Seroprevalence of hepatitis B virus markers in individuals for physical examination in West China Hospital, China

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Abstract. – Background: Hepatitis B virus (HBV) is the major cause of chronic hepatitis, cirrhosis, and hepatocellular carcinoma. The global epidemiological scenario of HBV infection has been changing rapidly over the last two decades due to an effective immunization programme initiated by the World Health Organization. The objective of this study is to estimate the prevalence of HBV in apparently adult people who were taken health examination in our Hospital.

Methods: A cross-sectional seroprevalence analysis of hepatitis B virus infection was performed in 12037 adult residents (aged ≥18 years) in Chengdu, who visited Health Examination Center of West China Hospital of Sichuan University for routine medical check-up during the period from March to December 2008. A structured medical form was used to collect data on demographic characteristics and risk factors. ELISA was used to test sera for HBV markers. Descriptive and logistic regression models were used for analysis.

Results: A total of 12037 urban residents were involved. Prevalence of positive HBsAg was 6.1%, lower than the level of national sero-epidemiological survey in (7.18%). Among HBsAg negative people, anti-HBs and anti-HBc was 60.2% and 13.6% respectively. There was a maximum between 18 to 29 years of age (61.8%) in anti-HBs positive people. Multivariate condition- al logistic regressive analysis showed that, except for blood and vertical transmission, factors of male gender (OR, 1.876; 95% CI, 1.519-2.316; P<0.001) and alcohol intake (OR, 0.689; 95% CI, 0.571-0.832; P<0.001) were associated with a higher risk of positive HBsAg.

Conclusions: Among the medical examination people in Chengdu, HBsAg positive rate was lower than the national general population, the epidemiological characteristics of hepatitis B has been changed, because of vaccination policies to the newborn; therefore, the necessity to continue to carry on the vaccination program.

Key Words: Hepatitis B, Prevalence, Risk factors, Health-examined individuals.

Introduction

Hepatitis B virus infection continues to be a major public health problem1, which could cause a life-threatening liver infection that often leads to chronic liver disease and puts people at high risk of death from HBV-related liver diseases2. According to the World Health Organization (WHO), hepatitis B is estimated to infect 2 billion people globally (having serological evidence of past or present HBV infection), with 350 million to 400 million chronically infected patients and one-third reside in China3,4. Some studies reported around half a million patients die from hepatitis B caused hepatocellular carcinoma and end-stage cirrhosis each year in China5,6. With the implementation of infant vaccination programs and powerful measures to block transmission from mother to child, the prevalence of HBV infection in child had declined significantly7-10. Although most infections in the
developing world occur in childhood and early adulthood, a significant proportion of non-immune adult population remains at risk. Thus through undergoing the physical examination, we can understand the situation of vaccination in order to lay the foundation for further formulate prevention strategies.

In this study, a cross-sectional prevalence analysis of HBV markers in health-examined individuals was presented and risk factors of HBV infection were investigated to understand the hepatitis B virus infection in Chengdu and further improve the prevention and treatment of hepatitis B.

### Materials and Methods

#### Population and Study Design

We retrospectively screened general healthy adult populations (≥18 years) who had undergone regular health examinations in the Physical Examination Center of West China Hospital of Sichuan University between March and December 2008. All subjects were interviewed, face-to-face, prior to serological testing by occupational physician in a private room at Physical Examination Center of West China Hospital. A structured medical form was used for recording the following demographic data: age, sex, height, weight, and residence; behavioral risk factors: smoking and alcohol intake; previous history of infectious diseases; and medical procedure history.

Venous blood was collected from each subject and kept in a cold container and immediately transferred to the Central Laboratory of our Hospital. The items of hepatitis B serological markers, including HBsAg, anti-hepatitis B surface antibody (anti-HBs), hepatitis B e antigen (HBeAg), anti-hepatitis B e antibody (anti-HBe), and anti-hepatitis B core antibody (anti-HBc), were assayed using commercial reagents.

#### Statistical Analysis

All data were managed and analyzed using the SPSS version 13.0 software (SPSS Inc., Chicago, IL, USA). Quantitative data were presented as the mean ± standard deviation (SD), and categorical data were presented as counts and percentages. Prevalence of serological markers of HBV was calculated. Group comparisons were carried out by the chi-square test and Student’s *t* test. Multiple logistic-regression analysis was used to identify independent predictors of positive HBsAg among general adult populations. A *p*-value of less than 0.05 (two-tailed) was considered to indicate a significant difference.

### Results

#### Characteristics of Study Population

A total of 12037 populations were involved in this retrospective study with the mean age of 46.9 ± 14.9 years, and 58.4% male subjects. Among the 12037 subjects, 40.6% had the body mass index (BMI) higher than the up limits of normal (25 kg/m²); 37.9% were with a history of surgery, and 40.6% and 69.7% were alcohol intake and smoking, respectively. The detailed information was showed in Table I.

#### Prevalence of HBV Marker

Among the 12037 serum samples, a total of 14 serological patterns were observed, and detailed information was presented in Figure 1. HBsAg was positive in 6.1% (731/12037) of the serum samples. Of the 731 health-examined populations tested positive for HBsAg, 89.1% (648/731) were anti-HBe positive and only 4.8% (35/731) were HBeAg positive. The negative rates of the HBVM was 32% (3867/12037).

Additionally, there were 11310 populations who were negative for HBsAg, of whom, 60.2% (6804/11310) populations were positive for anti-HBs with a peak shown between 18 to 29 years of age (61.8%, 873/1413). And rate of positive anti-HBs descended with age increasing (Figure 2A).

