

Masumeh Baiani(MD)<sup>1</sup>  
Mostafa Javanian (MD)<sup>1</sup>  
Mahmoud Sadeghi Haddad  
(MD)<sup>1</sup>  
Hassan Taheri (MD)<sup>2</sup>  
Mohammad Jafar Soleimani  
Amiri (PhD)<sup>3</sup>  
Mohammad Reza Hassanjani  
Roushan (MD)<sup>1\*</sup>

1- Infectious Diseases and  
Tropical Medicine Research  
Center, Babol University of  
Medical Sciences, Babol, Iran.  
2- Department of Internal  
Medicine, Babol University of  
Medical Sciences, Babol, Iran  
3- Razi Laboratory Medicine,  
Babol, Iran

\* Correspondence:  
Mohammad Reza Hassanjani  
Roushan, Professor of  
Infectious Disease, Infectious  
Diseases and Tropical  
Medicine, Research Center,  
Babol University of Medical  
Sciences, Babol, Iran.

E-mail: hagar2q@yahoo.ca

Tel: +98-111-3232962

Fax: +98-111-2197667

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## Prevalence of isolated anti-HBc in previously HBV infected individuals

### Abstract

**Background:** The outcome of Hepatitis B virus (HBV) infection is chronic or resolved HBV infection. Over the time, the levels of HBsAg or Anti-HBs declined and were not detectable in their sera and was named as isolated anti-HBc. The purpose of this study was to assess the prevalence of isolated anti-HBc in previously HBV infected individuals.

**Methods:** From April 2000 to September 2008, the results of HBV markers on 2036 cases of previously infected individuals were recorded. Those who were HBsAg or anti-HBs negative but anti-HBc and anti-HBe positive was named as isolated anti-HBc. The prevalence of isolated anti HBc in both males and females was determined.

**Results:** Among the 1160 males with past HBV infection, isolated anti-HBc was seen in 35 (3%) cases. The mean age of these cases was 33.8±13 years. Isolated anti-HBc was seen in 44 (5%) cases of 876 females with previous HBV infection (p=0.014). The prevalence of isolated anti-HBc was 79 (3.9%).

**Conclusion:** The result of this study emphasizes on the differentiation of occult or resolved HBV infection in isolated anti-HBc cases in endemic regions of HBV.

**Key words:** Past HBV infection, isolated anti-HBc, Prevalence.

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It is estimated that approximately 2 billion people in the world have serological evidence of past Hepatitis B virus infection (HBV) and more than 400 million people are chronic carriers of HBV. The prevalence of past HBV infection varies greatly in the different parts of the world and is related to endemicity of this infection (1). In high endemic regions, more than 8% of population has HBsAg and 70-90% population shows past HBV infection. These proportions in intermediate regions are 2-8% and 20-60% and low endemic regions are <2% and 5-10%, respectively (1, 2). Exposure to hepatitis B virus infection (HBV) is associated with chronic or resolved HBV infection (2). Over the time, with the decline of anti-HBs to undetectable titers or rarely after years of chronic infection with decline of HBsAg below the limit of detection, only anti-HBc is detectable (2). Several studies reported isolated anti-HBc in 0.1 to 40% of individuals with past HBV infection (3-6). Consequently, blood negative for HBsAg, which is used as screening test in developing countries, may be potentially infectious due to occult HBV infection among the isolated anti-HBc cases. The purpose of this study was to determine the prevalence of isolated anti- HBc in individuals with past HBV infection.

### Methods

From April 2000 to September 2008, all chronic HBV carriers who attended at the Infectious Diseases and Tropical Diseases Research Center of Babol University of Medical Sciences were entered into the study.

For these chronic HBV carriers hepatitis B surface antigen (HBsAg), hepatitis B e antigen (HBeAg), antibody against surface antigen (anti-HBs), antibody against hepatitis B e antigen (anti-HBe), serum aspartate aminotransferase (AST), alanine aminotransferase (ALT),  $\alpha$ -fetoprotein as well as liver sonography for those over 40 years old were done to determine the viral status. The viral markers tested in Elisa (HBsAg, from Bio Meraux, the Netherlands; anti-HBs from RadiHm Italy, anti-HBc, HBeAg from Dia. Pro Diagnostic BioProbes, Italy).

HBsAg, anti-HBs, and anti-HBc were assessed in all family members of these cases. Subjects tested positive for HBsAg and or HBeAg were considered as chronic HBV infection, and those positive for anti-HBs and anti-HBc were named as resolved HBV infection. All family members of these cases with negative tests to HBsAg, anti-HBs and anti-HBc received hepatitis B vaccine at 0, 1 and 6 months. Subjects negative for HBsAg, HBsAb but positive for anti-HBc and anti-HBe were named as isolated anti-HBc. The study was approved by the infections diseases of tropical medicine research center. The data were analyzed by SPSS version 10 and the prevalence of isolated anti-HBc was determined.

## Results

Among 1160 males with past HBV infection, isolated anti HBc was seen in 35 (3%) cases. Isolated anti-HBc was seen in 44 (5%) cases of 876 females with previous HBV infection ( $p=0.014$ ). The mean age of isolated anti-HBc cases was  $33.8 \pm 13$  years. Therefore, the prevalence of isolated anti-HBc was 3.9% (79 out of 2036) (table 1). The prevalence of isolated anti-HBc among men was 3% and female was 5% ( $p<0.05$ ). The characteristics of patients with past HBV infection are shown in table 1.

**Table 1. Past HBV infection and isolated anti-HBc regarding age groups**

Age group (yr)	Past HBV infection	Isolated anti HBC
	No (%)	No (%)
0-9	52 (2.6)	0 (0)
10-19	371 (18.2)	11 (3)
20-29	640 (31.4)	24 (3.8)
30-39	502 (24.6)	20 (4)
40-49	311 (15.3)	13 (4.2)
>50	160 (7.9)	11 (6.9)
Total	2036 (100)	79 (3.9)

## Discussion

In the present study, among the 2036 cases of past HBV infection, the prevalence of isolated anti-HBc was 3.9%. However, we did not differentiate the decline of anti-HBs to undetectable titers or chronic infection with the decline of HBsAg below the limit of detection. Among the 158 volunteer blood donors negative for HBsAg and anti-HBs but positive for anti-HBc, were analyzed and HBV DNA was detected in sera from 13 (8.23%) of the patients (7). In Greece, isolated anti-HBc was reported to be 4.2% (8). The absence of HBsAg in the blood of apparently healthy individuals may not be sufficient to ensure lack of circulating HBV, and blood-containing anti-HBc only may be infectious until proven otherwise. Several studies showed protective levels of anti-HBs in 50 to 97.8% of cases with isolated anti-HBc after receiving one to three doses of hepatitis B vaccine (9-14, 16). To differentiate between immunity and occult infections, a single dose of vaccine with a follow-up anti-HBs test, is preferable for subjects with isolated anti-HBc. An amnestic response indicates late immunity, and no response a suspect occult infection (1, 2). Among the 30 cases with isolated anti-HBc, an amnestic response was 50% (16).

Polymerase Chain Reaction (PCR) is able to find out cases of occult HBV infection among isolated anti-HBc cases. Several studies reported HBV DNA in sera of 4% to 13% cases of isolated anti-HBc (7, 15, 17-18). In conclusion, the result of this study shows that nearly 4% of past HBV infected cases in our region are isolated anti-HBc. The differentiation of occult or resolved HBV infection in isolated anti-HBc cases is recommended for prevention of HBV infection in blood recipients.

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