Efficacy of Hepatitis B Virus Vaccination on the Incidence of Hepatitis C Virus Infection

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Abstract: The Efficacy of Hepatitis B Virus vaccination on the incidence of Hepatitis C Virus infection was evaluated; a total number of 7500 blood samples were collected from children, below the age of 16, from different localities, either vaccinated or unvaccinated. The samples were tested for the presence or absence of HCV-Ab using ELISA technique. The overall effect was highly significant where the infection rate of HCV decreased from 7.4% (283 positive HCV out of 3810 cases) in the unvaccinated control group to only 0.4% (15 positive HCV out of 3723 cases) in the fully vaccinated test group. However, the decrease in the infection rates varied in different governorates from 0--1.45% in test group while in the control group it was from 2.34%--11%. Our data clearly demonstrate that hepatitis B virus vaccination, contributing in some how in protection and/or neutralization of the hepatitis C virus, thus decrease its incidence of infection.

Key words: Hepatitis C virus Hepatitis B virus vaccine, Hepatitis C virus antibodies.

INTRODUCTION

The prevalence of Hepatitis viruses B and C are considered one of the highest prevalence rates among viruses. HBV prevalence rates of 0.71%, 0.89% and 13.3% were reported in India, Middle East Asia and Turkey, respectively. Sandesh et al., (2006); Yakaryilmaz et al., (2006). In Egypt, the prevalence rates reported to be about 10.3--24.3%. el-Sayed et al., (1997); Abdel-Aziz et al., (2000).

Many studies, world widely, tried to detect the effect of Hepatitis B virus vaccination on the rate of infection of HCV. Some studies suggested that it had no role in infection and there is no observed significant difference in the HCV infection between responders and non-responders to hepatitis vaccination. Urbanowicz W, (2000).

However, in France, another study used hepatitis B virus surface antigen (hepatitis B virus vaccine) in cloning expression plasmids, as DNA vaccination for the induction of immune responses against hepatitis C virus proteins. Inchauspé (1997). Later on, in France also, another study reported that both humoral and cellular immune responses are likely to contribute to protection and/or neutralization of the hepatitis C virus. Brinster; Inchauspé (2001).

A study in the USA reported that the proliferative activity of T cells as well as the humoral immune responses to HCV core protein was substantially enhanced by some chimeric fusion proteins as compared to the HCV core protein alone. Several chimeric HBV-HCV constructs were prepared to enhance the immunogenicity of the non-secreted viral structural protein at both the B- and T-cell level, which were designed to express and secrete HCV core protein along with various regions of the hepatitis B envelope protein (HBsAg; hepatitis B vaccine). However, such chimeric proteins were capable of generating CD4+ inflammatory T cell and CD8+ CTL (cytotoxic T lymphocyte) activity against both HBV and HCV components of the fusion proteins. The strength of the immune responses appeared directly related to the level of Th1 (helper T cell) cytokines produced by CD4+ T cells obtained from immunized animals. Geissler et al., (1998).

Recently in 2008, in China, the researchers found that: HBV pre core enhanced the humoral and cellular immune responses of BALB/c mice to HCV. In vivo CTL responses verified that mice immunized with pre core fused DNAs showed significantly high specific lysis compared with mice immunized with HCV cores only. DNA that encodes truncated HCV core proteins may lead to increased immune responses in vivo, and these responses may be enhanced by HBV pre core. Liao et al., (2008).

MATERIALS AND METHODS

Blood Samples:

From 3723 vaccinated and 3810 unvaccinated children below the age of 16 were collected, from different seven different governorates in Egypt. Samples were centrifuged for 3 mintues to separate blood cells from...
serum and the serum was examined for the presence of HCV-Ab at The Central Health Laboratories in The Ministry of Health in Egypt.

**Vaccination:**

Hepatitis B Vaccine (Recombinant) RECOMBIVAX HB®, genetically produced hepatitis B surface antigen (HBsAg). Intramuscular IM injection of 5 mcg/0.5 mL of the vaccine at 2, 4, 6 and 18 months and annual booster doses within 5--6 years.

**HCV-Ab kits:**

ELISA 4th generation kits, are the product of ETI-AB-HCVK-4 DiaSorin Kits with diagnostic specificity 99.7--99.8% and diagnostic sensitivity 100%, according to the manufacturer.

**Instruments:**

Washers, Photometers, Micro pipettes and ARCHITECT System.

**Statistical Method:**

Crosstab/Chi-Square test.

**Results:**

The Results obtained were analyzed and subjected to statistical analysis using Crosstab / Chi-Square. The samples taken were from seven different governorates in Egypt. The results varied from significant effect in only one governorates and highly significant effect in the other governorates. The overall effect was highly significant where the infection rate of HCV decreased from 7.4% (283 positive HCV out of 3810 cases) in the unvaccinated control group to only 0.4% (15 positive HCV out of 3723 cases) in the fully vaccinated test group. However, the decrease in the infection rates varied in different governorates from 0--1.45% in test group while in the control group it was from 2.34%--11%.

**Discussion:**

The aim of this study is to evaluate the Efficacy of Hepatitis B Virus vaccination on the incidence of Hepatitis C Virus infection. In the present study, the impact of HBV vaccine on HCV infection was evaluated in two groups of children, of age below 16 years and from different localities. A control group of 3800 unvaccinated children were compared to a test group of 3700 vaccinated candidates. The test group was fully vaccinated through intramuscular injection of 0.5 mL of RECOMBIVAX HB® Hepatitis B Vaccine (Recombinant) containing 5 mcg/0.5 mL of HBsAg at 2, 4, 6 and 18 months of age followed by booster doses given annually up to the age 5--6 years. The presence or absence of Hepatitis C antibody (HCV-Ab) in all blood samples was carried out using ELISA technique. The overall effect was highly significant where the infection rate of HCV decreased from 7.4% in the unvaccinated control group to only 0.4% in the fully vaccinated test group, giving high indication that the hepatitis B vaccination contributed in some how in protection and/or neutralization of the hepatitis C virus, thus decrease its incidence of infection.

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**REFERENCES**


