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Immune Response to Standard Dose of Hepatitis B Vaccine in HIV Positive Clients of Kermanshah Behavioral Diseases Counseling Center

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Background and Aims: **Coinfection eventuality of HIV and HBV infection and having common transmission ways has turned Hepatitis B into a major health concern among HIV positive cases. The increasing number of HIV infected patients and their relevant problems, especially opportunistic infections, demands for Hepatitis B vaccination. This study, therefore was conducted to evaluate the immune response against hepatitis B vaccine and related factors among HIV positive cases and probable approaches to improve its level.**

Methods: **In this cross -sectional study, 169 HIV positive cases who were Kermanshah's Behavioral Disease Counseling Center's clients, with negative HBsAg and HBcAb ,were vaccinated against hepatitis B virus with a 20µg of recombinant HBsAg at 0-1-6 month schedule in deltoid region. A month after the last shot, their HBsAg titer was measured. Titers higher than 10 Iu/ml were considered as a suitable immune response. Data included in this study were: age, gender, CD4 count, antiretroviral treatment history, hepatitis C coinfection and injecting drug abuse. Then these data were analyzed through X2 test.**

Results: **Among 169 under study cases, immune response was overally 52.7% and this rate was 51.9% for males and 66.7% for females (P=0.313). Immune response was 54.3%, 44.3%, 45.3% in CD4 count>500, 200-499, and <200/mm^3 respectively (P=0.039). In cases with and without antiretroviral treatment the immune response was 81.8% and 50.6%, respectively (P=0.045%).**

Conclusions: **In this study the CD4 count and history of antiretroviral therapy correlation with immune response level was significant, but other factors like age, HCV co-infection, drug abusing, and gender were ineffective factors in immune response to HBV vaccine. Therefore, early vaccination among cases with higher CD4 count and cases under antiretroviral treatment seems necessary.**

Keywords: **HIV, HCV, Vaccination, Kermanshah**

Introduction

Since HIV and hepatitis B have common ways of transmission like practicing unsafe sex, injecting blood products and drugs, mother to baby transmission, and because of high prevalence of hepatitis B as an opportunistic infection among HIV positive individuals, it has turned into a major health concern. Liver abnormalities are widespread among HIV infected cases and they are usually seen with an increase in liver transaminase and alkaline phosphatase average serum level. Liver lesions developed by acute or chronic hepatitis virus and hepatitis B and C co-infection make HIV more difficult to tackle. Nearly 20% of HIV positive cases with acute hepatitis B infection, suffer chronic hepatitis B infection that can be diagnosed by HBsAg antigen and HBV DNA PCR. Chronic hepatitis B rate among HIV negative cases is about 5% [(1)]. In this group the incidence of chronic hepatitis in other studies has been reported to be 7.6%, which rather higher than the healthy individuals[(2)]. Because HIV and its related opportunistic infections are spreading globally, it is

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very important to know their ways of transmission and prevention. One of important ways of HIV and HBV infection transmission is injection among IDUs, which is quite common in our country. Some hepatitis B prevention ways are: providing a healthy environment, avoiding hepatitis B transmission risk factors, and finally vaccinating at-risk groups and HIV positive cases. The rate of immune response to hepatitis B vaccine in three standard doses 0-3-6 month is more than 95% in healthy individuals and 50% in people older than 59 years. This rate in HIV positive cases, in people with kidney problems, and other impaired immune system is estimated about 50%-70%; and finally in people with liver abnormalities it is 60%-70% [1]. Other studies have shown that injecting drug is an independent factor in decreasing immune response to hepatitis B vaccine [2, 3]. Other factors like HIV and hepatitis C co-infection [5, 1, 4], low level of CD4 count [6, 7, 8, 9, 10], alcoholism[2], high level of CD8, CD38 count [11], high viral load [9], and homosexuality [12, 13] all and all influence the immune response to hepatitis B vaccine.

Not only the importance of the problem, but also lack of any research about the effects of hepatitis B vaccine on HIV positive cases in Iran, to study their serologic response level and its relation with other variables, called for a comprehensive study. The subjects in this study were HIV positive clients of Kermanshah Behavioral Diseases Counseling Center.

Materials and Methods

This cross-sectional study was accomplished in Kermanshah Behavioral Diseases Counseling Center in 2004. Due to small number of the subjects, the sample volume included all 169 qualified cases. The prerequisites to take part in this study were: making sure of being HIV positive through ELISA and Western Blot tests; making sure of no hepatitis B infection history through negative HBsAg and HBcAb results. Indicators to exclude the participants were: positive HBsAg and HBcAb results; and irregular hepatitis B standard vaccination. The variables under study were: age, gender, way of infection transmission, injecting drug history, CD4 count through flocytometry, positive hepatitis C co-infection proved by an anti-HCV through ELISA test, and finally having a history of at least one month of antiretroviral treatment (including Zidovudine, Lamivudine, and Indinavir or Nelfinavir).

First of all, the Behavioral Diseases Counseling Center HIV positive clients with negative HBcAb and HBsAg were sampled, then with a RADIM kit and through ELISA test the anti-HBs titer in patients with regular 0-1-6 month hepatitis B vaccination was measured.

