

# Seroprevalence of Hepatitis B in maintenance dialysis patients and associated risk factors in tertiary care institute

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## Abstract

**Background:** The prevalence of HBV in dialysis population is reported to range between 3.4% to 42%. The prevalence of HBsAg depends on various factors like duration of patient being on hemodialysis, multiple blood transfusions, use of multiple centers for hemodialysis, number of times the dialyser is reused, socio demographic factors and prevalence of HBsAg in local population. **Aims and Objectives:** To study the seroprevalence of hepatitis B in maintenance dialysis patients and associated risk factors in tertiary care institute. **Materials and Method:** In the present study all patients of ESRD with Arteriovenous fistula and registered in the study institute and requiring regular maintenance hemodialysis for atleast 2 months included. Total 100 patients were enrolled. Patients were informed and written consent obtained to collect blood sample for the present study purpose. Testing was done by the HBsAg one step ultra Hepatitis-B surface antigen test device HEPACARD manufactured by J. Mitra and Co. Ltd. It is a qualitative, one step enzyme immunoassay for the detection of HBsAg in human serum or plasma. But in the present study only serum was used for practical purposes. **Results:** It was observed that out of total 100 patients in the present study 6% were HBsAg positive. Out of total 5 patients in the age group of 61- 70 years 4 (80%) were HBsAg positive. The difference observed in the age, sex and social economic class distribution was not statistically significant. The duration of dialysis of HBsAg positive and negative patients with mean durations was 231.16±69.39 days and 181.07±50.63 days respectively. The difference observed between the duration of dialysis of HBsAg positive and negative patients was statistically significant. The association of HBsAg in patients on hemodialysis with more than 6 units of blood transfusion with patients on hemodialysis receiving less than 6 blood transfusions was done and the difference was statistically significant. It was seen that the patients on hemodialysis in more than 1 centre were at increased risk of sero-positivity. The association of sero-positivity in vaccinated patients with patients not vaccinated or incompletely vaccinated was statistically significant. **Conclusion:** Thus we conclude that the seroprevalence of hepatitis B in maintenance dialysis patients was 6% in the study institute. The risk factors associated with HBsAg and found statistically significant were duration of hemodialysis, use of multiple centers for hemodialysis, lack of HBV vaccination and multiple blood transfusions. **Key Words:** Hepatitis B, prevalence, maintenance hemodialysis.

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## INTRODUCTION

End-stage renal disease (ESRD) subjects on maintenance hemodialysis are at high risk for HIV and hepatitis B virus infection<sup>1,2</sup>. Parenteral route is the major route for HBV transmission<sup>3</sup>. The process of hemodialysis requires vascular access for prolonged period<sup>4</sup>. Furthermore, ESRD patients are immunosuppressed<sup>5,6</sup> that increases their susceptibility to infection requiring frequent hospitalization and surgery, which again increases their risk for exposure to nosocomial infections<sup>4</sup>. The prevalence of HBsAg has shown a declining trend in

developed countries. But still it is a major problem in developing countries. In hemodialysis both patients as well as staff are at high risk for infection. The prevalence of HBV in dialysis population is reported to range between 3.4% to 42%<sup>7</sup>. The prevalence of HBsAg depends on various factors like duration of patient being on hemodialysis, multiple blood transfusions, use of multiple centers for hemodialysis, number of times the dialyser is reused, socio demographic factors and prevalence of HBsAg in local population. The risk of transmission of HBV infection due to blood from one patient to another is mostly because of inadequate precautions taken by dialysis staff, needle stick injuries, breakdown of standard infection control practices, physical proximity to infected patients, dialysis machines, dialysis membranes and hemodialysis ultrafiltrates<sup>2</sup>. Thus the present study was conducted with the aim to determine the prevalence of HBsAg in patients on maintenance hemodialysis and factors responsible for the prevalence, so that adequate preventive measures are implemented.

## MATERIALS AND METHOD

The present study was conducted in the Nephrology Unit of Department of Medicine of Government Medical College and Hospital, Aurangabad. Following inclusion and exclusion criteria was used to select the study patients.

