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Article *in* Saudi journal of kidney diseases and transplantation: an official publication of the Saudi Center for Organ Transplantation, Saudi Arabia · December 2007

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Original Article

The Status of Immunity Against the Hepatitis B Virus among Vaccinated Hemodialysis Patients: A Single Center Report from Iran

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ABSTRACT. Patients on maintenance hemodialysis (HD) are very susceptible to infection with the hepatitis B virus (HBV). Repeated contact with factors that aid in transmission of this virus, is conceivably a reason for the high prevalence of HBV infection in patients on HD. Suppressed immunity also probably plays a role. The present study attempts to determine the level of immunity against the HBV among patients on HD at the Urmia University of Medical Sciences, Iran. A total of 141 patients were enrolled in the study and comprised of 76 males and 65 females. Their mean age was 45 years. Data such as the age, gender, blood transfusion(s) received and renal transplantation background, were collected from their medical records in order to identify the risk factors. The hepatitis B surface antibody (HBsAb) levels in the serum was measured in these patients using enzyme-linked immunosorbent assay (ELISA). Based on the levels of HBsAb, the study subjects were classified as non-immune (less than 10 IU/L), which included 56 patients (39.71%); moderately immune (between 10 and 100 IU/L) comprising 65 patients (46.09%) and fully immune (more than 100 IU/L) seen in 20 patients (14.18%). Our results suggest that the current status of vaccination of patients on maintenance HD, against hepatitis B is not satisfactory. Better training should be imparted to the relevant staff members. Also, timely kidney transplantation and avoiding blood transfusions, as far as possible, is recommended.

Introduction

Hepatitis B Virus (HBV) is a common virus that can cause acute and chronic disease of liver. HBV is the only human hepatotropic virus with genome of DNA and it is a member of the Hepadnaviridae family.[1] More than one third of the world's population is infected with the HBV and it is believed that about one million people die annually world wide due to complications of HBV infection. Additionally, it is estimated that there are about 350 million infected persons, who act as carriers of hepatitis B, all around the world. By definition, a chronic carrier is a person who remains positive for hepatitis

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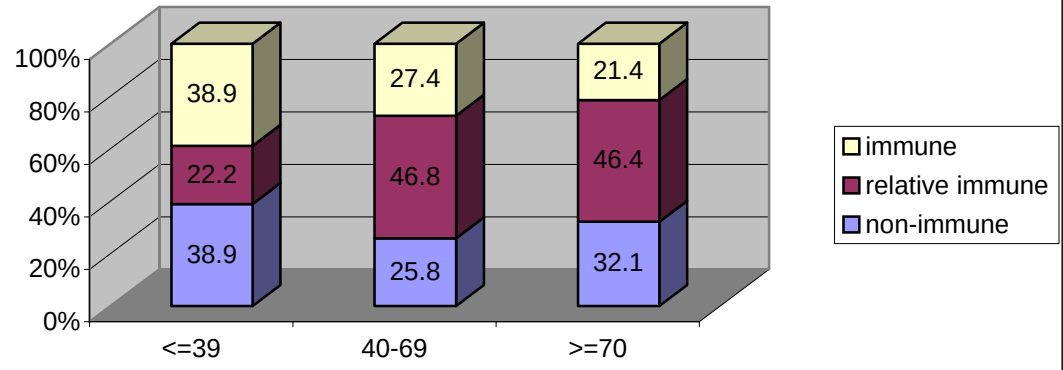
Figure 1. The immunization condition according to different ages



B surface antigen (HbsAg) for more than six months. The probability of being a chronic carrier after being infected by the HBV is about 90% in children and 5 to10% in adults.[2]

The prevalence of HBsAg positivity in Iran is 1.5 to 6.5 percent.[3,4] Based on the prevalence rates, the various countries of the world are classified into three categories: low prevalence (less than 2%), average prevalence (between 2 and 7%) and high prevalence (more than 7%).

The HBV, which was discovered in 1968, is transmitted through the usage of contaminated syringes, particularly among drug abusers, through blood transfusions, through sexual intercourse with HBV-infected partners and finally, through transmission from infected mother to fetus and newborns.[5]

Patients who are on regular hemodialysis (HD) are considered as high-risk groups in developing infecting with the HBV resulting in high incidence, prevalence and mortality in this group. Thus, vaccination against the HBV in these patients becomes mandatory.[7,8] In these patients, sufficient response to vaccination is deemed obtained when the serum hepatitis B surface antibody (Hbs Ab) titers are higher than 100 IU per ml.[9] Lower levels of titer, renders a patient on HD at high-risk of re-infection by the HBV.[10,11] Vaccination against hepatitis B has achieved great success,[12-14] and injection of three doses of the vaccine in persons younger than 50-years results in obtaining high serum levels of Hbs Ab in more than 90% of these people.[10,11,15] Ageing, obesity, smoking and immunodeficiency are some factors that lead to decrease in response to vaccination.[9,16,17] Because of low response to hepatitis B vaccination in patients on HD, the present study was undertaken to determine the serum HBsAb levels in these patients following vaccination. The study was conducted in the HD section at the Urmia's Taleqani Hospital, Iran.

