Hepatitis B surface antigenemia in patients on hemodialysis

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ABSTRACT:

Objective: To estimate the frequency of Hepatitis B surface antigen (HBsAg) in patients on hemodialysis and to study the association of various risk factors in the acquisition of Hepatitis B infection.

Materials and Methods: All patients on long-term hemodialysis in nephrology unit of Shifa International Hospital, Islamabad between January 2002 to June 2003 were studied. Their medical records were reviewed for presence of HBsAg. Any risk factors were noted from the patient’s records and from the history of those patients who were regularly attending the dialysis unit. All data was fed and analyzed using SPSS v 10.0.

Results: A total of 97 patients on hemodialysis were included in the study. Out of these, 12 (12.4%) were found to be HBsAg positive. The mean age of study participants was 54.93 ± 15.09 years. The mean age of HBsAg positive patients was significantly lower than those who were HBsAg negative. HBsAg positive patients (n=12) were compared with HBsAg negative patients (n=85) with regards various risk factors such as history of dialysis more than 2 years, history of transplant, history of transfusion and history of injections. HBsAg positive group had significantly greater proportion of
patients with a history of dialysis more than 2 years (58.3% versus 16.5%), with an unadjusted p-value of 0.003. When adjusted for the confounding risk factors the adjusted p-value obtained was 0.007. No significant association of any other risk factor with HBsAg positivity was found.

**Conclusion:** Patients on hemodialysis in our unit had 12.4% positivity of HBsAg and history of dialysis more than 2 years was noted to be a significant risk factor for acquisition of infection in these patients.

**Key words:** Hemodialysis, HBsAg, and hepatitis B.

**INTRODUCTION:**
Hepatitis B remains a disease with a low endemicity in Pakistan (1). A prevalence of 3% was noted for hepatitis B surface antigen (HBsAg) in normal individuals of Karachi (2). In an earlier study of healthy population in our area, we found a prevalence of 2.56% in nearly 50,000 adult subjects (3). In volunteer blood donors, the prevalence has been noted to be 0.82% (4). Besides Pakistan, 1.3% healthy population was found to be HBsAg positive in UAE (5) and 1.07% was noted to be positive in Iran (6). Significant association of transmission of hepatitis B virus (HBV) infection has been noted with the transfusion of blood and its products, by contaminated surgical instruments and by administration of intramuscular injections (7).

Hepatitis B virus infection has been also noted to be present in patients on hemodialysis and end-stage renal disease (8). Several factors including exposure to contaminated equipments and patient-to-patient transfer has been noted (8,9). When HBV infection is associated with concomitant infection with hepatitis C virus (HCV), it can lead to aggressive liver disease and cirrhosis (9). Infection of both these viruses has been noted to be more frequent in Indian subcontinent (10). Presence of hepatitis B virus markers as high 36% has been noted from dialysis units in Japan (11). The prevalence of HBV was just 1.63% reported from the dialysis units in Switzerland (12). The aim of this study
was, therefore, to evaluate our hemodialysis unit for positivity of HBsAg in these patients and their associated risk factors.

**MATERIALS AND METHODS:**

This retrospective descriptive study was carried out at Shifa International Hospital, Islamabad. Medical records of all patients attending the hemodialysis unit of the hospital from January 2002 to June 2003 were reviewed and presence or absence of HBsAg was noted. Demographic characteristics of study participants were noted. Information was collected from the study participants with regards the risk factors under study including years of dialysis, history of transplant, transfusion, surgery and intramuscular Injections. Hepatitis B surface antigen assay was performed by ELIZA Method (AXYEM, Abbott Laboratories, North Chicago, IL, USA) in all the patients. The Ethics committee and the Institutional Review Board of Shifa International Hospital approved the study. Informed consent was obtained from the study participants.

**Statistical Analysis:**

All data was entered in statistical software package SPSS 10 (SPSS Chicago, USA) for analysis. Descriptive Statistics were obtained. T test was done to compare the mean values of quantitative variables among the Hepatitis B surface antigen positive and negative patients. Chi-square test was done to test the association of various risk factors with HBsAg positivity. Binary Logistic regression analysis was performed to test the association of HBsAg positivity with various risk factors taking account of confounding and adjusted p-values were obtained. A p value of <0.05 was considered significant.

**RESULTS:**

A total of 97 patients on hemodialysis were studied. A total of 12 (12.4%) were found to be HBsAg positive (Fig 1). The mean age of all patients was 54.9±15.1 years. There
were 64 (66%) males and 33 (34%) females. HBsAg positive patients were significantly younger (43.16 ± 15.13 years) as compared to HBsAg negative patients (56.6 ± 14.42 years). This difference was statistically significant (p=0.003) as shown in table 1. Out of the 12 patients who were HBsAg positive 10 (83.3%) were males. Serum creatinine level among HBsAg positive patients (13.5 ± 5.97mg/dl) was significantly higher than HBsAg negative patients (10.94 ± 3.47), p=0.03 (table 1).