### Inclusion Criteria

- The patients fulfilled the criteria set by the National Kidney Foundations' Kidney Disease Outcome Quality Initiative for diagnosing CRF.
- All patients of ESRD with Arteriovenous fistula and registered in the study institute and requiring regular maintenance hemodialysis for atleast 2 months included.

### Exclusion Criteria

- Patients of acute renal failure requiring temporary dialysis were excluded.
- Patients not giving consent for study.

Thus by using the above mentioned inclusion and exclusion criteria total 124 patients were enrolled during the period of study. Out of them 12 patients were excluded as they were lost for follow up or died before completing 2 months on hemodialysis. 10 patients did not consent for the study. Thus total 100 patients were studied in detail and were analysed.

First the patients were given health education regarding HBV infection, modes of transmission, nature and prognosis of hepatitis-B infection and preventive measures including vaccination and vaccination schedules. Patients were informed and written consent obtained to collect blood sample for the present study

purpose. The patients were informed about the test results next day. Patients found negative were counseled about the need of vaccination and were vaccinated. Vaccine dose used was 1ml per dose given intramuscularly at 0, 1, 2, 6 months as recommended for maintenance hemodialysis patients.

Testing was done in the microbiology department of the study institute. It was done by the HBsAg one step ultra Hepatitis-B surface antigen test device HEPACARD manufactured by J. Mitra and Co. Ltd. It is a qualitative, one step enzyme immunoassay for the detection of HBsAg in human serum or plasma. But in the present study only serum was used for practical purposes. The Data was collected by filling a proforma which was then entered in MS Excel spreadsheet 2007.

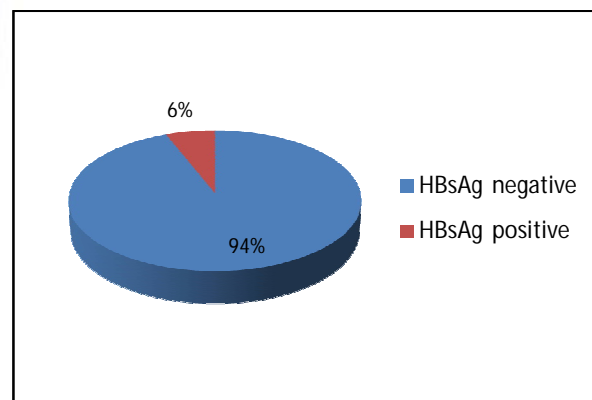
Statistical analysis was done by using Fishers exact test, student unpaired t test and Chi squares test etc.

## RESULTS

**Table 1:** Prevalance of HBsAg in patients on maintenance hemodialysis

|                  | Number of positives | Percentage |
|------------------|---------------------|------------|
| Total patients   | 100                 | 100        |
| HBsAg negative   | 94                  | 94%        |
| HBsAg prevalence | 6                   | 6%         |

It was observed that out of total 100 patients in the present study 6% were HBsAg positive, thus the prevalence of HBsAg among the patient son maintenance dialysis was 6%.



**Figure 1:** Prevalance of HBsAg in patients on maintenance hemodialysis

**Table 2:** Distribution of HIV and HBsAg status according to age

| Variable     | HBsAG positive | HBsAG Negative | Total patients | P value |
|--------------|----------------|----------------|----------------|---------|
| Age group    |                |                |                |         |
| 11 to 20     | 0              | 4              | 4              | 0.19    |
| 21 to 30     | 1              | 6              | 7              |         |
| 31 to 40     | 2              | 9              | 11             |         |
| 41 to 50     | 2              | 54             | 56             |         |
| 51 to 60     | 0              | 17             | 17             |         |
| 61 to 70     | 1              | 4              | 5              |         |
| Sex          |                |                |                |         |
| Male         | 5              | 62             | 67             | 0.66    |
| Female       | 1              | 32             | 33             |         |
| Social class |                |                |                |         |
| I            | 0              | 1              | 1              | 1.00    |
| II           | 0              | 10             | 10             |         |
| III          | 1              | 9              | 10             |         |
| IV           | 0              | 14             | 14             |         |
| V            | 5              | 70             | 75             |         |
| <b>Total</b> | <b>6</b>       | <b>94</b>      | <b>100</b>     |         |