Materials and Methods

Our study is a cross sectional descriptive design study. All patients who were referred to the HD unit of the Taleqani Hospital were included in the study. We excluded all Hbs Ag positive patients as well as patients which did not receive vaccination against the HBV. There were 141 patients in the study, which included 76 males and 65 females. Their mean age was 45 years. Data collected included the

Figure 2. The immunization condition in males and females

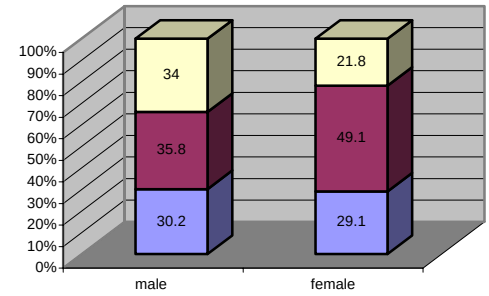
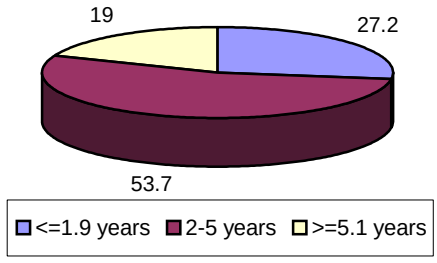


Figure 3. How many years do patients undergo hemodialysis?



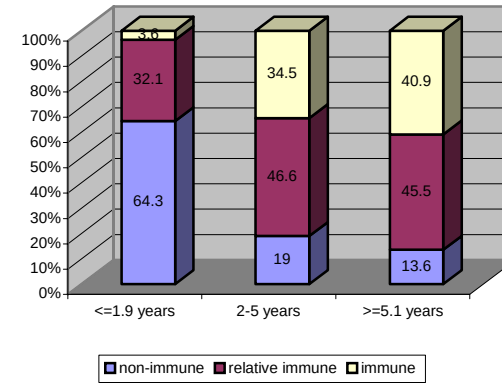
following: demographic information, vaccination details against hepatitis B including the dose of vaccine received, HBsAb titer (International unit-IU) and history pertaining to HD.

Educated researchers collected the data by referring to medical records as well as through personal interviews. The enzyme-linked immunosorbent assay (ELISA) was used to determine the HbsAb titers. All collected data were entered in statistical software program SPSS (version 11.5) and were analyzed by descriptive statistics.

Results and Discussion

Based on the serum HbsAb levels, the subject population was classified as non-immune

Figure 4. The immunization condition in patients with different history of Hemodialysis



immune (less than 10 IU/L), which was seen in 56 patients (39.71%); moderately immune (between 10 and 100 IU/L), seen in 65 patients (46.09%) and finally, fully immune (more than 100 IU/L) which was seen in only 20 patients (14.18%). Thus, the majority of our study subjects fell outside the fully immune category.

We categorized the patients into three age-groups: ≤ 39 years, 40-69 years and ≥70 years. The immunization status among these age-groups is given in Figure 1. It is clear that the percentage of immune patients was much higher in the group less than 39 years of age.

There were 76 males and 65 females among the 141 subjects of this study. The immunization status in these two groups is given in Figure 2. It is evident that there were a higher percentage of males in the fully immune category. Whether this indicates a gender bias in the immunization protocol needs to be studied in detail.

Among the study subjects, 53.7% had been on HD for 2-5 years, 27.2% for less than two years and 19% for more than five years. The immunity status according to the duration on HD is given in Figure 3. The result show that longer the duration on HD, higher is the percentage of immune patients.

The patients in our study had received different doses of the anti-HBV vaccine. The number of doses varied from a single dose to 14 doses. This suggests that we do not have a regular protocol for anti-HBV vaccination in our unit. However, we found that patients who received the maximum number of doses of the vaccine had the highest percentage of immunity Figure 4**.**

In conclusion, our study suggests that the current status of vaccination against hepatitis B in our unit is not acceptable. Better training needs to be given to the relevant staff. Also, avoiding blood transfusions as far as possible and timely kidney transplantation is recommended.

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