

Blood Bank as a Resource Centre for Anti HBs Sero-prevalence Study to Assess HBV Vaccination Status Among Blood Donors: A Preliminary Study

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Abstract :

Background: Hepatitis B virus infection is a major global health problem with significant morbidity and mortality. India falls in intermediate endemic zone with high disease burden. Despite Universal HBV Vaccination in childhood, full compliance of HBV vaccination is unclear with unknown protective anti HBs titer in adult population after HBV vaccination. Testing for anti HBs levels in blood donors may reflect rough estimates of immunity against Hepatitis B Virus in a particular area or region. The role of blood bank as a primary resource center for quick estimation of Anti HBs sero-prevalence may help to start adult HBV vaccination program in that area.

Aim : To study sero-prevalence of anti HBs and anti HBc Total among blood donors attending Nehru Hospital, PGIMER, Chandigarh.

Methods: Blood donors who were donating blood at Nehru Hospital, PGIMER were included in the study after taking written consent. 3 ml blood sample of these blood donors negative for HBsAg, Anti HIV, Anti HCV, TPHA were stored at -20°C and further tested for anti HBs and anti HBc Total by ELISA in the Department of Gastroenterology, PGIMER, Chandigarh.

Result: 580 blood donors were included in the study. Overall 436 blood donors (75.17%) were negative for anti HBs and anti HBc Total signifying these donors were not vaccinated for Hepatitis B vaccine earlier. 101 blood donors (17.41%) were positive for anti HBs and negative for anti HBc Total indicating earlier Hepatitis B vaccine compliance. 43 blood donors (7.41%) were anti HBc Total positive indicating their past history of HBV exposure.

Conclusion: 75.17% of blood donors attending Nehru Hospital, PGIMER were not vaccinated against Hepatitis B virus. Blood bank could be an easily accessible resource center to estimate and start adult Hepatitis B vaccination program in an area or region.

Key words: Adult HBV vaccination, HBsAg, Anti-HBs, Anti HBc Total

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I. Introduction:

Hepatitis B virus (HBV) infection is a major global health problem with significant morbidity and mortality (1). India falls in an intermediate endemic zone (prevalence of 2 - 7%, with an average of 4%), with a disease burden of approximately 50 million (2). Universal HBV vaccination during childhood has dramatically reduced the incidence of HBV infection in several countries. But full compliance of HBV vaccination in a population is unclear, that too of adult population in our scenario. Anti HBs level in adults reflects the HBV vaccination compliance done during childhood. Testing of anti HBs levels in blood donors at a blood bank reflects rough estimates of immunity against HBV in adults of that particular area or region. The anti HBs level of blood donors attending Blood Bank, PGIMER for blood donation is not known which needs to be evaluated. The outcome of the study may lead to fresh HBV vaccination in those adults who were not vaccinated earlier due to any reason.

II. Objective :

To study sero-prevalence of anti HBs and anti HBc Total among blood donors attending Nehru Hospital, PGIMER, Chandigarh.

III. Materials and Methods:

Study Design : Prospective study

Study Method : Blood donors donating blood at Nehru Hospital ,PGIMER, Chandigarh were included in the study. Past history of HBV vaccination, jaundice etc. were noted. Blood donors who were negative for HBsAg, Anti HCV, Anti HIV and TPHA were included in the study. Blood samples (3 ml.) of these donors were stored at -20⁰ C and further tested for Anti HBs and Anti HBcTotal by ELISA in Department of Gastroenterology, PGIMER Chandigarh.

Ethical Considerations: Informed consent were taken from each donor before its inclusion in the present study. There was no additional physical or financial burden on the donors. Ethical clearance was obtained from Institute Ethics Committee.