It was seen that the distribution of HBsAg positives in various age groups ranging from 21 years to 70 years with mean age of 41 years. Out of total 5 patients in the age group of 61- 70 years 4 (80%) were HBsAg positive thus the prevalence was highest in age group 61 to 70 (20%). It was seen that among the HBsAg positive patients; 5 were male. The distribution of HBsAg positives according to social class, as depicted above 5 of 6 patients belonged to social class 5 whereas 1 belonged to social class. But the difference observed in the age, sex and social economic class distribution was not statistically significant.

**Table 3:** Distribution of HBsAg positive status with respect to duration of dialysis

| HBsAg    | Mean $\pm$ SD      | t value | P value |
|----------|--------------------|---------|---------|
| Positive | 231.16 $\pm$ 69.39 | 2.29    | 0.02    |
| Negative | 181.07 $\pm$ 50.63 |         |         |

The duration of dialysis of HBsAg positive and negative patients with mean durations was 231.16 $\pm$ 69.39 days and 181.07 $\pm$ 50.63 days respectively. The difference observed between the duration of dialysis of HBsAg positive and negative patients was statistically significant.

**Table 4:** Distribution of HIV and HBsAg positive status with respect to blood transfusion

| Risk factor                             | HBsAg positive | HBsAg negative | Total      | P value |
|---|----------------|----------------|------------|---------|
| Blood Transfusion                       |                |                |            |         |
| 0 to 6 units                            | 1              | 58             | 59         | 0.040   |
| > 6 units                               | 5              | 36             | 41         |         |
| Centers of dialysis                     |                |                |            |         |
| > 1 centre of dialysis                  | 5              | 26             | 31         | 0.0105  |
| Single centre of dialysis               | 1              | 68             | 69         |         |
| HBV vaccination status                  |                |                |            |         |
| Complete                                | 0              | 58             | 58         | 0.0044  |
| Not vaccinated/ incompletely vaccinated | 6              | 36             | 42         |         |
| <b>Total</b>                            | <b>6</b>       | <b>94</b>      | <b>100</b> |         |

The association of HBsAg in patients on hemodialysis with more than 6 units of blood transfusion with patients on hemodialysis receiving less than 6 blood transfusions was done and the difference was statistically significant with p value 0.040 using Fischers exact test. Thus indicating that blood transfusion of more than 6 units was an important risk factor. It was seen that the patients on hemodialysis in more than 1 centre were at increased risk of sero-positivity and the difference was also statistically significant. The comparison of outcome (sero-positivity) in patients on hemodialysis vaccinated patients with patients not vaccinated or incompletely vaccinated was studied and the difference was statistically significant with p value of 0.0044 using Fishers exact test, indicating that lack of vaccination was an important risk factor for HBsAg.

## DISCUSSION

The present study was carried out in nephrology unit under Department of Medicine of Government medical college, Aurangabad with the aim to study the prevalence of HBV infection among maintenance hemodialysis patients. In the present study total 100 patients were enrolled and there was a male: female ratio of 2.44: 1. The mean age was 46.04 years. The youngest patient was 15 years of age and the oldest 62 years of age with mean age of 43 years. This showed the broad variation in age in our study group highlighting the preponderance of CRF across a very large age group. It was seen that 6 patients were found to be positive for HBsAg thus the prevalence of HBsAg was 6%. The findings of the present study were comparable with the prevalence observed by Varghese *et al*<sup>8</sup> (5.76%), Reddy *et al*<sup>9</sup> (5.22%) and KK Murthy *et al*<sup>10</sup> (4%) in their studies. The prevalence of present study was comparable with some international studies also. Qadi *et al*<sup>11</sup> from Saudi Arabia reported

