

# The Significance of Anti-HBc IgM in the Diagnosis of Acute Hepatitis B viral infection

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## ABSTRACT

**Objective:** To create awareness among the health care professional, specially doctors about diagnosis of acute hepatitis B.

**Study Design:** Cross-sectional study

**Place and Duration of Study:** Department of Internal Medicine, Bolan Medical Complex Hospital, Quetta from 1<sup>st</sup> January 2018 to 30<sup>th</sup> October 2020.

**Methodology:** A total number of 1877 patients above the age 20 years recruited randomly after written consent in patients having positive HBsAg during routine screening of hepatitis B in indoor and outdoor patients. These patients were further evaluated for Anti-HBc IgM. The history was taken and clinical examination was done according to Performa, specially made for this study. The Blood sample was collected from each patient to detect the Anti-HBc IgM titer by radioimmunoassay kit.

**Results:** The mean age in anti-HBc IgM detected patients was 37.69±8.12 years. Mean duration of symptoms was 7.71±0.82 weeks, while certain patients were asymptomatic. Male to female ratio was found to be 3:2. The frequency of acute HBV infection was found to be 320 (17.04%), while rest of the patients 1557 (82.95%) were suffering from chronic hepatitis B.

**Conclusion:** The Anti-HBc IgM is very important serologic marker in patients suffering from acute hepatitis B infection. It is also present during window period of acute hepatitis B.

**Keywords:** Acute hepatitis B; Hepatitis Surface Antigen; IgM antibody to hepatitis B core antigen.

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## INTRODUCTION

Hepatitis B is a viral infection, which is caused by hepatitis B virus (HBV).<sup>1</sup> It infects the liver and can cause acute and chronic hepatitis.<sup>2</sup> According to WHO estimates in 2015, 257 million people were suffering from chronic hepatitis B infection.<sup>3</sup> The hepatitis B surface antigen (HBsAg) is hallmark of both acute and chronic hepatitis.<sup>1-2</sup> A patient with reactive HBsAg of more than 6 months is considered as chronic hepatitis B.<sup>2-3</sup> It is necessary to evaluate all newly diagnosed patients for acute hepatitis.<sup>1,3</sup> The IgM antibody to hepatitis B core antigen (IgM anti-HBc) when present, is suggestive of acute hepatitis B, which is a recent HBV infection with duration of less than or equal to 6 months.<sup>1-3</sup>

The most common modes of transmission of HBV are vertical transmission e.g. mother to child during child birth.<sup>4</sup> The other commonest modes of transmission of HBV are contact with blood, blood products or other body fluids such as saliva, nasal or vaginal secretions.<sup>5</sup> It also spread by sex with an infected person.<sup>6</sup> The other important modes of transmission are injection drug abusers, which involves sharing common and recurrent use of needles, disposable syringes.<sup>4-6</sup>

The HBV can cause acute viral hepatitis.<sup>7</sup> The acute hepatitis B disease varies from subclinical hepatitis to icteric hepatitis to fulminant hepatic failure, which may be hyper-acute, acute and sub-acute.<sup>8</sup> In adults the acute HBV infection is asymptomatic in 2/3<sup>rd</sup> of patients.<sup>9</sup> It is symptomatic in 1/3<sup>rd</sup> of patients and characterized by anorexia, nausea, jaundice, right upper quadrant discomfort, fever, and rash.<sup>7-8</sup> It may rarely present as fulminant hepatic failure in less than 1% patients.<sup>8-9</sup> The

Chronic hepatitis B infection is often asymptomatic. It becomes symptomatic mostly during complications such as liver cirrhosis, HCC etc.<sup>7-9</sup>

The fate of acute HBV infection in healthy adults is sero-conversion.<sup>10</sup> In these patients immune system produces Anti HBs antibodies against HBsAg.<sup>11</sup> These individuals get rid of the infection within six months.<sup>12</sup> The other 9-10% of patients develop chronic liver disease (CLD).<sup>10-11</sup> In patients suffering from CLD approximately 15% to 40% of ultimately develop cirrhosis, end-stage liver disease or hepatocellular carcinoma (HCC), or require liver transplantation.<sup>11-12</sup> In certain people it may be asymptomatic for life.<sup>11-12</sup>

