

Hepatitis B Virus Markers in Male Blood Donors

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Objective: To study the prevalence of HBV infection with particular emphasis on the rate of hepatitis B surface antigen (HBSAg) and hepatitis B core antibody (anti-HBc) IgG type among apparently healthy blood donors at Aseer region, Saudi Arabia.

Material and method: A retrospective analysis of all blood bank records at Aseer Central Hospital, covering a total of 5174 blood donors during the period of one year starting in April 5, 2000, was carried out.

Results: A total of 4664 Saudis and 510 non-Saudis were screened for HBSAg, anti-HBc, and anti-HBs. The total exposure rate of HBV infection was 17.9% and 34% among Saudis and non-Saudis respectively. If HBSAg and anti-HBc are considered together, 11.7% of Saudi blood donors will be potentially infectious and are likely to transmit the disease. In addition, the total exposure rate increases with age, though, HBSAg carrier peaks at ages between 32-42 years.

Conclusion: The reported rate of total exposure of HBV infection is lower than other areas in Saudi Arabia but much higher than the Western countries. The prevalence of HBSAg peaks among highly productive age groups.

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Hepatitis B virus (HBV) infection is one of the major health problems in the Kingdom of Saudi Arabia. It contributes significantly to the morbidity related to acute viral hepatitis and chronic liver disease including liver cirrhosis and hepatoma¹.

The reported prevalence of HBSAg among healthy blood donors varies widely from country to country, ranging from nearly zero in the western countries to as high as 15% in some Asian and African countries^{2,3}. Similarly, in Saudi Arabia the prevalence of HBV infection differs widely among different regions in the country. The overall estimated prevalence of HBSAg in Saudi Arabia is 8.3% with the highest being reported in Khaiber (26%) and Gizan areas (20%)⁴⁻⁷. For

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this reason, several actions have been taken by the government trying to minimize the reservoir of HBV and HBV related chronic liver diseases. One of the most important and effective actions taken, is the inclusion of hepatitis B vaccine into the Expanded program on Immunization which was commenced since September 1989^{8,9}. Previous report from the same hospital was confined to the prevalence of hepatitis C antibody and HBSAg carrier rate without testing the other HBV markers¹⁰, which would certainly under estimate the problem among the healthy blood donors at Aseer region which lies in close proximity with Gizan area having a high prevalence of HBV infection.

The aim of the present study is to determine the prevalence of potentially infectious HBV carriers among apparently healthy male blood donors at Asir region.

METHODS

This study was conducted by retrospectively reviewing the blood bank records over a period of one year (from 5/4/2000 to 24/3/2001) at Aseer Central Hospital which is the only tertiary care teaching and referral hospital at Aseer region. Aseer Region is a densely populated area and is located in a close proximity with Gizan area in the southwestern part of the kingdom. The hospital blood bank is a well equipped and receives blood samples from different hospitals in the region for screening. All blood donors were male volunteers who appeared healthy without previous history of hepatitis, jaundice, or exposure to risk factors to HBV infection such as intravenous drug abuse, homosexuality, or previous blood transfusion. All blood units were tested for HBSAg and hepatitis B core antibody (anti-HBc) IgG type by DiaSorin qualitative enzyme immunoassay (EIA), a third generation kit using Sanofi Diagnostic Pasteur Reader. Blood units which were negative for HBSAg but positive for anti-HBc, were further tested for hepatitis B surface antibodies (anti-HBs) by DiaSorin qualitative/quantitative EIA third generation kits using Sanofi Diagnostic Pasteur Reader. All units were also tested for hepatitis C antibody (HCV antibody), human immune deficiency virus (HIV), VDRL and malaria. All assays were performed and evaluated according to the manufacturer's instructions. Hepatitis Be antigen (HBEAg) and antibody (anti HBe), and liver function tests were not done.

RESULTS

The results of HBV markers used in this study in 4664 Saudis and 510 non-Saudis healthy male blood donors are shown in Table 1. The presence of HBSAg in the serum of healthy blood donors generally indicates a carrier state for HBV and, if transfused, transmission of HBV is definite. The rate of HBSAg with or without anti-HBc is similar in both groups being higher among Sudanese. Most significant is the presence of anti-HBc (alone) which is higher among non-Saudis (19.4%) than Saudis (8.7%). The positivity rate of HBSAg with or without anti-HBc together with anti-HBc (alone) accounts for 11.7% of Saudis and 22.7% of non-Saudis blood units and considered potentially infectious when transfused.

