Occult Hepatitis B Virus Infection in Haemodialysis Egyptian Patients with Chronic Hepatitis C

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Abstract: Background: Hepatitis B virus (HBV) and Hepatitis C virus (HCV) are common nosocomial infections that cause higher rates of mortality and morbidity in maintenance hemodialysis (HD) patients than in the general population. Occult HBV (OHBV) infection is a clinical form of hepatitis B in which, despite the absence of detectable hepatitis B surface antigen (HBsAg) in serum, HBV-DNA is present in both serum and hepatocytes **Objective:** To determine the prevalence of OHBV infection among HD patients with chronic HCV infection and to compare it with that of HCV-infected patients with normal renal function. **Patient and Methods:** A total of 32 chronic renal failure patients undergoing maintenance HD (Group1) in the dialysis unit of Nephrology Department at Theodor Bilharz Research Institute (TBRI) Giza, Egypt and 22 chronic HCV patients with normal renal function (Group 2) who were admitted to Gastroenterology Department at TBRI were included in the present study. Serological markers of HBV infection including hepatitis B surface antigen (HBsAg), hepatitis B surface antibodies (anti-HBs), hepatitis B core antibodies (anti-HBc) and anti-HCV antibody were determined using enzyme linked immunoassays. HBV DNA and HCV RNA were detected by polymerase chain reaction. **Results:** OHBV was detected in 71.9% (23/32) of HD patients compared to 0% in group (2). HBV DNA seropositivity and anti-HBc were significantly higher in Group (1) than in Group (2) (P = 0.005, P = 0.03, respectively). HCV RNA positivity by PCR were significantly higher in patients with chronic HCV infection with normal renal function than in HD ones (P = 0.003). Among patients on maintenance HD, no statistically significant differences were detected regarding duration of HD, history of blood transfusion, biochemical parameters and serological markers between HBV DNA positive patients versus negative ones. **Conclusions:** The prevalence of occult HBV infection is high in HD patients with chronic HCV infection in our institute suggesting a possible risk of procedure –related infection in HD unit. Sensitive molecular diagnosis of HBV DNA is recommended for patients in addition to routine serological tests.

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1. Introduction

Haemodialysis patients are at high risk for viral hepatitis infections due to the high number of blood transfusion sessions, prolonged vascular access and the potential for exposure to infected patients and contaminated HD equipments **(Telaku *et al.*, 2009).** HBV and HCV are common nosocomial infections that cause higher rates of mortality and morbidity in maintenance HD patients than in the general population **(Chu and Lee, 2008).**

HBV infection is a major global health problem. Infection can induce a wide spectrum of clinical forms ranging from a healthy carrier state to cirrhosis and hepatocellular carcinoma **(Lee, 1997).** Diagnosis of HBV largely relies on the serological detection of HBsAg, however, the availability of highly sensitive molecular biology techniques has also allowed the identification of HBV infection in HBsAg-negative individuals, with or without serological evidence of previous HBV infection **(Allain, 2005).** The failure to detect HBsAg, despite the persistence of the viral DNA, is due in most cases to the strong suppression of viral replication and gene expression that characterizes this "occult" HBV (OHBV) infection **(Minuk *et al.*, 2004)**. Serological recovery from HBV infection, marked by absence of HBsAg and occurrence of anti-HBs does not indicate eradication and seems to merely represent immune control of viral replication **(Shiota *et al.*, 2000)**

OHBV infection has been previously reported in patients with chronic HCV infection, human immunodeficiency virus infection, hepatocellular carcinoma (HCC), HD patients, cryptogenic liver disease, drug injection users, blood donors and in those undergoing frequent blood transfusion **(Grob *et al.*, 2000, Gonçales *et al.*, 2003, Marrero *et al.*, 2004**

and Jardim *et al.*, 2008). Co-infection with HBV and HCV viruses is frequent particularly in areas where the two viruses are endemic and among people at high risk for parenteral infections **(Pontisso *et al.*, 1993).**

In patients undergoing maintenance HD, the risk of acquiring HBV and HCV infection is high, due to the dialysis process. Prevalence of OHBV in adult HD patients was reported to be four to five times higher than the standard HBsAg testing would suggest (**Burdick *et al.*, 2003 and Fabrizi *et al.*, 2005).**

