

PREVALENCE OF HEPATITIS B SURFACE ANTIGEN AS A SEROLOGICAL MARKER IN HBV INFECTION

***Raminder Sandhu & **Gaurav Sharma**

*Assistant Professor, Department of Microbiology,

BPS Govt. Medical College for Women, Khanpur Kalan, Sonapat (Haryana), India.

** Professor and Head, Department of Forensic Medicine,

BPS Govt. Medical College for Women, Khanpur Kalan, Sonapat (Haryana), India.

*Corresponding Author Email: sandhuraminder19@yahoo.com

ABSTRACT

Hepatitis B virus infection (HBV) is a global public health problem. The areas of intermediate endemicity (2-7%) include South Asia, Eastern and Southern Europe, Russia and Central and South America. India being the largest nation in South Asia region and by its sheer population bears the bulk of HBV burden accounting for 10-15% of the entire pool of HBV carriers of the world. The aim of this study was to determine the prevalence of HBsAg carriers who are the part of infectious pool and to determine the trend of HBV infection among the patients attending the various clinical departments of BPS Govt. Medical College for Women, Khanpur Kalan. Both the inpatients and outpatients in whom HBsAg detection was advised on the basis of clinical findings, demographic & risk factors, as a part of pre-operative screening & antenatal screening were included in the study. Blood sample was collected by standard procedure and sera analyzed by an immunoassay using one step HBsAg Rapid Card Test for qualitative detection of HBsAg. Samples which were repeatedly reactive for HBsAg were considered positive. Out of 4019 patients tested, seropositive cases were 115 (2.8%). Sero positivity among males and females were 5.174% and 1.662% respectively. In the present study, highest prevalence of sero positivity was seen among the age group of 21-30 years. The promising way of decreasing HBV infection is to implement routine vaccination of high risk young adults especially those attending sexually transmitted disease centers, drug treatment and rehabilitation centers.

KEY WORDS

HBsAg, Sero positivity, HBV

INTRODUCTION

The history of modern research on viral hepatitis began in the year 1963, when Nobel Prize winner Baruch S. Blumberg (1925–2011) reported for the first time publicly on the discovery of a new antigen named Australia antigen (AuAg). Thereafter, viral hepatitis type B became a driving force for the development of modern virus diagnostics and vaccines.¹

Based on the prevalence of hepatitis B surface antigen (HBsAg), countries are classified as having high (>8%), intermediate (2-7%) or low (<2%) HBV

endemicity. Areas of high endemicity (where >8% of the population is HBsAg positive) include South-East Asia, China, most of Africa, most of Pacific Islands, the Amazon basin and parts of the Middle East. The areas of intermediate endemicity (2-7%) include South Asia, Eastern and Southern Europe, Russia and Central and South America. On the other hand areas with low endemicity (<2%) include United States, Western Europe and Australia. The South Asian countries, a contiguous block of countries which have been classified together as Global Burden of Disease Regions include Afghanistan, Bangladesh, Bhutan,

India, Nepal and Pakistan. India is the largest nation in the region and by its sheer population bears the bulk of HBV burden in South Asia and accounts for 10-15% of the entire pool of HBV carriers of the world.²

First licensed in United States in 1981, hepatitis B vaccine is now one of the most widely used vaccines in the world and is part of the routine vaccination schedule for many of the world's infants and children. It is the world's first cancer prevention vaccine and the first vaccine to prevent sexually transmitted disease. In countries where large scale vaccination efforts were made in the first decade after introduction of vaccine, the epidemiology of hepatitis B and HBV infection has been transformed. High risk adults may have limited or inconsistent access to health care or their need for vaccination may go unrecognized by health care providers. If the need is identified, there is often limited reimbursement for adult vaccination and minimal public health infrastructure in place for this purpose.³

HBV is transmitted by percutaneous or mucosal exposure to infected blood or other body fluids. HBV transmission has been observed with numerous forms of human contact: perinatal/mother-to-child; household (nonsexual); sexual; needle-sharing; and occupational/health-care-related. The highest concentrations of infectious HBV are found in blood and serum. However, other serum-derived body fluids, such as semen and saliva, are also infectious. Persons with chronic HBV infection are the major reservoir for transmission, although any person testing positive for HBsAg is potentially infectious to both household and sexual contacts. Because HBV can remain stable and infectious on environmental surfaces for at least 7 days, transmission may occur indirectly via contaminated surfaces and other objects. Transmission from a chronically infected woman to her infant during delivery is efficient and is one of the most common routes of HBV infection worldwide. Perinatal transmission of HBV most often occurs during the birth process; in-utero transmission can occur but is rare and accounts for less than 2 percent of perinatal transmissions. The risk of perinatal infection is 5–20 percent in infants born to HBsAg-positive mothers and 70–90 percent if the mother is HBeAg-positive. Transmission of HBV can also occur in situations where there is frequent and

