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Reveal the Prevalence of Anti-Hepatitis B Core and its Importance among Hemodialysis Patients in Hodeidah City

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Abstract

Hepatitis B is a dangerous illness and simple blood transportation and other ways, particularly in patients with chronic hemodialysis (HD). HBV has significant pathogenicity and mortality rates. The objective of this experiment was to assess the rates of anti-HBc distribution among chronic HD patients in Hodeidah City. This investigation was applied to 150 chronic HD patients and soon before HD sessions, samples were obtained. All samples have been analysed using ELISA for anti-HBc. Sera, which has shown that anti-HBc is positive, were tested for liver function. The ages of 30 to 50y (40,7 percent) were the most vulnerable and statistically significant to the HD process ($P < 0,05$). Of 150, 129 (86.0 percent) were anti-HBcAg positive. Conclusions: significant anti-HBc distribution rate among HD patients in the city of Hodeidah.

Keywords: chronic HD patients, Anti-Hepatitis B core (anti-HBc).

1. Introduction

Hepatitis B is a dangerous illness and simple blood and other ways of transport, particularly in patients with chronic hemodialysis (CH). The HBV continues to be an enormous health burden that generates substantial morbidity and mortality[1, 2] and accounts for 96% of hepatitis C (HCV) death etiology[3]. Approximately 1.34 million people die from viral hepatitis annually, with mortality rate being greater than the HIV-related mortality [4]. A strategy has been devised by the World Health Organization (WHO) to eliminate chronic HBIs by 90 percent and reduce death to 65 percent by 2030[5].

Chronic HD disease is an enormous problem in practically all societies, and in poorer areas it has increased dramatically[6]. Despite the fact that the prevalence of HBV in chronic HD patients declined significantly throughout past decades[7], the immunosuppression of HD patients is still a major clinical problem. All techniques in HD centres may play a leading role in HBV transmission unless they are correctly and accurately used. In the course of organ transplants [8], too. The inadequate reactions to the HBV vaccination were characterised by that group of patients which led to a more likely transmission of HBV and Occult Hepatitis B (OBI) [9, 10].

An internal, structural protein thus non-found in the blood, hepatitis B core antigen (HBcAg) [11, 12]. The presence of HBcAg is derived from its antibody in the serum of the patient, which is present even after recovery from the start of the infection. The HBcAg and the e antigen (HBeAg) share sequences, but do not interact [11, 13]. Core protein has multiple role functions, for example I stimulating humoral immunity by anti-HBc, as well as cellular immunity when HBcAG peptide particles are found on the hepatic cell surface in order to stimulate immune cells to kill cells[14], (ii) tying HBV to covalently closed circular DNA (cccDNA).

HBsAg and/or anti-HBsAg may be affected by many factors arising from immune or molecular pathways affecting their presence in the blood of the patients. Anti-HBc is the initial antibody response to the infection of hepatitis B (HBI) and its presence may indicate: I acute or chronic HBI (ii), healing (iii) window time (21-23), (iv) OBI when no viral DNA detection technique is used[24], even although about 20% are negativ-anti-HBc [25]. Anti-HBc has gained significant attention, particularly in the absence of protective anti-HBs. Wang et al reported an anti-HBc alone, around 40%-70% of OBI[26].

Everyone carrying this serological mark is thus regarded as a carrier of the virus and may transmit it to other persons, both immunocompetent and immunocompromised[27-30].

The incidence of anti-HBc ranges between 6.2% and 35%[31]. In earlier decades, the prevalence of anti-HBc in HD patients in various nations was as follows: In Turkish [32], 30% in Egypt [33], 2% in Iran [34], 44.6% in Iran [35], 49.1% in Suez Canal, Egypt [363], 18.9% at Al-Gharbia, Egypt [37], 17.55% in Fatima Memorial Hospital, Lahore [31], 24.2% in China [38] and 25% (59/237) [39].

Healthy cells in the liver contain a normal amount of enzymes such as alkaline phosphatase (ALP) and other enzymes. The amount of alanine aminotransferase (ALT) in positive HBeAg is increased. In HBI the level of liver enzymes is modified, and the same alterations also present during pregnancy, leading to challenging recognition of the true cause in pregnant patients[40]. Treatment of chronic HBI with normal ALT should be based on both histology and HBV-DNA levels[41]. ALT increase may occur spontaneously or superadded in chronic HBI patients with other viruses or medications or for drug-inducing seroconversions[42]. In individuals with Fibrosis (12-43%) without chronic HBI, normal ALT is seen [43]. Decrease in AST and

ALT serum in individuals with HD owing to several variables shown in Figure (1) [44].