In patients with chronic hepatitis C, OHBV infection may be associated with more severe liver damage and even development of hepatocellular carcinoma and may correlate with lack of response to interferon treatment **(Gonçales *et al.*, 2003 and Laguno *et al.*, 2008).** In addition, OHBV infection harbors potential risk of HBV transmission through blood transfusion and organ transplantation **(Minuk *et al.*, 2004).** Despite the potential clinical importance of occult HBV infection, the existing data are limited for the prevalence of OHBV among Egyptian patients on long-term hemodialysis. Furthermore, screening for OHBV in dialysis patients by biochemical testing is problematic and insensitive due to the fact that aminotransferase activity and serum level is usually decreased in these patients **(Ismail *et al.*, 2008).**

The aim of this study was to determine the prevalence of OHBV infection among HD Egyptian patients with chronic HCV infection and to compare it with that of HCV-infected patients with normal renal function.

2. Study design and patients:

The present study was conducted through the period from February to November, 2009. A total of 32 chronic renal failure patients undergoing maintenance HD in the dialysis unit of Nephrology Department at TBRI were included in the present study (Group I). A second group of 22 chronic HCV patients with normal renal function who were admitted to Gastroenterology Department at TBRI was also included to serve as a control (Group 2).

The dialysis unit contains 24 HD machines in three isolated rooms. Among these, 3 are dedicated for HBV positive patients, 9 machines are dedicated for HCV positive patients and 12 for HBV &HCV negative patients. All patients were maintained on regular hemodialysis 3 sessions per week each 4 hours using disposable dialyzers with standard acetate dialysate.

Demographic and laboratory information on all subjects was obtained. Inclusion criteria included end-stage renal disease on regular hemodialysis for at least 6 months' duration. Chronic HCV infection was defined by the presence of anti-HCV antibodies for more than six months **(Anwar *et al.*, 2006)**. Exclusion criteria included acute or chronic HBV infection as determined by positive hepatitis B surface antigen, other causes of liver dysfunction (eg, primary biliary cirrhosis, autoimmune hepatitis, continued alcohol abuse, autoimmune hepatitis, and HIV infection) and being on treatment with interferon and/or ribavirin. A complete medical history, including, duration of hemodialysis, past blood transfusion, and HBV vaccination was obtained for all patients. All patients also underwent a complete clinical examination.

Serum samples were collected from all HD patients just before the haemodialysis session and from chronic HCV patients at the time of examination. Samples were stored at -70°C until processed.

Laboratory tests

Serological markers of HBV infection including HBsAg, anti-HBs and anti-HBc were determined using standard commercially available enzyme-linked immunosorbent assay (ELISA) (DiaSorin diagnostic kits, Italy). Anti-HCV antibody was tested by a third generation ELISA (DiaSorin diagnostic kits, Italy). Levels of aspartate aminotransferase (AST), alanine aminotransferase (ALT), serum albumin, and bilirubin were determined using standard techniques. All procedures were performed according to the manufacturers' instructions.

Detection of HCV RNA by polymerase chain reaction

HCV-RNA was extracted from 500 µl human plasma using single step RNA isolation by acid guanidinum-thiocyanate-phenol-chloroform extraction method. HCV RNA was detected by qualitative nested reverse transcription polymerase chain reaction (RT-PCR) using two sets of primers within 5' non-coding region in two steps, reverse transcription-PCR and second PCR. PCR reactions were done in PTC-100 programmable thermal cycler (MJ Research, Inc. Waltham, MA). Amplification products were analyzed using 2% agarose gel electrophoresis **(El-Dabaa *et al.*, 2004).** The sensitivity of this method is 50 IU/ml.

Detection of HBV DNA by polymerase chain reaction

Very sensitive modified qualitative HBV DNA detection method has been used. Genomic DNA was extracted from 1000 µl plasma using magnetic particles (Promega Inc.) and eluted into 70 ul DH20. Nested PCR for 50 ul of extracted DNA have been done using a set of nested primers designed for the core/precore region according to standard method **(Hassan *et al.*, 2004).** PCR reactions were done in PTC-100 programmable thermal cycler (MJ Research, Inc. Waltham, MA). Amplification products were visualized using 3% agarose gel electrophoresis. Several negative controls have been tested to exclude carry over. Samples those were negative by nested PCR when further tested by highly sensitive and

specific real-time PCR (Abbott HBV Real time, Taq Man probe, sensitivity 10 IU/ml) and detected using API 7500 instrument, found negative.

The study was conducted in accordance with the ethical guidelines of the 1975 Declaration of Helsinki and International Conference on Harmonization Guidelines for Good Clinical Practice.