prevalence of 5.88% while Bisek *et al*<sup>12</sup> from Brazil and Al hijazat *et al*<sup>13</sup> from Jordan reported 5.9% each. C.A.Onykwere *et al*<sup>14</sup> from Nigeria reported the prevalence of 6%. It was seen that the prevalence of HBsAg was distributed over a wide range of 21 to 70 years of age with mean age of 43 years; there was no association between age and sero-prevalance. Mirta Mahdavamazdeh *et al*<sup>15</sup> study demonstrated that there was a statistically significant association between age of patient and seroprevalance, younger age being more susceptible. The prevalence of HBsAg was more in males but the association was not statistically significant, as the study population had two times more number of males than females. The association of social class with HBsAg was not statistically significant as even though 5 of the 6 positives were from class 5, the class comprised of 75% of the study population. The difference in durations of dialysis between HBsAg positive and negative was statistically significant indicating that patients undergoing hemodialysis for prolonged duration were at an increased risk of acquiring HBsAg. This association was consistent with studies of, Bisek *et al*<sup>12</sup>, Al hijazat *et al*<sup>13</sup> and Burdrick *et al*<sup>16</sup> which found significant association between duration of dialysis and HBsAg positive status. Patients undergoing hemodialysis for prolonged periods are exposed to more stay in hemodialysis ward that increases the chances of getting infected by different means as discussed previously in review of literature. The association of HBsAg with number of blood transfusions i.e patients receiving >6 blood transfusions with <6 blood transfusions was compared and it was seen that the difference between two proportions was statistically significant indicating that patients getting more than 6 blood transfusions were at an increased risk of acquiring HBsAg. The findings were in agreement with Cao *et al*<sup>17</sup> study that showed conclusively that blood transfusions increase the risk. This was also in agreement with literature that says that blood transfusions increase the risk of HBsAg positivity. Reddy *et al*<sup>9</sup> also studied prevalence of hepatitis B in maintenance hemodialysis patients, the study showed multiple blood transfusions as a risk factor. But Bisek *et al*<sup>12</sup> and Al hijazat *et al*<sup>13</sup> studies failed to show association between blood transfusions and HBsAg positivity status. The association of HBsAg with use of more than 1 centers of dialysis i.e. comparing patients receiving dialysis from >1 centre with patients taking dialysis from the same centre and the difference between two proportions was statistically significant indicating that patients getting dialysis from more than 1 center were at an increased risk of acquiring HBsAg. This was in agreement with previous studies. Bisek *et al*<sup>12</sup> in their study showed conclusively that use of more than one centre was a definite risk factor for

HBsAg positivity. The dialysis centre of the study institute is a major tertiary care centre in government setup and has a large turnover of patients as compared to peripheral dialysis centers. Different centers have different protocols for infection control. The association indicates poor measures taken for infections control like poor disinfection of machines, poor hygiene, poor screening of blood bags for HBsAg and lack of awareness about the spread of parenterally transmitted infections at these peripheral dialysis centers. The association of HBsAg with HBV vaccination i.e. comparing patients vaccinated with 4 dose schedule with unvaccinated or incomplete vaccinated was also assessed and the difference between two proportions was statistically significant. Thus it indicates that patients receiving all four doses of vaccine were at a decreased risk of acquiring HBsAg. Al hijazat *et al* in Jordan<sup>13</sup> and Burdrick *et al*<sup>16</sup> intercontinental study showed that lack of vaccination was a significant risk factor. Reddy *et al*<sup>9</sup> study also showed that lack of vaccination was a significant risk factor. Patients of CRF are immunosuppressed and need a modified dosing schedule yet HBV vaccination is known to decrease chances of getting infected with Hepatitis B virus since immunization of all the patients is not a routine practice at this centre, the prevalence is high at this centre.

## CONCLUSION

Thus we conclude that the seroprevalence of hepatitis B in maintenance dialysis patients was 6% in the study institute. The risk factors associated with HBsAg and found statistically significant were duration of hemodialysis, use of multiple centers for hemodialysis, lack of HBV vaccination and multiple blood transfusions.

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