Anti-HBs which was done in only 850 sera with negative HBSAg and positive anti-HBc, is positive in 287 (6.2%) and 58 (11.4%) among Saudis and non-Saudis respectively. In this study, the presence of anti-HBs did not change the overall exposure rate (positivity of any marker) of HBV infection since it is included with those who are positive for anti-HBc. The presence of both anti-HBs and anti-HBc indicate past infection with development of immunity. This combination

is more frequently seen among Egyptians and increases the overall exposure rate of HBV infection to 39%.

Table 1. Prevalence of HBV markers by nationality.

| Nationality | HBSAg ± Anti-HBc | Anti-HBc Alone | Anti-HBs ± Anti-HBc | Positive for Any Marker |
|-------------|------------------------|-------------------|---------------------------|-------------------------------|
| Saudis | 139 (3.0%) | 406(8.7%) | 287(6.2%) | 832 (17.9%) |
| Non-Saudis | 17.0 (3.3%) | 99(19.4%) | 58(11.4%) | 174 (34%) |
| Egyptians | 4.0 (2.8%) | 31(20.9%) | 23(15.5%) | 58 (39%) |
| Sudanese | 4.0(3.9%) | 22(21.4%) | 10(9.7%) | 36 (35%) |
| Others | 9.0(3.5%) | 46(17.8%) | 25(9.7%) | 80 (31%) |
| Total | 156 (3.0%) | 505(9.8%) | 345(6.7%) | 1006 (19.4%) |

When the presence of HBV markers was considered in relation to the various age groups (Fig 1), the prevalence of HBSAg with or without anti-HBc peaks at the ages between 32 to 42 years. However, the overall exposure rate was found to increase with age and 35% of the donors aged 42years and above were positive for at least one HBV marker.