## MATERIALS AND METHODS

This cross-sectional study was conducted at Department of Internal Medicine, Bolan Medical Complex Hospital Quetta from 1<sup>st</sup> January 2018 to 30<sup>th</sup> October 2020. In this population study, a total number of 1877 patients above the age 20 years were participated randomly after written permission. All the selected patients were having positive HBsAg during routine screening of hepatitis B in indoor and outdoor patients. The certain patients were suffering from jaundice, while other patients were asymptomatic and they were blood donors. The inclusion criteria were consisting of, patients having age above 20 years of both sexes, patients having positive HBsAg of less than six months. The patients suffering from chronic liver disease whatsoever the cause, patients having age less than 20 years were excluded from study. The patients suffering from acute hepatitis of any other etiology, other than hepatitis B were also excluded from study. These patients

were further evaluated for Anti-HBc IgM. The comprehensive medical history was taken and complete clinical examination was done according to Performa, specially made for this study. The Blood sample was collected from each patient to detect the Anti-HBc IgM titer by radioimmunoassay kit. In those patients in which the Anti-HBc IgM were detected, they were declared acute hepatitis B, while in those patients in which the Anti-HBc IgM were not detected, they were declared chronic hepatitis B.

**RESULTS**

All the collected data was entered and analyzed by SPSS version 27. The mean age in anti-HBc IgM detected patients was 37.69±8.12 years. The mean duration of symptoms was 7.71±0.82 weeks. The frequency of acute

HBV infection was found to be 320(17.04%), while rest of the patients 1557 (82.95%) were suffering from chronic hepatitis B. The male patients were 172(40.93%), while female were 148(46.25%). The 164(51.25%) were having age ≤45 years, while rests of patients 156(48.75%) were having age >45 years. The symptomatic patients were 133(41.56%), while asymptomatic patients were 161(50.31%) and they presented with other diseases. The rest of 26(8.125%) were found to having positive HBs Ag during blood donation screening. (Table 1)

The fate of acute HBV infection consists of seroconversion in 289(90.31%) patients, while 28(8.75%) patients were developed chronic HBV infection. The fulminant hepatic failure was noted in 3(0.93%) patients, 1(0.33%) of them died, while 2 (0.62%) of them survived, significant p value correlation was found (Table 2).

Table 1: The fate of acute hepatitis B patients according to demographic information of the patients

Characteristics	Fulminant hepatic failure	Seroconversion	Chronic hepatitis B	No. of patients	P value
<b>Age</b>					
≤45	1 (0.33%)	150 (46.87%)	13 (4.06%)	164 (51.25%)	0.011
>45	2 (0.62%)	139 (43.43%)	15 (4.68%)	156 (48.75%)	
<b>Gender</b>					
Male	2 (0.62%)	158 (4.93%)	12 (3.75%)	172 (40.93%)	0.016
Female	1 (0.33%)	131 (40.93%)	16 (5.00%)	148 (46.25%)	
<b>Symptoms</b>					
Asymptomatic	-	170 (53.12%)	17 (53.125%)	187 (58.43%)	0.023
Symptomatic	3 (0.93%)	119 (37.18%)	11 (3.43%)	133 (41.56%)	
<b>Residence</b>					
Urban	2 (0.62%)	135 (42.18%)	19 (5.93%)	156 (48.75%)	0.017
Rural	1 (0.33%)	154 (48.12%)	9 (2.81%)	164 (51.25%)	
<b>Occupation</b>					
HCPs*	-	10 (3.125%)	4 (1.25%)	14 (4.37%)	0.021
Non HCPs	3 (0.93%)	279 (87.18%)	24 (7.50%)	306 (95.62%)	
<b>IV Drug users</b>					
Yes	1 (0.33%)	25 (7.81%)	8 (2.50%)	34 (10.62%)	0.014
No	2 (0.62%)	264 (82.50%)	20 (6.25%)	286 (89.37%)	
<b>Tattooing</b>					
Yes	-	17 (5.31%)	3 (0.93%)	20 (6.25%)	0.008
No	3 (0.93%)	272 (85.00%)	25 (0.33%)	300 (93.75%)	