prolonged close personal contact with an infected person. HBV is efficiently transmitted by sexual contact. Sexual contacts of chronically infected persons have been shown to have a higher seroprevalence of HBV infection than control populations, including household (nonsexual) contacts of infected persons. Men who have sex with men (MSM) have long been known to have high rates of disease and they have persistently higher HBV seroprevalence rates than the general population. Countries with intermediate endemicity have a mix of perinatal, horizontal, health-care-related, sexual, and other forms of transmission.³

Apart from exposure from extraneous sources, intrafamilial aggregation of HBV infected persons in a family has been well documented in India. HBsAg contamination of surfaces is widespread in homes of chronically infected persons, which may explain the non-sexual interpersonal spread of HBV infection such as among household contacts. Household contacts of subjects with chronic HBV infection are known to be at high risk of acquiring infection through multiple modes.²

MATERIAL & METHODS

The present study was carried out on 4019 patients tested over a period of one and half year in the Department of Microbiology, BPS Govt. Medical College for Women, Khanpur Kalan, Haryana, India. Both inpatients & outpatients in whom HBsAg detection was advised on the basis of clinical findings, demographic & risk factors, as a part of pre-operative screening & antenatal screening were included in the study. The subjects who had previous history of HBV immunization were excluded. Blood sample (2-3ml) was collected by standard procedure and transported to the lab for testing. In case delay was inevitable, serum sample was separated & stored in refrigerator at 2-8°C till further testing. Blood was allowed to clot & after centrifugation, clean clear serum samples were separated in clean test tubes. The sera were analyzed by an immunoassay based on the antigen capture or sandwich principle by using one step HBsAg Rapid Card Test, Hepacard (J Mitra & Co. Pvt. Ltd.) for qualitative detection of HBsAg as per the

manufacturer's instructions. The kit has sensitivity of 99.8% & specificity >99%. The samples which were positive for HBsAg were further re-tested second time using same kit & method. Samples which were repeatedly reactive for HBsAg were considered positive.

RESULTS

Out of 4019 patients tested over a period of one & a half year, total number of positive cases were 115 (2.86%) as shown in **Table I**.

Gender specific prevalence

The total males tested were 1372, of which 71 (5.174%) remained seropositive, whereas in case of

females, total number tested was 2647, of which 44 (1.662%) were seropositive as shown in **Table I**.

Age specific prevalence in Males

Among males maximum number of HBsAg positive cases belonged to the age group 21-30 years (22.54%) followed by the age group 31-40 years (21.13%) and then the age group 41-50 years (16.90%) as shown in **Table II**.

Age specific prevalence in Females

In case of females, maximum number of HBsAg positive cases were also in the age group 21-30 years (50.00%) followed by the age group 31-40 years (15.91%) and then the age group 61-70 years (9.10%) as shown in **Table III**.

Table I: Prevalence of HBsAg in relation to gender of patients

Gender	Total number tested (%age)	Total seropositive (%age)
Male	1372 (34.13)	71 (5.174)
Female	2647 (65.87)	44 (1.662)
Total	4019 (100.00)	115 (2.86)

Table II: Age wise distribution of HBsAg positive cases in males

Age group	HBsAg positive	Percentage
0-10	2	2.82
11-20	11	15.50
21-30	16	22.54
31-40	15	21.13
41-50	12	16.90
51-60	7	9.85
61-70	7	9.85
71-80	0	0
81-90	1	1.41
Total	71	100.00

Table III: Age wise distribution of HBsAg positive cases in females

Age group	HBsAg positive	Percentage
0-10	0	0
11-20	3	6.82
21-30	22	50.00
31-40	7	15.91
41-50	3	6.81
51-60	3	6.81
61-70	4	9.10
71-80	2	4.55
81-90	0	0
Total	44	100.00

DISCUSSION

The presence of HBsAg in serum indicates active HBV infection, either acute or chronic. The latter observation is the basis for the present use of HBsAg test in many laboratories as well as blood banks, the diagnosis of which in any individual has important management implications, including appropriate counseling, monitoring and/or treating and vaccinating family or at-risk contacts. Keeping in view of such findings, many nations since 1969 initiated screening of blood donors for HBsAg as mandatory and this practice has resulted in the diminution of post transfusion hepatitis by 25%.⁴