Statistical analysis

The statistical analysis was performed using SPSS version 10.0 statistical software (SPSS Inc, Chicago, IL). Data were presented as mean ± SD and range or as an absolute number and percentage. Chi-square tests were used for the analysis of the categorical variables and Quantitative data with uneven distribution were analyzed with the Mann-Whitney U test. $P < 0.05$ was considered statistically significant.

3.Results:

Two groups of patients were included in the present study; Group (1): consists of 32 chronic HCV patients on maintenance HD, they were 22 males and 10 females. Their ages ranged from 31 to 73 years with a mean of 54 ±11.8 years (average ± SD). The duration of hemodialysis ranged from 1 to 13 years. A history of blood transfusion was recorded for 21 (65.6%) patients. Group (2): consists of 22 chronic HCV patients with normal renal function, they were 11 males and 11 females and their ages ranged from 49 to 69 years with a mean of 58.2 ± 7.5 years (average ± SD).

OHBV infection was detected in 71.9% (23/32) of hemodialysis patients compared to 0% in group (2). Demographic, laboratory and serologic characters of group (1) and group (2) were illustrated in table (1). HBV DNA seropositivity and anti-HBc were significantly higher in Group (1) than in Group (2) ($P = 0.005$, $P = 0.03$, respectively). On the other hand, HCV RNA positivity by PCR were significantly higher in chronic HCV patients with normal renal function than in HD ones ($P = 0.003$). No statistically significant differences were detected regarding HCV antibodies and anti-HBs antibodies seropositivity between the two groups ($P > 0.05$).

Table (2) showed demographic, laboratory and serological characters of patients on maintenance HD according to HCV RNA positivity. No statistically significant differences were detected between the two patients category.

Among patients on maintenance HD, no statistically significant differences were detected regarding duration of HD, history of blood transfusion, biochemical parameters and serological markers between HBVDNA positive patients versus negative ones (Table 3).

Table (1): Demographic, laboratory and serologic characters of haemodialysis patients (group 1) and chronic HCV hepatitis patients with normal renal function (group 2)

Character	Group (1) N=32	Group (2) N=22	*P* value
Age (mean± SD)	54 ±11.8	58.2 ± 7.5	> 0.05
Sex:			
Male	22 (68.8%)	11 (50%)	> 0.05
Female	10 (31.2%)	11 (50%)	
Laboratory tests:			
Creatinine(mean±SD)	5.72 ± 2.22	1.26 ±0.49	0.003
ALT (mean±SD)	28.4±11.4	50.5± 29.8	0.05
AST(mean±SD)	24.9 ±9.9	37± 25.6	0.01
Albumin (g/dl, mean ±SD)	3.7± 0.36	2.85± 0.74	0.02
Bilirubin (mean ±SD)	0.9± 0.26	2.29±0.78	0.01
Serological tests:			
HCVRNA+ve(n,%)	22 (68.8%)	22(100%)	0.003
HBVsAb+ve(n,%)	17 (53.1%)	12 (54.5%)	> 0.05
HBVcAb+ve(n,%)	26 (81.3%)	10 (45.5%)	0.03
HBVDNA+ve(n,%)	23 (71.9%)	0 (0%)	0.005

P value ≤0.05 is significant

Table (2): Demographic, laboratory and serological characters of patients on maintenance hemodialysis according to HCV RNA positivity

Character	HCV RNA positive (n=22) No (%)	HCV RNA negative (n=10) No (%)	*P* value
Age (mean± SD)	53.9±9.5	56.5±11.2	> 0.05
Sex:			
Males	19 (86.4%)	3 (30%)	0.003
Females	3 (13.4 %)	7 (70%)	
Duration of hemodialysis(mean ±SD) year	5.8± 3.4	6.9 ±3.7	> 0.05
History of blood transfusion	15(68.2%)	6 (60%)	> 0.05
History of HBV vaccination	0 (0%)	1 (10 %)	> 0.05
Liver function tests:			
ALT (mean±SD)	28.7±10.7	29.9±14.9	> 0.05
AST (mean±SD)	23.6±10.7	22.6±7.5	> 0.05
Serological features:			
HBs antibodies +ve	10(45.5%)	7 (70%)	> 0.05
Anti-HBc antibodies +ve	18 (81.1%)	8 (80%)	> 0.05
HBV DNA +ve	14 (63.6%)	9 (90%)	> 0.05

