Research Paper

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The Role of HB core IgM as a serological marker for Hepatitis B viral infection

Medical Science

KEYWORDS : Hepatitis, HBV, HBs Ag, HBc IgM.

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ABSTRACT

Objectives: To evaluate the significance of detecting anti Hepatitis B core antigen in screening of Hepatitis B viral infection.

Patients, materials and methods: A study was conducted in 2013 at Baghdad Teaching Hospital/ Medical City on 823 patients and 50 healthy individuals using Enzyme Linked Immuno Sorbent assay to detect Hepatitis B surface antigen and Hepatitis B core IgM..

Results: Hepatitis B surface antigen was detected in 2.9% among the examined patients, Hepatitis B core IgM antibody was detected in 1.5%, 4 (16%) patients were positive for both at the same time.

Conclusion: The combined use of Hepatitis B surface antigen test and Hepatitis B core IgM test is more reliable as serological markers for detecting Hepatitis B viral infection than the use of Hepatitis B core IgM test alone.

Introduction:

Hepatitis B Virus (HBV) is a member of hepadna virus family.The virus particle (virion) consists of an outer lipid envelope and an icosohedral nucleocapsid core composed of protein. The outer envelope contains embedded proteins which are involved in virus binding and entry into susceptible cells.[1] The mode of transmission occurs parentally and primarily through contact with infected blood, sexual contact with an infected person and from mother to child during birth. [2,3,4]

Certain people are liable to get HBV infection such as people sharing needles during injecting drugs, those on haemodialysis, tattooing, sticks or injuries from needles and other sharp instruments.[5,6,7]

Hepatitis B surface antigen (HBs Ag) is secreted in excess into blood; its presence in the serum indicates that viral replication is occurring in liver. It can be detected in the serum from several weeks before the onset of the symptoms to months after onset of the symptoms.[8,9]

HB core (HBc) Ag is a core protein, which is not detected in blood but the presence of anti HBc IgM suggests infection with hepatitis B virus.[10] The diagnosis of HBV is usually aided by laboratory tests for blood samples such as liver enzymes and serological markers like HBs Ag and anti HBc antibodies, the use of these two serological markers may help in the diagnosis of occult hepatitis B viral infection (OHB) which is characterized by the presence of hepatitis B viral infection with undetectable HBs Ag, OHB infection harbors risk in transmitting the virus through hemodialysis.[11]

Patients, Materials and Methods:

A case control study was conducted during the period from February to May 2013 at Baghdad Teaching Hospital/ Medical City, including 823 patients, 762 of them experienced different types of surgery and complaining of diseases other than hepatic or renal, 61 of them were on maintenance hemodialysis. All were compared to 50 apparently healthy individuals representing the control group.

Five ml of blood were recruited from each patient, allowed to clot then centrifuged to separate serum and stored frozen at -17 °C until processing by enzyme linked immunosorbent assay (ELISA). HBs Ag ELISA test is based on the principle of antibody sandwich technique for the detection of HBs Ag in human serum or plasma. The ELISA test for HBc IgM is two steps incubation solid phase antibody capture assay.

Results:

HBs Ag was detected in 25 (2.9%) of the patients, 15 of them were males and 10 were females, no positive result was detected in the control group. The mean age in these patients was 50.9 ± SE of 3 years. There was no statistical significant association between detection of HBs Ag and age (P = 0.408), nor statistical significant association between seropositive HBs Ag and patients on maintenance hemodialysis or those subjected to surgery ($p > 0.05$), nevertheless, it was more frequent in patients having surgery than those on maintenance hemodialysis (Table 1).

Table (1) The association of HBs Ag with Patients on maintenance hemodialysis and Patients subjected to surgery.

	HBs Ag +ve		HBs Ag –ve		Total
Patients on maintenance hemodialysis	1	1.64%	60	98.36%	61
Patients subjected to surgery	24	3.15%	738	96.85%	762
Total	25		798		823

HBc IgM was detected in 13 (1.5%) of the patients, 7 of them were males and 6 were females, non was reported in the control group. There was no statistical significant association between HBc IgM detection and gender (P = 0.343). The mean age in these patients was 51.8 ± SE of 3.6 years. There was no statistical significant association between detection HBc IgM and age (P = 0.119). HBc IgM was detected in only 1 patient on maintenance hemodialysis and in 12 patients who were subjected to surgery. However, there was no statistical significant association between occurrence of HBc IgM and the two patient's groups ($p > 0.05$) (Table 2).

Table (2) The detection of HBc IgM among Patients on maintenance hemodialysis and patients subjected to surgery.

	HBc IgM +ve		HBc IgM -ve		Total
Patients on maintenance hemodialysis	1	1.64%	60	98.36%	61
Patients subjected to surgery	12	1.57%	750	98.43%	762
Total	13		810		823

From the 25 patients with positive HBs Ag and the 13 patients with positive HBc IgM, 4 patients were positive for both at the same time; the remaining 9 patients were positive for HBc IgM and negative for HBs Ag (Table 3).

Table (3) The Detection of HBs Ag and HBc IgM.

	+ve HBc IgM		-ve HBc IgM		Total
+ve HBs Ag	4	16%	21	84%	25
-ve HBs Ag	9	1.06%	839	98.94%	848
Total	13		860		873

Discussion:

In the current study, two patient groups were tested for detecting HBs Ag and HBc IgM, HBs Ag was detected in 2.9% of the examined patients, there was a higher frequency in patients subjected to surgery than those on maintenance hemodialysis, yet not reached a significant level, this could be due to large number tested, on the other hand most of the patients on maintenance hemodialysis were vaccinated for HBV. Male to female ratio was 1.5:1 which agrees with the findings obtained by Meri *et al* [12].

During this study, HBc IgM was detected in 1.5% of the patients and it was nearly equally distributed in both genders (in 7 males and in 6 females). A result of 0.85% was documented by Abdul Rauf *et al* with a male to female ratio of 1.5:1 [13] while a higher frequency was reported by Meri *et al* being 20.96% with a high exposure rate for both genders [12]. A slightly comparable result of 20.2% was obtained by Ba Alawi *et al* [14]. Such variances could be attributed to the differences in populations and in sample sizes between current and mentioned studies.

In current study, only one positive result was detected among 61 (1.63%) patients on maintenance hemodialysis unlike what was reported by Fontenel *et al* where positive HBc IgM was detected in 38% of the patients on maintenance hemodialysis [15]. This could be explained by ethnic and environmental differences between Iraqi and other populations.

In the present study, the mean age for patients with positive HBs Ag was 50.9 $\pm$ SE of 3 years and the mean age for patients with positive HBc IgM was 51.8$\pm$3.6 years with no statistical significant association between mean age and detection of HBs Ag nor HBc IgM. That was to somewhat similar to findings of Meri who reported the peak carrier rate for HBs Ag in the middle age group and the higher rate of HBc Ab was in the age group 41-60 years [12].

Conclusion:

The use of combined HBs Ag and HBc IgM is more reliable as serological markers for detecting HB viral infection than the use of HBc IgM alone, since HBc antibody alone may miss infection with HBV.

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