People under vaccination process and people within one month of the start of the study were provided with all the three standard doses and 30 days after the delivery of the third dose, their anti-HBs titer was measured. Patients with titers higher than 10μIu/m were considered immune. The delivered vaccine was 20μg of (Ricombivax) a Cuban recombinant vaccine at a 0-1-6 month standard schedule in deltoid region. Then data were analyzed through SPSS software and X2 test.

Results

This study includes 169 HIV positive clients of Kermanshah Behavioral Diseases Counseling Center, aging from 35.4±3.5 (157 males and 12 females). 70 cases (41.4%) had CD4 count higher than 500/mm^3; 88 cases (52.1%) had CD4 count 200-449/mm^3, and 11 cases (6.5%) had CD4 count less than 200.

As table 1 showed there was no significant association between immune response and gender, age group, IV drug abuse and HCV co-infection.

The patients had a history of antiretroviral treatment significantly had higher immune response rate compared with the patients who did not have such a history (P=0.045). In addition, immune response rate had a significant association with CD4 count (P=0.039). The higher the CD4 count, the higher the immune response rate.

Discussion

In this study the overall immune response rate of HIV positive cases to hepatitis B vaccine was 52.7%. Although some studies developed a lot different rates of immune responses: some developed smaller rate (23.8%), that was considered as a poor prognostic factors also[10], some developed a negative immune response among homosexuals[12], and a study developed 77.8% immune response among children[14], but our study is more compatible with some other studies reporting a response rate between 41 to 78% [3, 6, 9, 11, 14, 15]. Fonseca *et al* have proved that factors like doubling the standard dose can increase the immune response, especially among cases with CD4 count>350mm^3 or viral titer<1000/ml [8]. To

Table 1. Immune response to hepatitis B vaccine in HIV positive cases based on the variables

Studied variables		Immune response		No immune response		P value
		Number	Percentage	Number	Percentage	
Gender	Male	81	51.9	76	48.4	0.313
	Female	8	66.7	4	33.3	
Age group	20-29 Y	10	55.6	8	44.4	0.953
	30-39 Y	39	50.6	38	49.4	
	40-49 Y	32	53.3	28	46.7	
	>50 Y	8	57.1	6	47.3	
IDU	yes	79	51	76	49	0.142
	no	10	71.4	4	28.6	
HCV co-infection	yes	78	51.3	74	48.7	0.294
	no	11	64.7	6	35.3	
Antiretroviral treatment history	yes	9	81.8	2	18.2	0.045
	no	80	50.6	78	49.4	
CD4 count	> 500	45	54.3	25	35.7	0.039
	200-499	39	44.3	49	55.7	
	<200	5	45.3	6	54.5	

increase the efficacy of hepatitis B vaccine in HIV positive cases, there are some studies which administered 20 microgram of GM.CSF [16], and CPG7909 and LPR as the vaccine adjunct [17].

Compared to the study about HIV negative health care workers in Kermanshah, the immune response in our study was lower [18], most probably because of negative HIV result. The immune response among men and women was 51.9% and 66.7% respectively which is not significant statistically. Therefore one can conclude that gender has no effect on immune response, which complies with previous studies results [1, 16]. However, in one study, HBsAg titer 15 year after immunization was reported higher among men [19]; another study also proved the same results [20], but in one study females' immune response was reported higher [21].

The immune response among hepatitis C co-infected groups and not infected groups was not significant also (P=0.294). Therefore one can conclude that hepatitis C co-infection has no effect on immune response; but some studies indicate that hepatitis C can reduces efficacy HBV vaccine [1, 5, 4]. This discrepancy is most probably due to the fact that most of our HIV positive cases had hepatitis C co-infection (89.9%) which makes it difficult to come to a final conclusion.

Some activities show no explicit effect of age on immune response [16]; some other studies consider age an influential factor [1, 18]. In our study there is no indication that age influences immune response. This could be due to impaired distribution of age groups or other influential factors which calls for further study.

In some studies CD4 count indicates no influence on immune response [16, 20, 21], but in our study immune response rate was significantly higher in groups with CD4 count higher than 500. Our result also complies with other studies (6-10) and accords with Rey's study (55%).

Since most of the subjects in our study were injecting drug users, the prevalent way of HIV transmission was estimated unsafe injection. Although some studies have proved that injecting drugs can reduce hepatitis B vaccine efficacy [2, 3] but in current study the effect of injecting drugs on immune response was not significant, which means injecting drugs has no effect on immune response. Maybe this discrepancy is due to the large number of IDUs (91.7%) in our study, which has undermined other transmission ways.

In a study analyzing the effects of antiretroviral treatment on hepatitis B vaccine response, there was a significant difference between 81.8% with a treatment history and 50.6% with no treatment history. This result complies with Kellerman's results, namely the positive effects of immune response in subjects with antiretroviral treatment [2]. Therefore in the primary stages of the disease (while the CD4 count is still high or the case is under

antiretroviral treatment), vaccination to getting better response seems necessary.

Conclusion

Finally the strong point of our study is providing vaccination for all HIV positive clients of Kermanshah Behavioral Diseases Counseling Center. However, in spite of qualitative and quantitative promotion of the health services, we still witness some shortcomings like lack of follow-up for the studied cases and irregular vaccination periods. These shortcomings limited out study. It seems that through improving evaluation system, the health officials can solve these problems.

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