P value ≤0.05 is significant

Table (3): Demographic, laboratory and serological characters of patients on maintenance HD according to HBV DNA positivity

	Occult HBV DNA positive (n=23) No (%)	Occult HBV DNA negative (n=9) No (%)	*P* value
Age (years)			
≤40	5	1	>0.05
>40	18	8	
Sex, No. (%)			
Males	16 (69.6%)	6 (66.7%)	>0.05
Females	7 (30.4%)	3 (33.3%)	
Duration of hemodialysis (years, mean ±SD)	5.4± 4.7	7.9 ±4.5	>0.05
History of transfusions	15(65.2%)	6(66.7%)	> 0.05
History of HBV vaccination	0 (0%)	1 (4.3%)	> 0.05
Laboratory tests:			
AST(mean±SD)	27.3 ±10.8	26.9±9.7	> 0.05
ALT(mean±SD)	24.7 ±9.4	25.1±8.9	> 0.05
Serological tests:			
Anti-HCV antibodies +ve	23(100%)	9 (100%)	> 0.05
HCV RNA +ve	14(60.9%)	8 (88.9%)	> 0.05
HBs antibodies +ve	12(52.2%)	5 (55.6%)	> 0.05
Anti-HBc antibodies +ve	17(73.9%)	9 (100%)	> 0.05

P value ≤ 0.05 is significant

4.Discussion:

Infections with HBV and HCV are well-known and important causes of liver disease in patients on HD. HBV infections is still a distinct clinical problem, as the immunosuppressive nature of renal disease often leads to chronicity of the viral infection and results in an opportunity for nosocomial spread of the infection among dialysis patients **(Abu El Makarem *et al.*, 2012)**. Chronicity following the acute infection has been shown to occur in up to 80% of patients with renal failure compared to a 1-3% rate of chronicity that occurs in healthy adults **(Saldanha *et al.*, 2001).**

OHBV infection is a clinical form of HBV in which, despite the absence of detectable HBsAg in serum, HBV-DNA is present in both serum and hepatocytes **(Arababadi *et al.*, 2012).** The serum

HBV DNA level in these patients is generally lower than 10^4 copies/mL **(Abu El Makarem *et al.*, 2012).**

In chronic renal failure patients undergoing maintenance HD, the diagnosis of liver disease based on biochemical tests is difficult; taking into account that aminotransferase levels in HD patients are usually suppressed. It has been hypothesized that reduced immune competence of chronic uremic patients is a possible cause of attenuated inflammatory reactions in the liver and consequently reduced hepatocyte destruction. Therefore, the quantitative detection of HBV-DNA has been shown to be the most efficient method to evaluate viral replication in HD patients infected with HBV **(Mina *et al.*, 2010).** Large-scale geographic heterogeneity in HBV prevalence has been reported worldwide, and prevalence is especially heterogeneous across Egypt **(Abu El Makarem *et al.*, 2012).**

Several studies have been conducted to assess the prevalence of OHBV infection in HD patients with HCV infection and all reported dissimilar rates of HBVDNA positivity, ranging from 0% to 36% in these patients **(Besisik *et al.*, 2003, Minuk *et al.*, 2004, Goral *et al.*, 2006, Kanbay *et al.*, 2006, Siagris *et al.*, 2006 and Nagakawa *et al.*, 2013).**

In the present study, HD patients with chronic HCV infection were found to have a significantly higher prevalence of OHBV infection (71.9%) than HCV infected patients with normal renal function (0%) matched for age and sex. Our results was consistent with that of **Siagris *et al.* (2006)** who reported higher prevalence of OHBV in HD patients (20%) versus 6.3% in HCV infected patients with normal renal function.

