among our study subjects. There was significant statistical association between nationality, history of transfusion and infection in husband and the risk of HBV infection among our cases. It was noted from this study that previous contact with someone with hepatitis B infection was a statistically significant predisposing factor for HBsAg infection.

Our findings were in accordance with other reports indicating that the risk of HBV transmission was high in people in contact with chronically infected HBV subjects (12, 27). In reports from other studies, some of these factors may be linked with the risk of HBV acquisition. In the study of Fumulla, there was no statistically significant association between age or other socio-demographic risk factors and HBsAg status. Only a history of a contact with hepatitis B infection was found to be significantly associated with HBsAg positivity (5). Kolawole in Osogbo, Nigeria found no significant difference in HBsAg positivity in relation to maternal age, gravidity, gestational age, family type, level of education and occupation ($P = 0.073$). There was significant difference in HBsAg just in history of HBV vaccination ($P = 0.039$) (1).

The study of Ayatollahi et al. showed the high acceptance and compliance of hepatitis B vaccination among the tested group due to the opportunity of free vaccination offered by the healthcare provider. Lack of knowledge about hepatitis B infection and the importance of vaccination, fear of side effects, worries about privacy, perceived low risk for infection, and time were the reasons for vaccination rejection (9). Therefore, encouraging the general population to voluntary HBV vaccination and obligatory vaccination of immigrant people can be a helpful method for prevention of transmission of HBV.

The major strength of our study was its large sample size. Patients were recruited prospectively and our results demonstrated the state of the epidemiology of HBV as it presently is. One of our limitations was that data on reported risk factors depended on the memories of the study participants and there was no other means to

verify the truthfulness of this information. Moreover, it was noticed that the probing into these risk factors created an atmosphere of suspicion of HBV infection among the study participants and may have biased some of the responses.

According to the higher frequency of HBsAg+ cases among immigrant women, HBsAg test for screening should be performed in primary evaluation of pregnant women in this group in Iran. The inclusion of HBsAg as a routine prenatal and premarriage test should be accompanied by appropriate facilities for management of positive cases and prevention of HBV transmission through prenatal and sexual routes.

Acknowledgements

The authors gratefully acknowledge the help of Dr. Zohre Tabassi and Mr. Seyed Gholam Abbas Moosavi. We would like to thank our participants for their patience and ongoing participation.

Authors' Contributions

Hasan Afzali designed the study. Hasan Afzali and Maryam Poorrahnam performed the study. Seyyed Alireza Moravveji analyzed the data. Mansooreh Momen Heravi wrote the manuscript. All the authors read and approved the manuscript.

Funding/Support

The present study was the thesis of a medical student, Maryam Poorrahnama, with code No. 1679 and was supported by the Medical Faculty of Kashan University of Medical Sciences.

References

1. Kolawole OM, Wahab AA, Adekanle DA, Sibanda T, Okoh AI. Seroprevalence of hepatitis B surface antigenemia and its effects on hematological parameters in pregnant women in Osogbo, Nigeria. *Virology*. 2012;**9**:317.
2. Jonas MM. Hepatitis B and pregnancy: an underestimated issue. *Liver Int*. 2009;**29** Suppl 1:133-9.
3. Kane MA. Global status of hepatitis B immunisation. *Lancet*. 1996;**348**(9029):696.
4. Lavanchy D. Hepatitis B virus epidemiology, disease burden, treatment, and current and emerging prevention and control measures. *J Viral Hepat*. 2004;**11**(2):97-107.
5. Fomulu NJ, Morfaw FL, Torimiro JN, Nana P, Koh MV, William T. Prevalence, correlates and pattern of Hepatitis B among antenatal clinic attenders in Yaounde-Cameroon: is perinatal transmission of HBV neglected in Cameroon? *BMC Pregnancy Childbirth*. 2013;**13**:158.
6. Ndumbe PM, Skalsky J, Joller-Jemelka HI. Seroprevalence of hepatitis and HIV infection among rural pregnant women in Cameroon. *APMIS*. 1994;**102**(9):662-6.
7. Kfutwah AK, Tejiokem MC, Njouom R. A low proportion of HBeAg among HBsAg-positive pregnant women with known HIV status could suggest low perinatal transmission of HBV in Cameroon. *Virology*. 2012;**9**:62.
8. Dehghani SM, Haghighat M, Imanieh MH, Honar N, Negarestani AM, Malekpour A, et al. Autoimmune hepatitis in children: experiences in a tertiary center. *Iran J Pediatr*. 2013;**23**(3):302-8.
9. Ayatollahi J, Ayatollahi A, Ayatollahi R, Mellat Ardekani A, Shah-

