

Efficacy of HBV Vaccination in Children with Thalassemia Major, South Khorasan, Iran

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Abstract

Background: Thalassemia patients are more susceptible to hepatitis than the normal population due to the frequent blood transfusion. This study was performed to determine the immune response of children with major β -thalassemia, by measuring anti-HBS antibody following the last HBV vaccine injection.

Methods: This study was carried out on all thalassemic children under the care of Iran Thalassemia Foundation (38 cases) in Birjand, receiving three standard intramuscular recombinant HBV vaccines. The children's mean age was 9.2 ± 4.6 years. Based on the time lapsed since their last vaccine injection, the subjects were divided into two groups of ≤ 5 years and > 5 years. Based on the serum level of anti-HBS-antibody, the subjects were categorized as good responders (anti-HBS > 100 IU/lit), low (anti-HBS = 10-100 IU/lit), and non-responders (anti-HBS < 10 IU/lit).

Results: The mean ranges of anti-HBS level in the above-mentioned groups were 99.7 and 43.3 IU/lit, respectively. Out of 38 individuals, 13 (34.2%) were good responders, 9 (23.7%) low and 16 (42.1%) non responders.

Conclusion: Standard HBV vaccination in thalassemic children results in an immune response in 57.9% of subjects. Therefore, assessment of anti-HBS-antibody 5 years after the last vaccination is recommended.

Keywords: Anti-HBS-antibody; Thalassemia; Vaccination; Iran

Introduction

There are more than 2 billion people with hepatitis B infection worldwide, with 400 millions as hepatitis B virus carriers. Overall, 1.4%-6.5% of the total population living in different parts of the world and 2-4 million living in Iran are carriers;^{1,2} there are also about 20000 cases of thalassemia major in Iran.³ Most of these patients need blood transfusions which increase the risk for hepatitis.^{4,5}

Hence, prevention in this high risk group is of great importance. A few comprehensive studies have been done on the post-vaccination immunization status of thalassemia patients to determine the necessity of booster dose based on the serum antibody lev-

els months to years after vaccination. Since the carriers of HBV are symptom-free but can transfer the disease,⁶⁻⁸ the importance of this study becomes more obvious. So this study was conducted to determine the immune response of children with major β -thalassemia, by measuring anti-HBS antibody following the last HBV vaccine injection.

Materials and Methods

This is a cross-sectional study in which all the thalassemic patients under the care of thalassemia foundations in Birjand (South Khorasan) were included. None of the children had hepatitis B (HBS Ag and total anti HBC were negative) or any other blood disease.

The required information was taken out of patients' files with the variables of sex, age at the time of diagnosis, use of desferal, and the time elapsed from the last hepatitis vaccination. The exact dates of

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their vaccination were recorded and those with unclear dates of vaccination were excluded from the study. Five ml venous blood was obtained from each child with consent of their parents after serum separation, and anti-HBS levels were measured with ELISA processor instrument.

According to the time intervals from the last vaccination dose, the patients were divided into the following 2 groups:

Group 1 was ≤ 5 years from the last vaccination and Group 2 was > 5 years from the last vaccination. Anti-HBS was measured in IU/lit and the results were classified into 3 groups as follows:

Group 1 included cases with no immunity, i.e. serum antibody < 10 IU/lit; Group 2 were cases with relative immunity, i.e. serum antibody of 10-100 IU/lit and Group 3 consisted of cases with complete immunity, i.e. serum antibody > 100 IU/lit.

Statistical analysis including Chi Square and T tests and correlations were performed, using SPSS software (version 14, Chicago, IL, USA).

Results

The age of the patients ranged from 1-18 years, with a mean of 9.2 ± 4.6 years. Out of the total 38 cases, 20 were males (52.6%) and 18 females (47.4%). All of the cases were HBS Ag negative and anti-HBC negative. The mean serum anti-HBS level in the two groups was 99.7 and 43.3 IU/lit, respectively.

Of the 38 cases, 13 (34.2%) were good responders (anti-HBS > 100), 9 (23.7%) were low responders (anti-HBS=10-100), and 16 (42.1%) were non-responders (anti HBS < 10).

No significant difference was found regarding the antibody titers of patients and their age and sex ($p > 0.05$). There was no significant difference between anti-HBS antibody and time interval after vaccination ($p = 0.600$).

Discussion

Several studies with controversial results regarding the immunity level and duration of acquired immunity from hepatitis B vaccination have been performed in different countries. A similar study has been performed on infants in our country, but there are few studies on thalassemic patients. In this study, the immunity level after hepatitis B vaccination and long-term effects of

the vaccination were studied. Out of 38 children with major thalassemia, 42.1% were non-responders, and the remainders were low or good responders.

In cases with ≤ 5 years after vaccination, 65.8% were low or good responders. In the group with > 5 years after vaccination, 34.2% were low or good responders. A study in Iran on 215 thalassemic children showed that 65% of the cases were low or good responders.⁸ In another study on 98 patients with thalassemia major, 78% of the cases were low or good responders, 6 years after vaccination.⁹

A study in Italy on 56 thalassemic children with 3-dose hepatitis B immunization showed that anti-HBS antibody level was < 10 IU/lit after 3 years; however, a booster dose raised it to > 1000 IU/lit.¹⁰ In another study on 114 patients with thalassemia major, 60 HBV negative cases were injected with hepatitis-B vaccine with intervals of 0, 1 and 6 months. After 12 and 72 months, 93% and 80% of the cases were low and good responders, respectively.¹¹ In a study on children in China, serum anti-HBS was 77% within 2 years of vaccination and it decreased to 48.2%, 7 years post vaccination.¹²

In Spain, serum anti-HBS level was evaluated 6.5 years after vaccination. In this study, 85% of the immunized patients had complete immunity after 6.5 years; therefore, administration of booster dose was not advised.¹³ While in our study, only 34.2% were good responders, 5 years after their vaccination. In Taiwan, 15 years after vaccinating the neonates, 75% were anti-HBS positive, but the level was not detected.⁷ In another study in Spain on a pre-pubertal group, 50% of those vaccinated had serum protective anti-HBS level after 7.5-10 years. It was suggested to have a booster dose, 10 years after the primary vaccination to acquire complete immunity.¹⁴

In some studies, there was no difference between the immune response of the two sexes, but in others, the immune response in the females was more than that in males.¹² Different results obtained in our study could be explained on the selected target group that is β -thalassemic children. The data of this study emphasize that children with major thalassemia are a high-risk group and it is advisable to measure serum anti-HBS level 5 years after the last vaccination and if necessary, give them a booster dose at that time.

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