Although HBsAg screening test works in particular among HD patients with HBI detraction, there are nonetheless several reasons, for example mutations that impede HBsAg detection. In addition, non-molecular approaches and especially in emerging districts are difficult to discover these mutations, since HD patients are more harmful to infection transmission and may lead to cirrhosis and HCC [25, 45]. Furthermore, in Yemen, the high cost of PCRs does not enable routine testing in HD patients and sensitive PCRs, needed for OBI detection (<200 IU/mL) are not accessible. However, we can prevent the transfer of HBV or OBI in HD patients by anti-HBc tests in which particular treatment must be carried out for HD patients positive for anti-HBc. The aim of this research is to recognise the prevalence of anti-HBc among chronic HD patients in the city of Hodeidah.

2. Patients and methods

This study was conducted at the HD center in the city of Hodeidah, western Yemen, the capital of the Hodeidah governorate. Hodeidah city is the fourth-largest city in Yemen and away from the capital Sana'a with a distance of about 226 kilometers. This study was applied to 150 chronic HD patients.

2.1. Inclusion criteria

- Both sex (male and female)
- patients with end-stage renal disease on regular HD (at least for one year).

2.2. Exclusion criteria

- The patients infected with HCV
- other causes of liver dysfunction such as HIV infection, autoimmune hepatitis, primary biliary, and cirrhosis.

2.1. Analysis of samples

Blood samples were taken immediately before the HD session, aliquoted, and stored at a temperature of –80°C until further analyses. All samples were tested for the anti-HBc by an automated ELISA (Cobas e 411 analyzer) method using the commercially available kits (Roche Diagnostics, Germany). The three liver enzymes level for 129 samples was measured by BioSystems BTS-330 using commercially available kits (Human Gesellschaft für Biochemica und Diagnostica mbH, Germany).

2.2 Data Analysis

Data were analyzed with SPSS version 21. The normality of data was first tested with the one-sample Kolmogorov-Smirnov test.

3. Results

The sex and age distribution of 150 chronic HD patients and the data are summarized in Table 1. Out of 150 patients, 104 (69.3%) were males and 46 (30.7%) were females. Patients with ages ranging between 9 and 75 years with a mean ±SD of 39.06 ±14.09, were divided into three age groups; i) <30 years old, ii) 30-50 years of age, and iii) >50 years old. HD patients were 30 to 50y (40.7%) followed by <30y (35.3%).

Fig. (1) Factors involved in aminotransferase reduction in patients with chronic kidney disease on hemodialysis.

Table (1) Demographic data of the studied group

Variables	Study group (n=150)	
	No	%
Sex		
Male	104	69.3%
Female	46	30.7%
Age/years		
<30 y	53	35.3%
30-50 y	61	40.7%
>50 y	36	24.0%
Mean ± SD	39.06 ±14.09	
Range	9-75	

The current study showed out of 150, 129 (86.0%) were positive of anti-HBcAg (Fig 2).

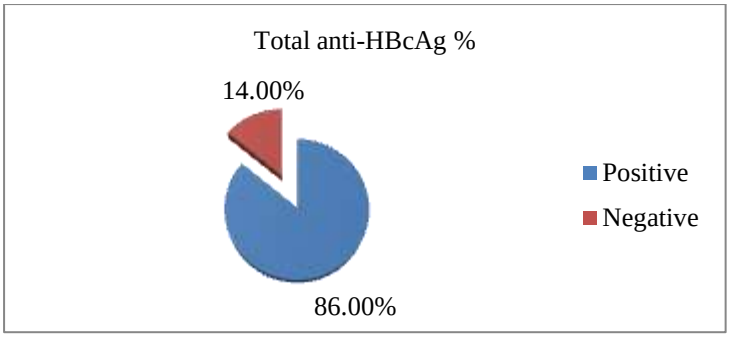

Fig. (2) Anti-HBcAg among the studied group

Out of 129 positive anti-HBcAg, 88 (68.2%) and 44 (31.8%) were male and female respectively. Also, the ages from 30 to 50 were more positively of anti-HBcAg. No significant statistical differences between anti-HBcAg and the sex and ages of the patients Table (2), Fig. (3), and Fig. (4).