IV. Results:

The present study included 580 blood donors. They were aged between 18 to 61 years (Mean 31.83 years, Standard Deviation 8.56 years, median 30 years). They were mostly men (n= 570, 98.27%).The median income of donor was Rupees Three Lakhs per annum (Range- Rupees Thirty Thousand to Rupees Fifty Two Lakhs per annum).The period of study was between 28/2/2020 to 21/8/2020 during which blood were collected from donors at different intervals at Blood Bank, PGIMER, Chandigarh. Positive anti HBs was defined as Anti HBs \geq 10 mIU/ml and Negative Anti HBs if detected level was of Anti HBs \leq 10 mIU/ml. A total of 436 (75.17%) donors were Anti HBs Negative and Anti HBc Total negative (Table 1).This meant that 75.17% donors were not vaccinated against Hepatitis B virus. Only 17.41% of blood donors (n=101) were positive for Anti HBs and negative for Anti HBc Total, meaning that they had taken HBV vaccinations earlier. 43 blood donors (7.41%) of the study group were Anti HBc Total positive signifying past history of HBV exposure. Among 43 Anti HBc Total positive donors, 35 donors (6.03%) were positive for Anti HBs, rest 8 donors (1.37%) were negative for Anti HBs.

Table No. 1. Serology Profile of Blood Donors (n = 580)

Sl. No.	Serology Markers	No. of Blood Donors	Percentage
1.	Anti HBs Negative + Anti HBc Total Negative	436	75.17 %
2.	Anti HBs Positive + Anti HBc Total Negative	101	17.41 %
3.	Anti HBs Positive + Anti HBc Total Positive	35	6.03 %
4.	Anti HBs Negative + Anti HBc Total Positive	08	1.37 %

Note : Anti HBs Positive : > 10 mIU/ml , Anti HBs Negative : < 10 mIU/ml , All were HBsAg, Anti HCV, Anti HIV, TPHA Negative

Anti HBs sero- positivity varied according to different age group among blood donors (Table 2). Maximum number Anti HBs positivity was among 25- 34 years age group. These included HBV vaccinated donors and donors with past history of exposure to HBV.

Table No. 2. Anti HBs sero-positivity in Blood Donors according to Age (n = 580)

Sl. No.	Age Group	Anti HBs Positive (Anti HBs > 10 mIU/ml)	Anti HBs Negative (Anti HBs < 10 mIU/ml)
1.	18 - 24 years	38 (6.55 %)	71 (12.24 %)
2.	25 - 34 years	57 (9.82 %)	230 (39.65 %)
3.	35 - 44 years	26 (4.48 %)	98 (16.8 %)
4.	45 - 54 years	14 (2.41 %)	38 (6.55 %)
5.	> 55 years	01 (0.17 %)	07 (1.2 %)

Note : Donors included Anti HBc total Negative and Anti HBc Total Positive

The mean Anti HBs titers varied in different age groups among vaccinated blood donors (Table 3). Higher mean Anti HBs titer was among 18-24 years and 25-34 years of blood donors. Blood donors between 45 to 54 years had lower level of anti HBs antibodies.

Table No. 3. Anti HBs Titers among Healthy Blood Donors (n = 101)

Sl. No.	Age Group	Anti HBs Titers (Mean \pm S.D.)
1.	18 - 24 years (n = 31)	245.06 mIU/ml \pm 323.57 (Range 14 - 1300 mIU/ml)
2.	25 - 34 years (n = 39)	240.63 mIU/ml \pm 331.62 (Range 12 - 1190 mIU/ml)
3.	35 - 44 years (n = 19)	163.11 mIU/ml \pm 293.7 (Range 16 - 1150 mIU/ml)
4.	45 - 54 years (n = 11)	106.81 mIU/ml \pm 162.27 (Range 13 - 450 mIU/ml)
5.	> 55 years (n = 1)	19 mIU/ml

Note : All donors were Anti HBc Total Negative

A total of 43 blood donors (43/580,7.41 %) were Anti HBc Total positive signifying previous exposure to HBV infection (Table 4). Among them 35 donors were Anti HBs positive with 26 blood donors having high level of Anti HBs titer. Rest 8 donors had undetectable Anti HBs level i.e. less than 10 mIU/ml.