In our hospital based study, the sero positivity rate of HBsAg was 2.86% which is in concordance with study done by Bhatta CP et al and Chaudhary I et al who reported prevalence of HBsAg as 2.5% and 2.28% respectively^{5,6}. In India, HBsAg prevalence among different populations and geographical areas varies greatly & very high prevalence has been noted among the aborigine population of Andaman & in the state of Arunachal Pradesh⁷. Prevalence of HBsAg in our study is lower than the study done by Osman EI et al in Khartoum who reported a moderate prevalence of 4.91%⁸. The reason for this lower prevalence can be introduction of HBV vaccination programmes and better screening of blood & blood products before transfusion. Presence of HBsAg indicates symptomatic and asymptomatic carrier states which may progress to serious consequences like cirrhosis and hepatocellular carcinoma⁹.

The present study depicted higher sero positivity rate in males (5.174%) as compared to females (1.662%) which is similar to the studies done by Dutta et al & Sood et al who also showed male predominance^{10,11}. The higher value in males (5.174%) is similar to the study done by Osman EI et al in Khartoum and study done in Nigeria by Okonko IO et al who also reported male predominance of 5.5% and 10.2% respectively^{8,13}. These observations are also comparable with Mehmet D et al who reported higher prevalence rate of HBsAg in males than females in both rural and urban areas with observation that male sex was an important risk factor for HBsAg positivity¹⁴. The reason for high infection rate among the males may be due to habits

such as multiple sexual partners, unprotected sex, sharing of needles in I/V drug abusers, tattooing, acupuncture and sharing of tooth brushes & razors. This may be because of a High immune response in females may also help to clear the HBV more rapidly and efficiently as compared to males¹². In the present study, the prevalence of sero positivity was highest in the age group 21-30 years, both in males as well as in female's i.e 22.54% and 50.00% respectively. This higher prevalence was reported in most sexually active age group. These findings are similar to the study done by Easow LM et al who also reported highest sero positivity among age group 21-30 years¹⁵. These findings are also in concordance with the study done by Buseri FI et al who reported HBV prevalence to be highest among age group 18-27 years¹⁶. The peaking of infection rates in adulthood in Indian population also suggests a close relationship of acquisition of infection in the adults. In an earlier study done by Datta S, frequent exposure to percutaneous injuries, repeated use of parenteral injections for trivial illnesses and the untrained paramedical personnel, lacking in knowledge about modes of sterilization in primary care centers have been found to be the major factors that facilitate transmission of HBV, as well as other viruses in this population². Groups at increased risk for HBV infection are persons with a history of sexually transmitted disease, household contacts of HBV infected persons, health care workers, haemodialysis patients, intravenous drug users, infants born to HBV infected mothers, immigrants and children of immigrants from hyper endemic areas, homosexual men, persons who have more than one sexual partner and sexual partners of HBV infected persons¹⁷.

The age of acquiring infection is the major determinant of the incidence & prevalence rates¹⁸. Safe and effective vaccines against HBV are available. People who are elderly, obese, heavy smokers, undergoing hemodialysis or immunocompromised have sub optimal antibody responses when vaccinated. For this reason, the key is to vaccinate the younger population as broadly as possible for maximal prevention¹⁹.

SUMMARY AND CONCLUSION

Since community based studies are inherently difficult in Indian scenario, so our hospital based population study along with other similar studies can be helpful in knowing the efficacy of HBV immunization programmes, screening of blood & blood products as well the risk factors involved in HBV infection. This study confirmed the presence of HBsAg among apparently healthy patients attending the various clinical departments of our tertiary care centre. The study depicted higher prevalence of hepatitis B surface antigenemia among males as compared to females. The results of the present study can serve as guidelines in formulating the various health care strategies regarding control and prevention of HBV. Since the present study also highlighted the prevalence of HBsAg sero positivity as highest among the young adults, so the most promising way of decreasing HBV infection and its further complications is to implement routine vaccination of high risk young adults especially those attending sexually transmitted diseases centers and drug treatment and rehabilitation centers.