Table (2) Relation between Total anti- HBcAg and demographic data

Variables	Total anti- HBcAg p positive (n=129)		Total anti-HBcAg negative (n=21)		Test of significance	p-value
	No	%	No	%		
Sex						
Male	88	68.2	16	76.2	0.54	0.462
Female	41	31.8	5	23.8		
Age/years						
<30 y	44	34.1	9	42.9	0.680	0.712
30-50 y	53	41.1	8	38.1		
>50 y	32	24.8	4	19.0		
Mean ± SD	39.64± 14.12		35.47± 13.68		*t= 1.26	0.210
Range	9-75		13-64			

χ^2: chi square test, *t= Student *t* test

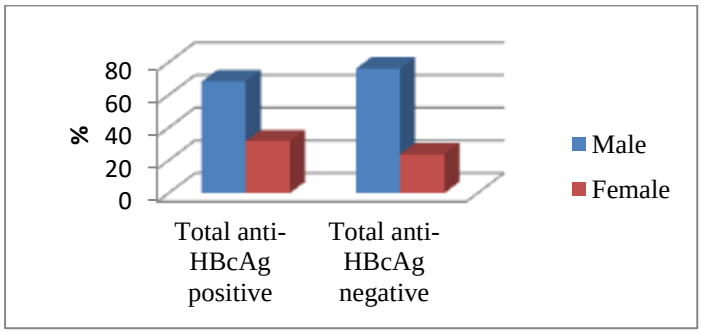

Fig. (3) Relation between Total anti- HBcAg and Sex

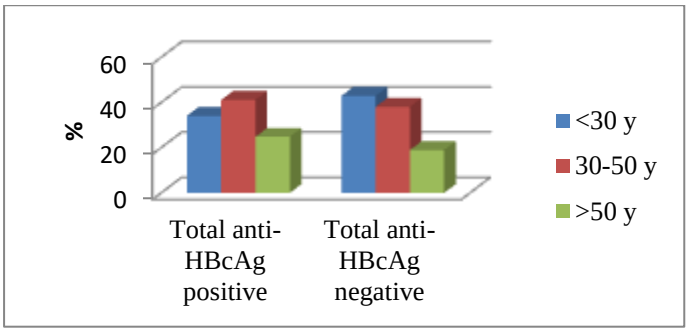

Fig. (4) Relation between Total anti- HBcAg and Age

Normal levels of ALT and AST showed in 117 patients (90.7%) and 108 patients (83.7%) respectively, whereas alkaline phosphatase (ALP) enzyme was abnormal in 90 patients (69.8%), no statistically significant (Table 3).

Table (3) Relation between Total anti- HBcAg and laboratory investigations.

Variables	Total anti- HBcAg positive (n=129)		Total anti- HBcAge negative (n=21)		χ^2	p-value
	No	%	No	%		
ALT						
Normal	117	90.7	20	95.2	0.470	0.493
Abnormal	12	9.3	1	4.8		
AST						
Normal	108	83.7	19	90.5	0.635	0.426
Abnormal	21	16.3	2	9.5		
ALP						
Normal	39	30.2	6	28.6	0.024	0.878
Abnormal	90	69.8	15	71.4		

4. Discussion

104 (69.3%) out of 150 patients were male and 46 (30.7%) were female. Patients between 9 and 75 years of age with a mean ±SD of 39.06 ±14.09. HD patients were between 30 and 50 years (40.7 percent). These age groups were particularly exposed to and statistically significant in the HD process ($P < 0.05$). That may be because of the hot climate and insufficient electrical support in this town, which results in increased perspiration followed by poor kidney function, therefore they are most prone to renal failure. In several China towns, HD was present in Shanghai (11.8%) [46], Beijing (13%) [47] and Tibet (19.1%) [47] among patients 18 years old and older. In another research in Beijing, however, people over 40 years of age were subject to HD (11.3 percent)[49]. Furthermore, the sexually active character, illegal drug use, tattooing and corporal piercing of these individuals are risk factors for HBV transmission.

Of 150, 129 (86.0%) were anti-HBcAg positive. Recovery from past acute or chronic HBI[24] or OBI may be indicated. Similar anti-HBc findings were observed in 80% of HD patients [50, 51].