Studies in dialysis units have demonstrated that the prevalence of OHBV infection varies from country to country. In Egypt, **Elgohry *et al.*, (2012)** in Alexandria Main University Hospital dialysis unit, reported that 25 individuals were HBV DNA-positive, representing 26.8% of the tested patients. In other Egyptian studies done by **Ismail *et al.* (2010)** and **Abu el Makaerm *et al.* (2012),** they found that OHBV infection were detected in 5.2% and 4.13% of the patients on chronic hemodialysis therapy respectively. Studies on Italian HD patients revealed that 26.6 % of them were OHBV positive **(Fabrizi *et al.*, 2005 and Stefano *et al.*, 2009).** American investigators demonstrated that 9 (3.8 %) out of 239 HD patients suffered from OHBV infection **(Fabrizi *et al.*, 2004).** High occurrences of 15.2 % and 16.9 % of OHBV infection were reported by **Kanbay *et al.* (2006) and Sav *et al.* (2010)** from Turkey, respectively. Another study from Turkey revealed that OHBV infection prevalence among HD patients was 17-27.5 % **(Yakaryilmaz *et al.*, 2006 and Altindis *et al.*, 2007).** Studies from Greece showed that 0.9-20.4 % of the HD patients suffered from OHBV infection **(Siagris *et al.*, 2006 and Mina *et al.*, 2010)**. **Motta *et al.* (2010)** reported that the prevalence of OHBV infection among Brazilian HD patients was 15%. Investigators from South-Korea (**Gwak *et al.*, 2008)** and China **(Jain and Nijhawan, 2008)** revealed that OHBV infection prevalence among patients on HD were 0 and 5 %, respectively **(Arababadi *et al.*, 2012).** Two different studies from Spain showed the presence of OHBV infection in 58% and 85% of HD patients **(Cabreriz *et al.*, 1997, Brechot *et al.*, 2001 and Kuhns *et al.*, 2004).**

The discrepancy in the reported incidence of OHBV infection between several studies, including our study, could be due to several factors. One could be attributed to differences in the various molecular biology techniques used for the detection of HBV-DNA **(Mina *et al.*, 2010 and Ramezani *et al.*, 2010).** Another reason could be OHBV infection with mutant virus that cannot be detected with commercially available molecular methods **(Kreutz, 2002).** Quantitative differences in the levels of HBV viremia during the course of the disease in different patient populations could be also a reason. This was evidence by study done by **Lili *et al.*(2002)** who examined repeated sera from the same patients for the presence of HBV DNA, and demonstrated inconsistent results with previously negative samples being positive for HBV DNA and vice versa, which suggests a fluctuating level of viremia in the course of the disease. Also, the detection of HBV-DNA in serum samples rather underestimates the true prevalence of OHBV infection. Indeed, the most correct and precise methodological approach for the determination of the prevalence of OHBV infection is the analysis of liver DNA extracts. However, the availability of liver tissues is often limited by restrictions on the performance of liver biopsies, which in the setting of HD is often very difficult, and usually contraindicated **(Mina *et al.*, 2010, Ramezani *et al.*, 2010 and Ismail *et al.*, 2010).** Furthermore, the differences in prevalence of HBV in the general population according to geographic location can influence the prevalence of HBV infection among HD patients **(Nalpas *et al.*, 1992).**

Patients undergoing chronic HD therapy may have either a lower response rate to HBV vaccination compared with healthy subjects, or have transient responses to vaccination as a result of profound immune suppression **(Shatat *et al.*, 2000 and Fabrizi *et al.*, 2006).** The relatively low response rates to HBV vaccination in this group of patients might contribute to the ongoing HBV transmission in this setting **(Mina *et al.*, 2010).** In our study, only one patient had had HBV vaccination. In Egyptian study done by **Ismail *et al.* (2010),** they reported that none of the HD patients

having evidence of prior HBV vaccination. **Siagris *et al.* (2006)** found that HBV DNA-positive HD patients had a significantly lower prevalence of past HBV vaccination and lower anti-HBs titers in serum than HBV DNA-negative patients. The fact that higher prevalence of occult HBV is detected in HD patients with no history of HBV vaccination suggests that the lack of past HBV vaccination could be a risk factor that could account, in part, for the higher prevalence of OHBV infection in HD patients.

In addition, HD patients are also at high risk of generation of HBV mutants **(Kreutz, 2002)**, such mutations could result in impaired antigen production by the virus, a diminished rate of replication or facilitate viral persistence **(Blum *et al.*, 1991 and Preister *et al.*, 1993).** In a study from Turkey, OHBV infection was reported in 12 out of 33 (36%) of HD patients with chronic HCV and in half of these, tyrosine-methionine-aspartate (YMDD) variants of HBV polymerase motif were present **(Minuk *et al.*, 2004).**

Other factors which may contribute to the increased rate of transmission of OHBV infection among HD patients include, impaired host immunoreponse, multiple transfusion requirements, and shared dialysis equipments, the preparation of injectable medications in the dialysis treatment room, invasive procedures that they undergo and the presence of undiagnosed HBV among HBV negative groups **(Pasquinelli *et al.*, 1997, Jardi *et al.*, 2001 and Bellecave *et al.*, 2009)**

