

The Effect of Hepatitis B Vaccination at Birth on Reducing the Prevalence of Hepatitis B Surface Antigen among Rural Pregnant Women in Babol, Iran

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ABSTRACT

BACKGROUND AND OBJECTIVE: Hepatitis B virus infection is regarded as a major factor for chronic liver disease and cirrhosis, worldwide. Hepatitis B is most commonly transmitted from mother to child at birth (perinatal transmission). In this study, we aimed to determine the prevalence of hepatitis B surface antigen (HBsAg) among rural pregnant women, who had received vaccination at birth, based on the national hepatitis B vaccination program, implemented in Iran in 1993.

METHODS: This cross-sectional study was performed on all rural women, born in years 1993-1999, who had received hepatitis B vaccination according to the national program and had become pregnant during 2007-2014. In order to diagnose the disease, the status of HBsAg marker was recorded and evaluated by reviewing the subjects' health records.

FINDINGS: Among 1065 pregnant women, only 2(0.18%) cases were HBsAg-positive; The mother of one of these two cases was diagnosed with hepatitis B infection.

CONCLUSION: The results of this study indicated that the national vaccination program had a considerable impact on reducing the prevalence of hepatitis B virus infection among women of reproductive age. Continuous vaccination of newborns and high-risk groups and screening programs for pregnant mothers should be also prioritized in the national program.

KEY WORDS: *Pregnant women, Chronic hepatitis B virus infection, National vaccination.*

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Introduction

Hepatitis B virus infection is one of the most common factors for liver disease, worldwide, leading to conditions such as cirrhosis, liver failure, and liver cell carcinoma (1-3). Approximately 350 million people in the world are diagnosed with chronic hepatitis B infection, with Asian countries accounting for two-thirds of the affected population (4, 5). Overall, the prevalence of chronic hepatitis B infection has been reported to be 2.7% in Iran (6). Currently, no effective treatment plan has been proposed for full eradication of chronic hepatitis B infection, and the available medicines are quite costly for the patients. Therefore, vaccination is the most effective and economical method for preventing hepatitis B infection and the associated complications (7). The main transmission route of hepatitis B is not fully understood in Iran. However, it seems that this disease is most commonly transmitted from mother to child at birth (perinatal transmission) or from family members during childhood (8). In recent years, considering the changes in the epidemiological trend of hepatitis B infection in Iran, risky behaviors and sexual relationships have been introduced as the major modes of transmission (9). Overall, the possibility of hepatitis B transmission from an infected mother to the newborn is estimated at 32-80% (10). Also, 90% of the infected newborns are at risk of chronic liver disease and in some cases Hepatocellular Carcinoma (11). In 1992, the World Health Organization recommended that all countries should integrate hepatitis B vaccination into their immunization programs; this plan was established in Iran in 1993 (12).

Vaccination in the early days after birth reduces the risk of infection for mothers and can play a major role in reducing transmission in the society. No previous research has evaluated the prevalence of hepatitis B infection among pregnant women since the national vaccination program was established in this region. Therefore, in the present study, we aimed to determine the prevalence of HbsAg marker in pregnant mothers, who had received hepatitis b vaccination at birth, and estimate the prevalence of hepatitis B infection in this population.

Methods

In this cross-sectional study, all rural pregnant women, who had received hepatitis B vaccination at birth in years 1993-1999 and had become pregnant

during 2007-2014, were recruited. It should be mentioned that HBsAg measurement is included in prenatal care, which is provided and recorded by all healthcare centers. For data collection, the medical records of patients at Babol Health Development Unit were reviewed. Also, information on full vaccination of subjects at birth was gathered, based on their vaccination cards and the data provided in the records. For statistical analysis, Chi-square test was performed, using SPSS version 18.0.

Results

In total, 1,065 pregnant mothers were recruited in this study. The mean age of the participants was 17 ± 4 years. Two (0.18%) of the evaluated subjects were HBsAg-positive, one of whom had a positive family history of hepatitis B infection; based on our evaluations, the mother was an inactive carrier of the disease. The two HBsAg-positive patients were 17 and 18 years old, respectively. These patients had received full vaccination at birth and were not given any hepatitis B immunoglobulin injections (table 1).

Table 1. The frequency and percentage of HBsAg marker in pregnant women, vaccinated at birth against hepatitis B in rural healthcare centers

Age	HBsAg marker		Total
	Negative N(%)	Positive N(%)	
13-16	221(20.75)	0	221
17-19	720 (67.6)	2(9.3)	722
20-22	122(45.11)	0	122
Total	1065	2(0.18)	1065

Discussion

Based on the findings reported in the present study, the prevalence of HBsAg marker was estimated at 0.18% among pregnant women, who had been vaccinated against hepatitis B virus at birth and had referred to rural healthcare centers. This rate was indicative of a significant decline in the prevalence of this disease, considering the higher reported rate in 1995 in Babol (2%) (13); in fact, this finding highlights the effectiveness of vaccination at birth.

In a previous study on 200 infants in Kashan, Iran, positive HBsAg was not reported among individuals, who had been vaccinated 14 years earlier (14). In a similar study in China, the prevalence of positive

HBsAg was estimated at 1.02% among 7,066 cases at 12 years following vaccination. Considering the high endemicity of this disease in China, this finding shows a significant decline in the prevalence rate (15).

In addition, based on a previous research in Atlanta, USA, the hepatitis B prevention program, which involved vaccination at birth and screening of pregnant mothers, could lower the prevalence of chronic hepatitis B infection from 2.1% in 1994 to 0.8% in 2008; this finding is in fact consistent with the present results (16).

In a study by Rezaee et al. in Tehran, Iran, which evaluated individuals' response to the national vaccination program, the prevalence of HBsAg was reported to be zero among 821 vaccinated cases; this finding was in line with the results of the present study (17). Moreover, in a study by Moradi et al. on newborns, aged 7-12 months in Gorgan, Iran, one positive case of infection was reported among 215 samples (18). Based on the literature, 1% to 10% of newborns and adults show no response to vaccination (19). In fact, various variables, such as genetic predisposition, vaccine dose, and the immune system status influence the effectiveness of vaccination (18, 19). Overall, it seems that the low prevalence of HBsAg in our study is indicative of mothers' safety. In

the past, hepatitis B infection was known to be vertically transmitted (from mother to the child). However, since the implementation of the national vaccination program in Iran in 1994, recent studies have indicated the less significant role of vertical transmission, compared to the past (20). Further complementary studies, covering both rural and urban regions, are required. Also, HBcAb measurement for determining the infection and hidden cases, as well as HBsAb assessment for improved cases, could provide a wider perspective on the effectiveness of vaccination. The results of this study showed that national vaccination has significant effects on decreasing the prevalence of infection among women of reproductive age. Therefore, vaccination of newborns and high-risk groups and screening programs for pregnant mothers (based on the national vaccination program) must be continued and prioritized.

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