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BRIEF REPORT

Response to the Hepatitis B Virus Vaccine in Iranian Infants

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Background and Aims: **The aim of this study was to evaluate infants' immune response to the hepatitis B virus (HBV) vaccination.**

Methods: **This was a cross-sectional descriptive study carried out on 215 infants 7-12 months of age in the Golestan province in northeastern Iran in 2006. These children had already received the complete three-dose vaccination against hepatitis B. The serumal levels of hepatitis B surface antigen antibody (anti-HBs), hepatitis B core antibody (anti-HBc), and hepatitis B surface antigen (HBsAg) were determined using enzyme-linked immunosorbent assay (ELISA).**

Results: **Of all 215 participants, 55.3% were males. All of them were 7-12 months old. Eighty-six percent of the studied cases responded positively to the vaccination. The response rate for males was lower than the rate for females (P = 0.34).**

Conclusions: **We found that non-response to HBV vaccination is an important issue in our area. Further studies are needed to assess the influence of major factors such as the vaccination procedure, the type and site of inoculation, and vaccine preservation and transportation.**

Keywords: **Hepatitis B Virus, Vaccination, Infants, Iran**

Introduction

Hepatitis B Virus (HBV) infection is a common health problem worldwide. Infants who prenatally acquire HBV have almost a 90-percent risk of developing chronic HBV infection [1]. Therefore, vaccination of infants and children takes the highest priority for HBV vaccination programs [2]. Some researchers believe that 0.7 to 3.8 percent of vaccinated individuals may not respond to the vaccine and become infected with HBV later. Adibi et al. reported that only 64.4 percent of vaccinated infants of non-HBV-infected mothers were positive for antibodies to hepatitis B surface antigen (anti-HBs) [3]. In another study, 598 babies with a mean age of 23.3 months who received all 3 doses of the hepatitis B vaccine had an overall seroprotection rate of 86.8 percent [4]. Therefore, we conducted this study to assess the vaccination responses in children of the Golestan province of Iran, previously known as a high-risk area for HBV [5, 6].

Materials and Methods

The participants of the present descriptive cross-sectional study were 215 infants of the Golestan

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province in northeastern Iran who were 7 to 12 months old in 2006. The infants lacked any known infectious diseases and were completely vaccinated with Euvax B, a Korean HBV vaccine (manufactured by LG Chem. Pharmaceutica DIV; one paediatric dose of 0.5 ml containing 10 micrograms of hepatitis B surface antigen [HBsAg], three doses in total). Serum samples were analyzed for anti-HBs and hepatitis B core antibodies (anti-HBc) using enzyme-linked immunosorbent assay (ELISA). Serums that tested negative for anti-HBs were analyzed for HBsAg. Anti-HB antibody levels higher than 10 IU were considered positive [7].

Student t-tests and Chi-square tests were used to compare serum antibody levels and response rates by sex.

Results

In all, 215 infants (7-12 months old) were included in the study. One hundred and nineteen of these infants (55.3 percent) were males, and 96 (44.7 percent) were females. In general, 86 percent of the studied cases responded positively to the vaccination against hepatitis B. Thirty cases (14 percent) did not respond properly (Table 1).

The mean antibody titer due to vaccination was 158.48 (standard deviation [SD] = 131.2) and 187.55 (SD = 135.5) in males and females, respectively (P = 0.11). The response rate for males was lower than the rate for females (P = 0.34).

A small percentage of cases (2.2 percent) were positive for anti-HBc, which is indicative of previous infection with HBV.

Of the studied cases, 30 individuals (14 percent) were anti-HB negative. Among these cases, one male tested HBs-Ag positive, indicating a continuous infection. Five of the 215 studied infants had been infected with HBV, and 4 of these infants tested positive for both anti-HB and anti-HBc Ab. One of these cases was HBsAg positive as well.

Discussion

In this study 14 percent of the sample acted as non-responders and showed no antibody following the standard three-vaccination program. In a previous study on one-year-old children, the non-response rate was 3.9 percent [8]. The rate of non-response to the HBV vaccine in a study from Babol, Iran was 12.4 percent [9]. A report from India revealed that 100 percent of a sample of normal children at birth (more than 2.5 Kg) responded well to a routine vaccination program [10]. However it is important to note that the India study focused on younger infants. A 100-percent response rate was also obtained in a study from Sweden [11]. A similar study has revealed that the rate of responders against HBV was 95 percent in all vaccinated infants, children and adults [7]. Our results were not consistent with the results derived from the abovementioned studies. Eighty-one percent of vaccinated children (12-16 months) in Mashhad city have responded to the Cuban-made vaccine [12]. This non-response rate (19 percent) is much closer to our rate of non-response (14 percent) to the Korean vaccine. Due to the coexistence of anti-HBc in 4 out of 185 anti-HB-positive cases, it might be possible that these children had already been infected with the virus. So, the rate of non-responder cases could even be as high as 15.81 percent; although, the coexistence may also have been due to transmission from infected mothers. Among the 30 cases that were anti-HB negative, one HBsAg-positive case was detected. Therefore, despite the Korean source of the recombinant vaccine used in the region and the presence of non-responders to the vaccination, it is possible that other factors like immunodeficiency, genetic background, vaccine type, and storage and handling problems influenced our findings. Still other factors may have affected the vaccination response rate, such as the vaccination procedure, the type and site of inoculation, and vaccine preservation and transportation.

Table 1. Sex distribution of the response to the HBV vaccine in 7- to 12-month-old infants in the Golestan province of Iran.

	Responder No (%)	Non-responder No (%)	Total No (%)	Odds Ratio	95% CI
Male	100 (84%)	19 (16%)	119 (55.35%)	0.68	0.28-1.61
Female	85 (88.5%)	11 (11.5%)	96(44.65%)		
Total	185 (86%)	30 (14%)	215 (100%)		

In conclusion, we found that non-response to the HBV vaccination is an important issue in our area. Further studies are needed to assess the influence of major factors such as the vaccination procedure, the type and site of inoculation, and vaccine preservation and transportation.

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