Chronic HCV infection is frequently reported with OHBV infection, due to almost the same route of transmission and risk factors. Clinical interactions between HCV and OHBV infection are still controversial **(Abu El Makarem *et al.*, 2012).** In our study, no OHBV infection was detected among hepatic cirrhosis patients. HCV RNA positivity was significantly higher in hepatic cirrhosis than in HD patients. The negative association of HBV-DNA positivity with HCV infection was supporting the possibility of reciprocal replicative suppression of the two viruses **(Mina *et al.*, 2010).** This result was consistent with **Pontisso *et al.* (1993) and Goral *et al.* (2006)** who failed to detect HBV-DNA in both serum and liver samples of HCV patients. In Egypt, **Sheneef *et al.* (2012)** reported that 13.3% of patients with chronic HCV had detectable HBV DNA in the serum, despite the absence of circulating HBsAg. However, a wide variation of the prevalence of OHBV infection in patients with chronic HCV has been reported. Some reports revealed prevalence of OHBV infection ranging from 11%-14.8% among chronic HCV patients **(Zignego *et al.*, 1997, Kao *et al.*, 2002, Silva *et al.*, 2004 and Selim *et al.*, 2011)** and others reported an exceedingly high prevalence reaching up to 90% among HCV-infected patients **(Uchida *et al.*, 1997 and Koike *et al.*, 1998).** This dissimilarity among studies might be due to the geographic variations regarding the HBV prevalence, the number of patients' samples investigated in each study or the different sensitivities of the assays used to detect HBV-DNA and the different types of specimens used to detect the presence of HBV (serum or liver) **(Sheneef *et al.*, 2012).**

The present study showed no association between the prevalence of HBV DNA and HBV serological markers. Our results were consistent with **Khattab et al. (2005), Emara *et al.* (2010) and Selim *et al.* (2011).** On the other hand, several reports suggested that OHBV could be predicted by serological markers of HBV infection especially isolated anti-HBc (**Kao *et al.*, 2002, El Sheriff *et al.*, 2009 and Abu El Makarem *et al.*, 2012). Ramezani *et al.* (2010)** determined the rate of OHBV infection in Iranian HD patients with isolated anti-HBc. Of 289 patients enrolled in this study, 18 subjects had isolated anti-HBc and HBV-DNA was detected in 50% of patients who had isolated anti-HBc and showed that OHBV infection was common in HD patients with isolated anti-HBc. The clinical significance of isolated anti-HBc detected in the serum of dialysis patients is not well clarified. The results of some studies support that anti-HBc positivity could be indicate of a potential infection **(Hollinger *et al.*, 2010).** HBV transmission from anti-HBc-positive donors to recipients via blood **(Thiers *et al.*, 1988),** liver transplantation, **(Dickson *et al.*, 1997 and Uemoto *et al.*, 1998)** and renal transplantation **(Fabrizi *et al.*, 2002)** has been demonstrated.

In this study, no risk factors were found to distinguish between patients with OHBV infection and those who are HBV DNA negative such as HD duration demographic features and biochemical parameters. Our results were consistent with **Besisik *et al.* (2003), Minuk *et al.* (2004) and Siagris *et al.* (2006).**

Most cross sectional studies that addressed the issue of OHBV infection did not report a strong correlation between ALT/AST levels and OHB **(Silva *et al.* 2004, Torbenson *et al.*, 2004, Chen *et al.*, 2010 and Emara *et al.*, 2010)**. In our study, biochemical parameters were not significantly different in our patients with and without OHBV infection. The baseline levels of these enzymes increase does not increase to reach the "high abnormal" range to indicate the presence of HBV-related liver disease **(Fabrizi *et al.*, 2002).** Serum AST and ALT levels are commonly used as screening tests for liver disease in HD patients, so recognition of liver damage may be hampered by reduction in aminotransferase values in these patients **(Fabrizi *et al.*, 2001).**

In conclusion: Our results suggest a relatively high prevalence of OHBV infection among patients at TBRI dialysis unit. This finding highlights the possible risk of procedure –related infection in HD patients. Considering the importance of OHBV infection in HD patients which may be accompanied with liver related morbidity and mortality and transmission of HBVI, Vaccination of susceptible patients and the adoption of preventive measures and extensive infection control guidelines such as avoidance of dialyzer reuse and isolation of diagnosed patients in specific ward have all been suggested for limiting HBV transmission within dialysis unit.

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