REFERENCES

- Blumberg BS. Hepatitis B- The hunt for a virus killer. Princeton: *Princeton University Press*, 2002.
- Datta S. An overview of molecular epidemiology of hepatitis B virus (HBV) in India. *Virology*, 5:156,(2008).
- Colin WS, Edgar PS, Lyn F, Anthony EF and Beth PB. Hepatitis B Virus Infection: Epidemiology and Vaccination. *Epidemiol. Rev.*, 28:112–125, (2006).
- Raghu KKG, Yogeesh BKV and Basavarajappa KG. Prevalence of hepatitis B surface antigen among patients attending a tertiary care centre, Davangere. *J.Evol.Med.Dent.Sci.*, 2(31):5856-5861, (2013).
- Bhatta CP, Thappa B and Rana BB. Seroprevalence of Hepatitis B in Kathmandu Medical College Teaching Hospital. *Kathmandu.Univ. Med. J. (KUMJ)*, 1:113-116,(2003).
- Chaudhary I, Khan SS, Majrooh MA and Alvi AA. Seroprevalence of Hepatitis B and C among patients reporting in a surgical OPD at Fauji Foundation Hospital, Rawalpindi: Review of 5 year literature. *Pak. J. Med. Sci.*, 23: 514-517,(2007).
- Chaudhary A. Epidemiology of Hepatitis B virus in India. *Hep B. Annual.*, 1:17-24,(2004).
- Osman El, Abdulrahman NA, Abbass O, Omer WH, Saad HA and Hamid MMA. Prevalence of Hepatitis B surface antigen and Hepatitis C virus antibodies among pre-surgery screened patients in Khartoum, Central Sudan. *J.Gen.Mol.Virol.*, 4(1):6-9,(2012).
- Mc Mohan B J. Hepatitis B related sequelae: prospective study in 1400 hepatitis B surface antigen positive Alaska native carriers. *Arch. Intern. Med.*, 150:1051-1054,(1990).
- Dutta S, Shivananda PG and Chatterjee A. Prevalence of Hepatitis B antigen and antibody among hospital admitted patients in Manipal. *Indian.J.Public.Health.*, 38:108-112,(1994).
- Sood S and Malvankar S. Seroprevalence of Hepatitis B surface antigen, antibodies to the Hepatitis C virus, and human immunodeficiency virus in a hospital-based population in Jaipur, Rajasthan. *Indian.J.Community.Med.*, 35:165-169,(2010).
- Cariappa MP, Jayaram J, Bhalwar R, Praharaj AK, Mehta VK and Kapur LK. Epidemiological differentials of Hepatitis B carrier state in the army: A community based seroepidemiological study. *Med.J.Armed.Forces. India.* 60:251-254,(2004).
- Okonko IO, Okerentugba PO and Akinpelu AO. Prevalence of HBsAg among Attendees of ARFH Centre in Ibadan, Southwestern Nigeria. *Am-Euras. J. Sci. Res.*; 7(3):100-105,(2012).
- Mehmet D, Meliksah EY, Serif S, Gunay OT and Zeynep S. Prevalence of Hepatitis B infection in the southeastern region of Turkey: Comparison of risk factors for HBV infection in rural and urban areas. *J. Infect. Dis.*, 58:15-19, (2005).
- Easow LM, Shankar PR, Tuladhar R and Singh YI. Sero epidemiology of Hepatitis B virus infection diagnosed at a teaching hospital in western Nepal: A prospective study. *J. Clin. Diagn. Res.*, 4: 3100-3189,(2010).
- Buseri FI, Muhibi MA and Jeremiah JA. Sero-epidemiology of transfusion transmissible infectious diseases among blood donors in Osogbo, South-West Nigeria. *Blood Transfusion*, 7(4): 293-299,(2009).
- Nagmi A, Vishnu PAL and Mishra R. Seroprevalence of HBsAg among blood donors in and around Bhopal. *Int. J. Pharm. Res.*, 5(2):114-118,(2013).
- Ezgbudo CN, Agbonlahor DE, Nwobu GO, Igwe CU, Agba MI, Okpala HO and Ikaraoha CI. The seroprevalence of hepatitis B surface antigen and human immunodeficiency virus among pregnant women in Anambra state, Nigeria. *Department of Internal Medicine Shiraz E-Medical J*, 5(2):1-8, (2004).
- Zanetti AR, Van Damme P and Shouval D. The global impact of vaccination against hepatitis B: A historical overview. *Vaccine*, 26(49):6266-6273,(2008).



***Corresponding Author:**

Dr. Raminder Sandhu, MD

Assistant Professor,

Department of Microbiology,

BPS Govt. Medical College for Women,

Khanpur Kalan, Sonapat (Haryana), India-131305.

E-mail : sandhuraminder19@yahoo.com

Ph - 91-9992111931