The rate of overall anti-HBc was 18.8% (2261/12037), alone for 2.4% (283/12037). Among HBsAg negative people, anti-HBc was 13.6% (1535/11306), prevalence of positive anti-HBc increased with age from approximately 17.3% (245/1413) for those 18-29 years old to more than 22.6% (580/2572) of those more than 60 years old, increased with age increasing (Figure 2A).

### Table I. Characteristics of study population.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (male/female)</td>
<td>5402/6635</td>
</tr>
<tr>
<td>Age (years)</td>
<td>46.9 ± 14.9</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>23.4 ± 3.3</td>
</tr>
<tr>
<td>Surgery history (yes/no)</td>
<td>4567/7470</td>
</tr>
<tr>
<td>Alcohol intake (yes/no)</td>
<td>4888/7149</td>
</tr>
<tr>
<td>Smoking (yes/no)</td>
<td>3653/8384</td>
</tr>
</tbody>
</table>
Among those population with evidence of HBV exposure (anti-HBc positive), the peak HBsAg prevalence was observed in the 30-39 years (37.5%, 197/526) and 40-49 years age (39.3%, 193/491) groups, while prevalence of HBsAg was decreased to 20.3% in the 60-years group (Figure 2B).

**Predictors of Positive HBsAg**

Differences in the distribution of risk factors were assessed between those who were HBsAg positive or not, and the detailed results were presented in Table II.

In univariate analysis, the following five factors were associated with positive HBsAg in general adult populations: gender, age, BMI, surgery history, alcohol intake and smoking. Compared to female populations, male populations were more likely to be with positive HBsAg (p=0.000). In multivariate analysis, all factors were applied to the analysis as variables, and positive HBsAg was higher in men (OR 1.876; 95% CI 1.519-2.316) and populations who had a history of alcohol intake (OR 0.689; 95% CI 0.571-0.832).
HBV infection in adult population

**Discussion**

Despite progress in the diagnosis and treatment of viral hepatitis, their incidence is still high in some parts of the world\(^4\)--\(^13\). In 2006, China hepatitis B serum epidemiology data show that surface antigen carrying rate of the general population has dropped from 9.75% in 1992 to 7.18%, namely the hepatitis B virus carriers fell from 1.2 billion to 0.93, reducing the 30 million cases, which made our country “high endemicity areas” down to the “intermediate Endemicity areas”. Chengdu is considered to be a moderate endemic region of hepatitis B\(^16\),\(^17\).

Our study was a general population-based HBV infection study in city residents. They all have a formal occupation, such as government staffs, white-collars and intellectuals, who have high income and education. And our sample size was large and provided comprehensive demographic and clinical information with which a reliable prevalence rate and risk factors for HBV infection could be determined.

According to our findings, the overall prevalence of positive HBsAg was 6.1%, which was significantly lower than that reported in 2006 (7.18%)\(^16\), suggesting that the proportion of HBV infection in the residents Chengdu is decreasing.

The overall proportion of positive anti-HBs among those health-examined populations was 60.2%, obviously higher than general population with anti-HBs in China 2006\(^16\), and the peak (61.8%) in anti-HBs positive appeared between 18 to 29 years of age group. At the same time, the rate of overall anti-HBc was 18.8%, alone for 2.4% and among HBsAg negative people, was 13.6%, markedly lower than in normal population (42.87%) in China 2006\(^17\). Since 1992, our country carried out for neonatal hepatitis B vaccine immunization planning management and health education leading to hepatitis B virus infection declined significantly. The reason why there are so high anti-HBs and low HBsAg and anti-HBc, these check-up population most likely injected with the hepatitis B vaccine in the past 20 years, especially in 18 to 29 years of age group, they were given vaccine in infancy, which contributed to the peak in anti-HBs. Besides vaccination, this result may also be related to following factors, such as improvement of quality of life, use of disposable medical equipments and screening of blood donors and pregnant women.

However, 39.8% of people still didn’t have anti-HBs. This proportion presents a significant challenge for public health because they are may not immune to HBV and susceptible to HBV infection. Thus, it is important and urgent to promote hepatitis B vaccinations in adult population\(^18\).

In this study, our age-specific analysis showed that prevalence of anti-HBc increased with age, consistent with other studies; and among anti-HBc-positive subjects, the peak prevalence of positive-HBsAg was observed in the 30-49 years age population (37.5% for 30-39 years age group, and 39.3% for 40-49 years age group). The reason for this result is still unclear, and may be related to higher risk of unhealthy lifestyle practices in those age groups, such as unsafe sex, injecting prohibited drugs, transfusion of unscreened blood, and etc.

Multivariate conditional logistic regressive analysis showed that except for blood and vertical transmission, the risk factors analysis also showed male and alcohol intake has been associated with positive-HBsAg, and these results were also observed in other reports\(^19\)--\(^21\). So cut down on drinking or stop drinking alcohol would reduce the risk of HBV infection\(^22\).

In conclusion, this study provides much important information concerning the prevalence of HBV markers among health-examined population.
in Chengdu, China. The effectiveness of routine hepatitis B immunization in significantly reducing or eliminating the prevalence of chronic HBV infection has been demonstrated in our city. However, there are still many challenges to achieve the goal of universal childhood immunization against hepatitis B, such as poor immunization delivery infrastructure, low coverage and lack of financial sustainability. Therefore, to continue to promote access to hepatitis B vaccines worldwide, great efforts are needed to support countries to ensure sustained funding for immunization programs.

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