Chi-squared test was done to test the association of various risk factors under study with HBsAg positivity status among hemodialysis patients. As shown in table 2, only history of dialysis more than 2 years was found to be significantly associated with HBsAg positivity (p=0.003). Other risk factors under study, which were history of transplant, history transfusion, history of surgery and history of injections, were not significantly associated with HBsAg positivity. Binary Logistic regression analysis was done to control the effect of confounding and see the direct effect of a single risk factor on HBsAg positivity. As such, adjusted p-values were obtained as shown again in Table 2. History of dialysis more than 2 years was still significantly associated with HBsAg positivity (p=0.007) although the effect was slightly reduced.
HBsAg frequency among Hemodialysis patients

- HBsAg -ive = 85 (87.6%)
- HBsAg +ive = 12 (12.4%)

Table-1

Comparison of groups: Hepatitis B positive and negative patients on Hemodialysis

<table>
<thead>
<tr>
<th></th>
<th>HBV positive (n=12)</th>
<th>HBV negative (n=85)</th>
<th>P values*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) Mean± SD</td>
<td>43.2 ±15.1</td>
<td>56.6±14.4</td>
<td>0.003</td>
</tr>
<tr>
<td>Male sex Number (% age)</td>
<td>10 (83.3%)</td>
<td>54 (63.5%)</td>
<td>0.18</td>
</tr>
<tr>
<td>Creatinine level(mg/dl) Mean ±SD</td>
<td>13.5±5.9</td>
<td>10.9±3.5</td>
<td>0.03</td>
</tr>
</tbody>
</table>

*t-test was done to compare the mean values.
Table-2
Comparison of Risk factors among HBV positive and negative patients on Hemodialysis

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>HBV positive (n=12) #(%age)</th>
<th>HBV negative (n=85) #(%age)</th>
<th>P-value* (Unadjusted)</th>
<th>P-value ● (Adjusted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dialysis more than 2 years</td>
<td>7(58.3%)</td>
<td>14(16.5%)</td>
<td>0.003</td>
<td>0.007</td>
</tr>
<tr>
<td>Transplant</td>
<td>4(33.3%)</td>
<td>9(10.6%)</td>
<td>0.05</td>
<td>0.22</td>
</tr>
<tr>
<td>Transfusion</td>
<td>5(41.7%)</td>
<td>16(18.8%)</td>
<td>0.13</td>
<td>0.59</td>
</tr>
<tr>
<td>Surgery</td>
<td>7(58.3%)</td>
<td>26(30.6%)</td>
<td>0.10</td>
<td>0.94</td>
</tr>
<tr>
<td>Injection</td>
<td>10(83.3%)</td>
<td>42(49.4%)</td>
<td>0.06</td>
<td>0.11</td>
</tr>
</tbody>
</table>

*ChiSquare test used to test the association between the two groups and obtain p-values. Fisher’s Exact test used for tables with expected frequency in any cell less than 5.
●Adjusted for history of dialysis more than two years, transplant, transfusion, Surgery and injection.

DISCUSSION:
There were 12 (12.4%) patients who were positive for HBsAg in this series. It is not known whether these patients were HBsAg positive before the start of dialysis or became positive during the dialysis. However, with increasing duration of the dialysis, positivity of the virus generally has been noted to increase. Studies had shown that the history of hemodialysis, previous blood transfusions and duration of renal replacement therapy are associated with increased positivity for HBV (13). Also, it has been noted that the risk of HBV infection correlates with the duration of hemodialysis and the number of transfusions (9). Acceptance of HBsAg screening whereby infected patients have been identified and isolated in past 25 years and consequently, the hepatitis B now has been less frequent in many dialysis units (8).
It is important that we take appropriate precautions to modify the risk factors so that transfusion and nosocomial spread and transmission by improper therapeutic injections can be controlled (14). Although these patients have lower response to hepatitis B vaccine, it is important that this very helpful method of prevention be advised to these patients (9). In addition, we need to improve our blood bank practices, which are still deficient, and proper screening of blood is not taking place (15). In the hemodialysis units, patients need to have dedicated dialysis machines for positive patients and they should be isolated and universal precautions should be observed to prevent the nosocomial transmission of hepatitis B virus. The fact that the patients who were HBsAg positive were significantly younger than those who were not and history of dialysis more than 2 years to be a significant risk factor for transmission of this infection has important Public Health implications for prevention and reduction of transmission.

In conclusion, this study shows that 12.4% patients on hemodialysis were positive for hepatitis B surface antigen. Although this figure is in the medium range of seropositivity but is higher than the positivity of virus in general population. Therefore, universal precautions, isolation and dedicated machines should be used in dialysis units to prevent the acquisition and transmission of hepatitis B virus in dialysis units.

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