Persistence of anti-HBsAg in sera samples of vaccinated individuals with special reference to different age groups

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Abstract: Hepatitis B virus (HBV) infection affects millions of people worldwide and about a half million people die every year. It is a serious liver disease, caused by hepatitis B virus. The disease is transmitted through human body fluids such as blood and serum. The objective of the study is to identify the optimal age for revaccination. All the subjects were received vaccination under vaccination project at childhood age. Serum was separated and the titre of anti-HBsAg was estimated using quantitative method of double antibody sandwich-ELISA. There were 100 subjects included in the study. Seroprotective rate decreased significantly with increasing time from last vaccination due to decrease in anti-HBsAg titre over time. Hepatitis B vaccination has been accepted to induce the protective antibody level after the complete dose of vaccination. Anti-HBsAg concentrations declined over time among studied subjects successfully immunized with HB vaccine starting at birth. The study shows that male were more prone to hepatitis B infection as compare to female. The correlation analysis revealed a highly significant negative correlation (r = 0.92, t= 9.95, p<0.05) between different age groups and conc. of Anti HBsAg of sera samples of selected individuals. HB vaccine-boosting could be advised for high risk subjects including adult health care workers and children at endemic area at twenty years intervals.

Key words: Hepatitis, Vaccination, Anti-HBsAg and ELISA

Introduction

Hepatitis-B virus infection is a global public health problem. It is estimated that more than one third of world’s population has been infected with hepatitis B virus (HBV) and it causes more than million deaths each year. About 5% of the population are chronic carriers of HBV, and nearly 25% of all carriers develop serious liver diseases such as chronic hepatitis, cirrhosis and primary hepatocellular carcinoma. Chowdhury A et al. (2005) and Lai CL et al. (2008). The exact carrier rate of HBV in India is not known with certainty, though an earlier preliminary attempt has suggested an estimated carrier rate of 4.7%. Thyagarajan SP et al. (1996). The World Health Organization recommends administering the first dose of hepatitis B vaccine within 24 hr of birth followed by 2 or 3 doses with a minimal interval of 4 wkWHO wkly (2009).

Hepatitis B vaccination has been one of the success stories of the 20th century Chen CJ et al. (2002). Hepatitis B vaccines are highly effective and safe and have been incorporated into national immunization programs in over 150 countries. The immune response is to date the common determinant of the surface antigen protein of the virus. Approximately 5-10% of healthy immunocompetent subjects do not mount an Anti-HBs Zuckerman JN et al. (2006). A universal vaccination program in infancy provides adequate protection against hepatitis B virus infection for school age children and a booster vaccination is not usually recommended Shih HH et al. (1999). Also, hepatitis B vaccine, hepatitis B immunoglobulin and vaccine plus immunoglobulin prevent hepatitis B occurrence in newborn infants of mothers positive for HBsAg Lee C et al. (2006).

The objective is to study the number of Anti HBsAg positive cases in different age group individuals and correlation between persistence of Anti HBsAg concentration and age groups. The study also done to find the occurrence of HBsAg positive cases in male and female.

Materials and Methods

The study was conducted in year 2016 at Chatrapati Sahuj Maharaj University, Kanpur, Uttar Pradesh, India. All subjects who had received at least one dose of vaccine as part of the vaccination project and a medical proforma has been filled at the time of the survey were included in the study. Five ml venous blood sample was collected from each of these subjects & samples were collected from Institute of health sciences, CSJM university and Lala Lajpat Rai Hospital located near the campus. Serum was separated and the titre of anti-HBs was estimated using quantitative method of double antibody sandwich-ELISAWolters G et al. (1977). The study protocol was cleared by the Department of Biochemistry, CSJMU, Kanpur.
Result and Discussion

In this study, 100 samples were collected from above-mentioned sources. Out of those 81 were being included in the study in which 38 were female and 43 were male. Those donor which get immunized after infection were excluded from the study. Subjects were divided into four groups, based on age of vaccinated donor.

**Group 1:** 1-5 years; **Group 2:** 6-10 years; **Group 3:** 11-15 years; **Group 4:** 16-20 years

The protective antibody level were detected 94.73% of subject of group 1. It is decreased to 85.7% by group 2. It is further decreased to 58.8% in group 3 and decreased to 37.5% by group 4. Seroprotective rate decreased significantly with increasing time from last vaccination due to decrease in anti-HBs titre over time. The observation reveal that the mean concentration antiHBsAg in male individuals was higher as compared to female individuals. The mean concentration was 1222.8mlU/ml in male individuals and 1201.1mlU/ml in female respectively (Fig. 1). The correlation analysis revealed a highly significant negative correlation (r = 0.92, t= 9.95, p<0.05) between different age groups and conc. of Anti HBsAg of sera samples of selected individuals. In the present study none of the included subjects had clinical evidence of symptomatic hepatitis. The prevalence of previous HBV infection in the studied subjects (proved by Anti-HBs positivity) were 0.0% in vaccinated subjects. Since the epidemiology is unclear, children could be followed into adulthood to assess whether they remain HBsAg negative and a comparison could be made with conversion to Anti-HBsAg positivity.

A national Egyptian study reported seropositivity to HBsAg of 7.5% among normal non-vaccinated children El-Marsafy et al (1985). However, El-Sawy and Mohamed El Sawy IH et al (1999); reported that the prevalence rate of HBV infection in their study population was 0.56% and the HBsAg carrier rate was nil. In a sero-epidemiologic study conducted to examine the impact of HB vaccination on the carrier state among avaccinated group of children in Alexandria, Egypt, the rate of HBsAg positivity in the vaccinated group was found to be 0.8%

Anti-HBs concentrations declined over time among studied subjects successfully immunized with HB vaccine starting at birth. Transient Anti-HBc appeared in a small percentage of children; however, none developed clinical signs of hepatitis or chronic HBV infection Dentinger CM, (2005). In the present study, despite the decline of Anti-HBs titer below the seroprotective level in some cases, an immunological memory exists in these subjects, evidenced by the anamnestic type of response with high Anti-HBs titer (>100 IU/L) in 100% of the seroprotective up to the age of 5. It has been shown that HB vaccine induces active synthesis of Anti-HBsAg antibody accompanied by immunological memory for HBsAg and that this affords ongoing protection in the absence of circulating Anti-HBsAg

In conclusion, HB vaccine could be highly protective against HBV infection as evidenced by the absence of hepatitis B infection among the vaccinated groups. The prolong exposure since vaccination, the lower was the seroprotection rate and the decrease the mean Anti-HBs level, but with persistence of an effective 

**Table 1:** Serological profiles of anti-HBsAg of four study group

<table>
<thead>
<tr>
<th>Age group</th>
<th>Mean age</th>
<th>Range of antibody titre</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>3.89</td>
<td>&gt;=1000mlU/ml</td>
</tr>
<tr>
<td>6-10</td>
<td>9.04</td>
<td>1000-1000mlU/ml</td>
</tr>
<tr>
<td>11-15</td>
<td>13.35</td>
<td>10-100mlU/ml</td>
</tr>
<tr>
<td>16-20</td>
<td>17.1</td>
<td>=&lt;10mlU/ml</td>
</tr>
</tbody>
</table>

![Fig. 1: Mean concentration of anti HBsAg in male and female individuals](image1)

![Fig. 2: Correlation between Anti-HBsAg concentration and different age groups](image2)
immunological memory in vaccines dose response. The study shows that male were more prone to hepatitis B infection as compared to female. HB vaccine-boosting could be advised for high risk subjects including adult health care workers and children at endemic area at twenty years intervals.

References


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