- cheraghi SH. Compliance with hepatitis B vaccination among adult males with sexually transmitted infections. *Jundishapur J Microbiol.* 2014;7(8):e11090.
10. Tabasi Z, Mir Hosseini F, Mousavi SGA, Ghafouri L. HBsAg in parturients referring to gynecologic clinics in Kashan, 2002. *KAUMS Journal (FEYZ).* 2003;7(3):35-41.
 11. Luka SA, Ibrahim MB, Iliya SN. Sero-prevalence of hepatitis B surface antigen among pregnant women attending Ahmadu Bello University Teaching Hospital, Zaria, Nigeria. *Nigerian Journal of Parasitology.* 2008;29(1):38-41.
 12. Eke AC, Eke UA, Okafor CI, Ezebialu IU, Ogbuagu C. Prevalence, correlates and pattern of hepatitis B surface antigen in a low resource setting. *Viol J.* 2011;8:12.
 13. Acquaye JK, Mingle JA. Hepatitis B viral markers in Ghanaian pregnant women. *West Afr J Med.* 1994;13(3):134-7.
 14. Itoua-Ngaporo A, Sapoulou MV, Ibara JR, Iloki LH, Denis F. [Prevalence of hepatitis B viral markers in a population of pregnant women in Brazzaville (Congo)]. *J Gynecol Obstet Biol Reprod (Paris).* 1995;24(5):534-6.
 15. Okoth F, Mbuthia J, Gatheru Z, Murila F, Kanyingi F, Mugo F, et al. Seroprevalence of hepatitis B markers in pregnant women in Kenya. *East Afr Med J.* 2006;83(9):485-93.
 16. Nacro B, Dao B, Dahourou H, Hien F, Charpentier-Gautier L, Meda N, et al. [HBs antigen carrier state in pregnant women in Bobo Dioulasso (Burkina Faso)]. *Dakar Med.* 2000;45(2):188-90.
 17. Reniers J, Vranckx R, Ngantung W, Sugita E, Meheus A. Prevalence and determinants of hepatitis B virus markers in pregnant women in West Java, Indonesia. *J Trop Med Hyg.* 1987;90(5):249-53.
 18. Denis F, Tabaste JL, Ranger-Rogez S. [Prevalence of HBs Ag in about 21,500 pregnant women. Survey at twelve French University Hospitals. The Muticentric Study Group]. *Pathol Biol (Paris).* 1994;42(5):533-8.
 19. Vasquez S, Cabezas C, Garcia B, Torres R, Larrabure G, Suarez M, et al. [PREVALENCE OF HBsAg AND ANTI-HBs CARRIERS IN PREGNANT WOMEN RESIDENTS IN AREAS FROM DIFFERENT ENDEMICITY LOCATED IN CENTRAL-SOUTH DEPARTMENTS OF PERÚ]. *Revista de gastroenterologia del Peru: organo oficial de la Sociedad de Gastroenterologia del Peru.* 1999;19(2):110-5.
 20. Bogomolski-Yahalom V, Granot E, Linder N, Adler R, Korman S, Manny N, et al. Prevalence of HBsAg carriers in native and immigrant pregnant female populations in Israel and passive/active vaccination against HBV of newborns at risk. *J Med Virol.* 1991;34(4):217-22.
 21. Yavuz U, Cevat C, Alaaddin B. Seroprevalence of Hepatitis B Virus among Pregnant Women in Northern Turkey. *Hepatitis Monthly.* 2009;2009(2, Spring):146-9.
 22. Zhang S, Li R, Wang Y, Liu Q, Zhou Y, Hu Y. Seroprevalence of hepatitis B surface antigen among pregnant women in Jiangsu, China, 17 years after introduction of hepatitis B vaccine. *International Journal of Gynecology & Obstetrics.* 2010;109(3):194-7.
 23. Aali BS. The prevalence of HBsAg among pregnant women referred to Kerman maternity hospitals in 1997. *J of Kerman Uni of Med Sci.* 1999;6(2):89-96.
 24. El-Magrahe H, Furarah AR, El-Figih K, El-Urshfany S, Ghenghesh KS. Maternal and neonatal seroprevalence of Hepatitis B surface antigen (HBsAg) in Tripoli, Libya. *J Infect Dev Ctries.* 2010;4(3):168-70.
 25. Ahmadi M, Toghyani R, Shahidi S, Izadi M, Merasi MR, Agdak P, et al. Prevalence of HBsAg and high-risk behaviors in pregnant women referring to Urban Health Centers in Isfahan province. *Iran J Nurs Midwifery Res.* 2011;16(1):47-54.
 26. Behnampour N. Frequency of HBsAg in pregnant women in Gorgan, Iran. *Journal of Gorgan University of Medical Sciences.* 2011;13(4):84-90.
 27. Sali S, Bashtar R, Alavian SM. Risk factors in chronic hepatitis B infection: a case-control study. *Hepat Mon.* 2005;5(4):109.