Table 2: The fate of fulminant hepatic failure

Variable	Fulminant hepatic failure		Total	P value
	Died	Survived		
<b>Age</b>				
≤45	1(0.33%)	0(0.00%)	1(0.33%)	0.021
>45	2(0.33%)	2(0.62%)	2(0.62%)	
<b>Gender</b>				
Male	1(0.33%)	0(0.00%)	1(0.33%)	0.011
Female	-	2(0.62%)	2(0.62%)	
<b>Occupation</b>				
HCPs	-	1(0.33%)	1(0.33%)	0.032
Non HCPs	2(0.62%)	0(0.33%)	2(0.62%)	

HCPs = Health care professionals

**DISCUSSION**

Hepatitis B is inflammation of liver caused by HBV infection.<sup>13</sup> There are two types of hepatitis B e.g. acute hepatitis B and chronic hepatitis B.<sup>14</sup> Acute HBV infection is a short-term liver disease that occurs within the 6 months after exposure to the hepatitis B virus.<sup>15</sup> The HBV infection is mostly asymptomatic or patients present with mild symptoms in 60-70 % of cases.<sup>13-14</sup> It may be symptomatic

in 30-40% of cases and may present with severe symptoms and may need hospitalization.<sup>14-15</sup> Very rarely it may present with fulminant hepatic failure in 1% of cases.<sup>14</sup> The chronic HBV carriers are the still major source of HBV infection all over the world.<sup>15</sup> The hepatitis B vaccine is having major role in prevention of hepatitis B virus, but this needs continuous vaccination in normal population up to several generations.<sup>13-15</sup>

The diagnosis of HBV infection requires the evaluation of the patient's blood for HBsAg, which is present in both acute and chronic hepatitis B viral disease.<sup>16</sup> The hepatitis B core antibody (HBcAb) is also indicative of both acute and chronic hepatitis B viral infection.<sup>17</sup> The anti-HBc IgM is suggestive of acute hepatitis B, while the IgG antibody to hepatitis B core antigen (IgG anti-HBc) is suggestive of chronic hepatitis B.<sup>18</sup> The qualitative HBV-DNA (deoxyribonucleic acid ) by PCR ( polymerase chain reaction ) is also indicates both acute and chronic hepatitis B viral infection, but it is not indicated in acute HBV infection.<sup>16-18</sup>

The incubation period of HBV infection is 30 to 180 days with an average of 75 days.<sup>19</sup> An infected person can

infect others 4 to 6 weeks before appearance of symptoms and for an unpredictable time period thereafter.<sup>20</sup> The presence of HBsAg indicates that the person is infectious.<sup>21</sup> The anti-HBc IgM appears at the onset of acute HBV infection.<sup>19-20</sup> It is also present during window period of HBV infection.<sup>20-21</sup> The window period of hepatitis B is a time period in HBV infection, when neither HBsAg nor hepatitis B surface antibody (HBsAb) is present in the serum of the patient.<sup>19-21</sup>

In adult population the fate acute HBV infection is consist of seroconversion in 90% of cases.<sup>22</sup> The acute liver failure, which is also called fulminant hepatic failure is present in  $\leq 1\%$  of patients, which can lead to death in  $\geq 50\%$  of patients.<sup>23</sup> The remaining 9-10% of patients may develop chronic liver disease (CLD), out of which 40% may develop complications of CLD and remaining may be asymptomatic for life.<sup>24</sup> In children's HBV multiplies very slowly and acute hepatitis B infection and fulminant hepatic failure is rarely present.<sup>22-23</sup> In children the fate of acute HBV infection is consist of seroconversion in 10% of cases, while the remaining 90% of may develop CLD.<sup>23-24</sup>

The management of acute HBV infection is supportive and no specific treatment is available.<sup>25</sup> The supportive is also indicated in severely symptomatic patients and patients suffering from fulminant hepatic failure.<sup>26</sup> Traditionally 90% of HBV infection may develop full recovery; due to this antiviral were not indicated.<sup>27</sup> Recently trials of antiviral such as Lamivudine, adefovirdipivoxil and entecavir has been started, which shows positive impact on the course and history of acute HBV infection.<sup>25-27</sup>

## CONCLUSION

The aim of this study is to create awareness especially about acute hepatitis B and commonly about hepatitis B, Chronic hepatitis B, its prevention and complications. The Anti-HBc IgM is very important serologic marker in patients suffering from acute hepatitis B infection. It is also present during window period of acute hepatitis B.

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