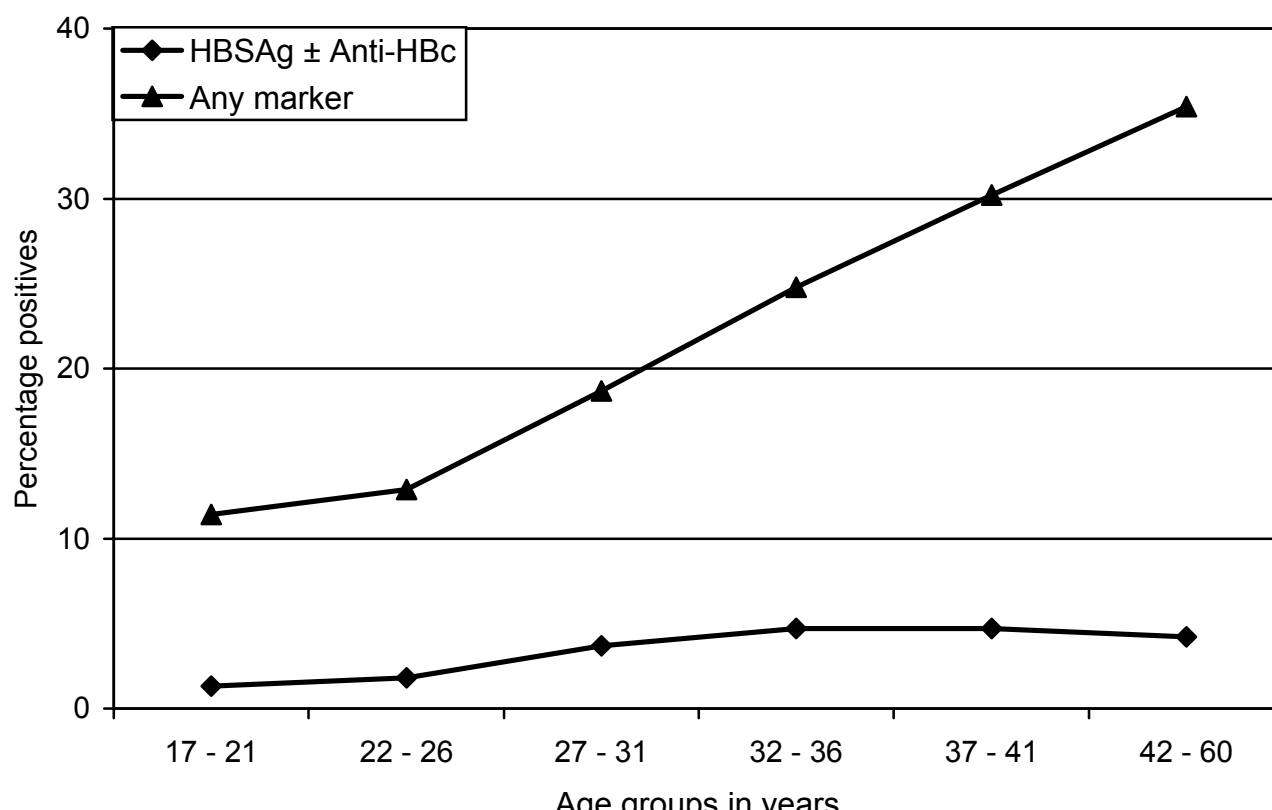


Figure 1. Prevalence of HBV markers among male blood donors by age group.

DISCUSSION

The present study shows that the infection rate of HBV among healthy male Saudi blood donors at Aseer region is 17.9%, HBSAg carrier rate is 3%, and anti-HBc alone is 8.7%, which is much higher than what has been reported among Europeans and Americans. However, it is much lower than the rate in the Far Eastern Countries and locally less than Gizan and Khaiber areas, and even lower than the highly commercialized and civilized areas like Riyadh, western and eastern provinces²⁻⁶. Previous studies have shown a higher prevalence of HBV infection in areas with low socioeconomic and educational status^{2,11}. Aseer region is a mountainous area, located at 3200 meter above the sea level. It has pleasant climate, and is composed of rural and semi-urban areas, it has undergone many socioeconomic changes over the past few years, which has attracted many tourists particularly during summer season. On the other hand, Gizan which is a less developed area, hot and humid, has the highest prevalence of malaria^{7,12-14}. These environmental and ecological differences might explain in part the lower rate of HBV infection at Aseer region. Furthermore, population awareness of the seriousness of HBV infection, the reduction of some of the traditional behaviors like the unsupervised and unhygienic circumcisions together with the extensive use of HBV vaccine during childhood period, have probably led to significant reduction in HBV reservoir.

The rate of HBV infection among non-Saudis is much higher than Saudis, the highest being among Egyptians 39.2%. Egyptians have consistently shown a very high prevalence of hepatitis C antibody but the rate of HBV infection was definitely underestimated since only HBSAg was used for screening^{10,15,16}. However, the number of non-Saudis including Egyptians in this study is small and will not reflect the true picture of the prevalence of HBV infection in their countries. In areas with high prevalence of HBV infection, the incorporation of anti-HBc in the screening of blood donors is crucial. During the window period of the infection, the period preceding the appearance of HBS antibody when HBSAg is no longer detectable in the serum, the antibody to the core of Dane particle (anti-HBc) can be the only serological indicator of exposure to HBV¹⁷. HBV DNA has been detected in the serum of individuals with isolated anti-HBc up to 20%¹⁸⁻²⁰. More important, transmission of HBV has been reported from blood and organ donors with isolated anti-HBc with a rate up to 78%²⁰⁻²³.

Although the total exposure rate increases with age the acquisition of HBSAg tends to peak at the ages between 32 to 42 years with subsequent decline thereafter (Fig 1). Subjects who are more than 20 years of age are expected to be involved actively in community services, marriages, and blood donation. If they are infected with hepatitis B, they will represent a serious reservoir of infection which can easily transmit the disease to their spouses, children, and other contacts. Therefore, HBV vaccination would probably be needed for these age groups.

CONCLUSION

In this study, a 17.9% total exposure rate of HBV, and 3% of HBSAg carriers are lower than the other regions of Saudi Arabia but much higher than the Western countries. However, 3% of HBSAg together with 8.7% for anti-HBc (alone) make a total of 11.7% of

the population studied potentially infectious and their donated blood will be unsuitable for transfusion.

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