The prevalence of anti-HBc ranges from 6.2 percent to 35 percent[31]. Other results recorded HD patients in the Iranian government were I 44.6%, (ii) 49.1% in the Suez Canal in Egypt and (iii) 18.9% in the Governorate of Al Gharbia in Egypt[37], (ii) 24.2% in China[38], and (iii) 25% (59/237) [39] respectively.

HD patients require frequent transfusions of blood and this may lead to the development of bloodborne disease serological markers, such as HBV anti-HBc, due to several factors, including use of the same machines for all patients, contaminated injection medication during preparation in HD rooms [52], common friction of infected patients and healthcare personnel, and weak HBV vaccinal response. While HBsAg screening assays work particularly between HD patients in HBI detraction, numerous reasons, such as mutations, hinder HBsAg detection. Detection of these mutations is challenging, especially in developing districts and non-molecular approaches, since HD patients are more dangerous and may lead to cyrrhosis and HCC [25, 45], However, any transfer of HBV, in particular via anti-HBcAg testing and proper handling of HD patients, may be avoided.

The high incidence of anti-HBcAg may contribute to our findings, in addition to the following explanations (1) HD patients with weak immunity, weak HBV vaccine response, (2) HBsAg mutations, (3) modest HD-patient facility and low-health precautions[53], (4) wartime war-time warfare, HD centre was lone in the governorate of Hodeidah, and it receives all HD patients from different areas in the Governorate, (5) war-related livelihood impacts, etc. Implementing anti-HBcAg and HBV NAT screening will make blood safer and minimise the occurrence of OBIs[55]. In Yemen, high PCR costs in HD patients are not permitted and the PCR sensitivity necessary (<200 IU/mL) may not generally be accessible for detecting OBI. In order to minimise transmission of and reactivation of hepatitis B infection (HBI) in HD, these results should be considered and the appropriate therapy of anti-HBcAg-positive HD patients[9, 10, 56][57].

88 (68.2 percent) and 44 (31.8 percent) were both male and female out of 129 positive anti-HBcAg. In addition, the ages between 30 and 50 were higher anti-HBcAg positive. No statistically significant variations between anti-HBcAg and the patients' sex and age (Table 2, Fig 3, and Fig 4). Anti-HBcAg was more common in men than in women because of disparities in their work. For example, men are working, barbershops are more visited and blood transfusion techniques are more engaged. In contrast, women mostly participate in domestic activities based on social, cultural and religious inclinations. As soon as the ages of 30 to 50 years are more experiencing HD so that anti-HBcAg and other blood-borne disorders might emerge more likely.

Although the frequency of anti-HBcAg was high, the normal levels of both ALT and AST were high in 117 patients (90.7%), 108 patients (83.7%) and the normal levels of alkaline phosphatase (ALP) in 90 patients (69.8%). (Table 3).

Similar findings were typical for individuals with HBI with chronic renal disease, aminotransferase levels were normal values. In these patients, too, elevated levels of ALP. However, 30.7 (4/13) patients

with positive anti-HBc alone reported Elghannam et al., while 33.3 percent (9/27) of the positive patients with anti-HBc and anti-HBs had normal liver function test (LVT) levels[33]. Different CKD phases need distinct aminotransferase reference limits [58]. Reduction in HD patients' aminotransferases due to several factors such as I removal of aminotransferases during HD session, (ii) the occurrence of uremic factors that inhibit the activities of the enzymes, (iii) pyridoxine failure, cofactor for aminotransferase synthesis, (iv) nicotinamide adenine dinucleotide (NADPH) intakes [59, 60]; The liver, bone, gut and placenta are the initial locations of ALP production. Serum ALP level is an essential indicator for screening and monitoring in a patient with liver disease. However, renal osteodystrophy leads to an elevated amount of ALP in a CKD patient[62]. After HD, AST, ALT and ALP increase, although the contrary is before [63].

5. Conclusion

The incidence of anti-HBc in HD patients is high, and HBV, OBI, and molecular mutations are very often detected, owing also to other factors preventing HBsAg from being detected on blood. We must take into account the significant incidence of anti-HBc and the appropriate care of HD patients. The test against HBC should be a standard component of our HD population screening. PCR analysis may assist to reduce high HBV infection in HD patients by low-cost and high-sensitivity PCR.

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