Table No. 4. Anti HBs levels in Anti HBc Total Positive Blood Donors (n = 43)

Sl. No.	Number of Donors	Anti HBs Level
1.	08	0 - 09 mIU/ml (undetectable)
2.	09	10 - 100 mIU/ml (low level titer)
3.	09	101 - 500 mIU/ml (high level titer)
4.	06	501 - 1000 mIU/ml (high level titer)
5.	11	1001 - 1400 mIU/ml (high level titer)

V. Discussion

In India Hepatitis B vaccination was launched in 2002 in 14 metropolitan cities. Later Hepatitis B vaccine was introduced in the Universal Immunization Program (UIP) of 10 states in 2007-2008 (3). Coverage with three doses of Hep B vaccine was low in these states due to poor stock management, incomplete recording and incomplete knowledge amongst health functionaries about vaccination schedule in children in the same study. These factors of low Hep B vaccine birth dose coverage could be the cause for undetectable Anti HBs level in adults. In present study 75.17% of blood donors had no protection against Hepatitis B virus infection as they had undetectable Anti HBs. This could be due to many factors e.g. due to lack of awareness about HBV vaccination, cost of vaccine, low socio economic group, rural background etc. The WHO scientific advisory group of experts (SAGE) to Global Programme for vaccines and immunization (GPV) has indicated the need to expand immunization activities beyond infancy, either as a part of routine immunization services or as a part of disease eradication measures. The number of HBsAg carriers in India is estimated to be over 40 million, hence the need for Hepatitis B vaccine coverage in adults become more important (4). Despite heavy burden of diseases, vaccines recommended for adults are not widely used due to various reasons. These could be that there is limited perception on the part of health care providers and beneficiaries that adult vaccine preventable diseases are significant health problems. Also healthy adults are harder to reach through public health system leading to difficulty in vaccination of this age-group. Hence the need to promote adult vaccination specially for Hepatitis B vaccine. The Hepatitis B vaccination is indicated in all unvaccinated adults at risk for HBV infection and all adults seeking protection from HBV infection including post- exposure prophylaxis. The Advisory Committee on Immunization Practices (ACIP) has recommended Hepatitis B vaccination in all infants, unvaccinated children aged < 19 years, adults aged 19 through 59 years, adults aged 60 years and older with risk factors for Hepatitis B (5). In present study Anti HBs titers in vaccinated healthy blood donors (Anti HBc Total negative) in 18 to 24 years age group was 245.06 mIU/ml \pm 323.57 SD (range : 14 -1300 mIU/ml). A study from Japan mentioned Anti HBs titer in 1085 adults (mean age \pm S.D: 23.2 \pm 1.76) after Hepatitis B vaccination between 100 mIU/ml to < 1000 mIU/ml in 31.6% adults and above 1000 mIU/ml in 50.8% adults (6). Since Anti HBc Total was positive in 43 blood donors (7.41%), it is important to test for Anti HBs and Anti HBc Total in all adults before giving complete dose of Hepatitis B vaccine. A study from Delhi has found Anti HBc Total positivity of 19.8% in voluntary blood donors (7). Similar study from Kerala showed prevalence of 14.6% for positive Anti HBc Total among HBsAg negative blood donors (8). In present study 18.6% (n=8) of Anti HBc Total positive donors lacked Anti HBs antibodies. But 9 donors (20.9%) were anti HBc Total positive with low level of Anti HBs titer and 60.46% (n=26) donors had high level of Anti HBs titer. A study from Delhi showed 37.04% absent Anti HBs, 21.54% low Anti HBs level and 41.4% high level of Anti HBs amongst Anti HBc Total positive donors (7). Since healthy adults are harder to reach directly or through public health system, the blood donors are the optimum group for adult Hepatitis B vaccination after testing for Anti HBs and Anti HBc Total. Even testing for Anti HBs and Anti HBc Total in blood donation camps can give rough estimates of Hepatitis B vaccine coverage in a community for starting adult Hepatitis B vaccination program in that area. Also these donor groups deserve preventive Hepatitis B vaccination for their selfless service being done by donating blood.

VI. Conclusion

75.17 % of blood donors attending Nehru Hospital , PGIMER were not vaccinated against Hepatitis B virus. So blood bank could be the earliest and easily accessible resource centre to know about anti HBs prevalence of blood donors in an area where blood bank is located. It gives a rough observation about HBV vaccine coverage in its locality in order to start adult HBV vaccination programme. Similar data from other blood banks are needed from different region to estimate the need for adult vaccination in working adults. Although other adult family members also may not have been vaccinated. Since details of donors are known, hence they can be pursued or contacted by their phone to urgently get vaccinated against Hepatitis B virus with

three schedules. Similar studies needed from all other blood banks to understand the urgent need for starting adult HBV vaccination in our working population.

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