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Original Article

Serologic response to hepatitis B vaccine in health care workers, Kermanshah, Iran

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ABSTRACT

Background: Hepatitis B is a major infectious risk factor for health-care workers (HCWs) and public- safety workers. Although seroconversion rate following hepatitis B vaccination is estimated to be more than 90%, serologic response to Heberbiovac HB vaccine currently given in our center in Kermanshah province has been varied in different experiences, So, this study was conducted to determine serologic response in HCWs.

Methods: In a descriptive-cross sectional study, in 138 HbcAb from 10 health care centers, HbcAb negatives and vaccinated with Heberbiovac HB (Cuba made, available vaccine in Iran), HbsAb titer was assessed by ELISA. Serologic response as antibody titer equal or more than 10mIU/ml considered protective level (serologic responder). The data were analyzed by SPSS software, using X^2 and Fisher exact test.

Results: Within 138 HCWs(60.1% female and 39.9% male), 69.6% had serologic response. The age had significant role in serologic response rate, but sex, weight, smoking and interval from the last time of vaccine reception were not effective factors.

Conclusion: Serologic response rate to HBV vaccine in Kermanshah was much lower than other experiences. We need more information about the efficacy of Heberbiovac HB in high-risk groups and general population, the reasons of low efficacy and increasing serologic response.

Keywords: Hepatitis B, Vaccine, Serologic response, Heberbiovac HB, Health-care workers

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Hepatitis B is a major infectious risk factor for health-care workers (HCWs) and public population. Acute hepatitis B may lead to chronic carrier state in 6-10% of patients [1]. On the other hand, chronic infection may result in various degrees of inflammation or necrosis, leading to cirrhosis and hepatocellular carcinoma. Hepatitis D virus may also superimpose to HbsAg positive patients and increase life threatening complications [2].

HCWs are at risk of HBV infection more than general population. Although serologic response to immunization is not complete, but vaccination can produces immunity in most vaccine recipients. Some factor such as sex, age, obesity, route of injection and smoking can influence seroconversion rate [1, 3]. In our country, all neonates, HCWs, medical students, accidentally exposed peoples and other high-risk groups have vaccinated routinely against hepatitis B, since 9 years ago. A few derivations of HBV vaccine are available in different countries (Recombivax HB, Engerix, Heptavax), but they are equally effective and approximately 90% of healthy adults will develop protective antibody[1, 4-7]. The only available vaccine in Iran is Heberbiovac HB and we aimed to know the efficacy of current vaccination program against HBV infection in high-risk groups and determine susceptibility rate in Kermanshah province, located in west site of Iran.

Subjects and Methods

In a descriptive cross-sectional study, 138 health-care workers were simply sampled from 10 health care centers of Kermanshah medical university. ELISA (RADIM kit) assessed the HbsAb titer. The antibody titer equal or more than 10mIU/ml considered protective level (serologic responder).

Our subjects had vaccinated with 3 doses of Heberbiovac HB (Cuba made), according to international protocol. They didn't have previous

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history of HBV infection and were HbcAb negative. Characteristics data such as sex, age, weight, smoking and interval from the last time of vaccine reception were obtained.

The data was analyzed by SPSS software using X^2 and Fisher exact Tests.

Results

No of the subjects had history of antibody response assessment after complete vaccination. Among 138 subjects (60.1% female and 39.9% male), the mean age was 36.94 years (range from 29 to 55). Responders and non-responders were 69.6% and 30.4% of subjects, respectively. Serologic response was detected in 74.7 % of females, 61.8% of males, and 61.7% of obese subjects and in 73.6% of thin or normal subjects, without significant difference. The response rate in subjects older than 40 years (58%) and in subjects younger than 40 years (76.1%) were significantly different ($p<0.05$). Serologic response in smokers and in nonsmokers has not significant difference. The frequency of last vaccination dose before or after 3 years was not statistically different. Detailed results have listed in Table 1.

Table 1: Demographic comparison of responders and non responders

Variables		Serologic Response		Statistical Correlation
		Responder	Non-Responder	
Sex	Male Female	34(61.8%) 62(74.7%)	21(48.2%) 21(25.3%)	NO
Weight	Obese Non obese	27(61.7%) 67(73.6%)	20(38.3%) 24(26.4%)	NO
Age	<40y ≥40y	67(76.1%) 29(58%)	21(23.9%) 21(42%)	yes
Smoking	Smoker Non smoker	10(66.6%) 86(69.9%)	5(33 .3%) 37(30.1%)	NO
Last Vaccination Dose	<3y ≥3y	57(70.4) 39(68.4%)	24(29.6%) 18(31.6%)	NO

Discussion

Serologic response rate to HB vaccine was seen in 69.6 %(74.7% male, 61.8% female) of Kermanshah HCWs which is lower than other similar studies in Iran and over than yazd study that it was 58.8% [4-7,9-12]. It may be due to less effective Heberbiovac HB than other similar vaccines.

On the other hand, the frequency of last vaccination dose before or after 3 years in our study was not uniform for all subjects. So, the gradually decline of antibody level is possible and vaccinated people after 3 years (70.4%) had low antibody level, too.Technical problems such as vaccine storage condition, safe transfer chain and injection quality may affect serologic response, but these mentioned parameters could not be prominent in our experienced health care system.

We found that more than 30% of vaccinated HCWs may be sensitive to HBV infection, Although symptomatic infection is rare in immunized peoples who developed protective levels of antibody even though then is eventual loss of detectable antibody in up to 50% of those peoples 5-10 years after immunization. For this reason, there is currently no recommendation for periodic boosting of HCWs who have responded to hepatitis B vaccine[13]

The assessment of HbsAb level 1-2 months after complete immunization and revaccination is suggested for HCWs and HIV infected and some high risk groups [14,15], but this is not routinely performed in our vaccination program.

In this study, serologic response rate was not different between both sexes, although some previous studies confirmed it [11, 12, 16, 17] and another showed it more in female than male [1, 9, 10,]

Like other studies [1,16,17], serologic response rate was significantly different in two age groups; higher in 40 years and younger, lower in older

than 40 years ($p<0.05$). Therefore, HWCs should be immunized before age 40, as soon as possible.

In our study, body weight, smoking and the time after last vaccine dose aren't effective factors on antibody level, although they were important related factors in some reports [1, 17].

We need more information about the efficacy of Heberbiovac HB in high-risk groups and general population, the reasons of low efficacy and increasing serologic response, We recommend immunologic assessment on vaccinated HCWs 30 days after routine vaccination and modifying HBV immunization plan for non-responder subjects[18].

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