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Evaluation of Hepatitis B Vaccination Efficiency among Health Care Workers in West of Iran

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ABSTRACT

Introduction: Hepatitis B is a major health problem in the world and Iran. Vaccination is the best way to prevent this disease. The risk of transmission among health care workers is more than other people in community. Therefore, the aim of this study was to determine the efficacy of hepatitis B vaccine among health personnel working in a hospital in West of Iran.

Materials and Methods: A cross-sectional study was conducted in the 2014, on 104 voluntary personnel from different sections of the hospital. After hospital ethical committee clearance, subjects have vaccinated three times were selected. The antibody titer level as an indicator vaccination effectiveness, was measured using ELISA test. Demographic information was recorded in a author-made questionnaire that its validity and reliability was confirmed by experts. The independent t-test was used to determine the relationship between antibody titer and age, the analysis of variance was applied to define its relation with the other variables. Linear regression was used to

test the relationship with age, antibody titer levels and Body Mass Index. Data were analyzed using SPSS software Ver: 14.

Results: *The mean antibody titers level was 312.45 mIU / mL and 208.64 mIU / mL in men and women respectively. Protection level of the subjects were 79.41% >100 mIU / ml, 13.73% , 11-100 mIU / mL and 6.86%, 0-10 mIU / mL based on antibody titer level respectively.*

Conclusion: *In our study, most of the worker level antibody titer were in protectable reneges. we found significant Correlation between level antibody titer and imitation of vaccination time and gender*

Keywords: *Antibody Titer Hbs, Hospital Personnel, Hepatitis B Vaccination Efficiency*

INTRODUCTION

Hepatitis B causes liver cirrhosis and hepatocellular carcinoma. Almost all cases of viral Hepatitis were created by one kind of five viruses as Hepatitis A, B, C, D and E [1]. one of the important cussing infections is Hepatitis B virus and many health problem in the Iran and world [2]. Hepatitis B involves liver and caused inflammation lead to death of many of people in the world [3]. Hepatitis B virus (HBV), is belong to a member of the Hepadna virus group, cussed endemic and hyper endemic in many parts of the world population [4]. Less than one percent of the infected people show a rapid indication of the disease that leads to liver failure and death [5] Virus surface antigen (HBsAg) is important diagnostic marker that detectable in serum. The specific antibody against the antigen (HBS AB) will be made 1-2 months after the onset of jaundice and in a maximum time of 6 months after the onset of infection in serum results. The maximum serum levels of antibody to remain indefinitely after the last vaccination time is 2-1 months [1]. Some specific symptoms include hives, skin rashes, arthritis, burning or tingling in the arms and legs (poly neuropathy) may occur in patients [6]. Deltoid injection of 3 doses of vaccine to immunize at 0, 1, 6 months is recommended. Two vaccines are available hepatitis B vaccine contains 10 micrograms of antigen and vaccine Engerix-B Recombivax that contains 20 micrograms of antigen. The first type of vaccine is very effective and has fewer side effects.

The vaccine for high-risk groups such as health care workers, physicians, medical students of medical sciences, surgical, dental and dialysis patients is recommended. Vaccination dose of both vaccines and people immune system varies according to age [7]. Serum antibody response after vaccination of both serums has been determined in 3 cases: 1- immune group (antibody levels more than 100 mIU / ml) 2- group partial immunity (antibody levels between 10-100. 3- Group no immunity (antibody levels lower than the 10mIU / ml) [8]. Typically, booster injection is not recommended, unless the antibody levels in person's serum annual be less than 10mIU / ml [9]. According to the World Health Organization, currently more than 350 million people carry the virus surface antigen of hepatitis B in the world and the annual incidence is estimated to be about 300- 200 thousand cases [10]. There are 2 million asymptomatic carriers in Iran (3% of the total population).

2 million people in the world-wide die for Hepatitis B each year [11]. Hepatitis B infection in the world is so variable. Iran is one of the endemic areas with intermediate prevalence 2 -10% [12]. Over 6-10% of patients with acute hepatitis B infection will not be better and go to the chronic carrier state [13]. Healthcare workers are more at risk than other groups; these groups of patients are at risk of infection. To ease the transition of the above risks, in addition to compliance with the appropriate protection and avoid contact with the source of infection, vaccination against hepatitis B is the best way to prevent the disease [14]. Immune hepatitis B vaccine can protect people against the virus for a long time. But after a time may vaccinate individuals' antibody be reduced and face with the virus and disease. Several factors may be important in the immune response among the vaccinated

individuals, such as vaccines, injection site, how it is administered, age, gender, obesity, smoking. Regular screening of people's safety, especially those at risk is of great importance [15-17]. The aim of this study is measure antibody levels by measuring antibody therapeutic vaccine against hepatitis B among staff of the hospital.

MATERIALS AND METHODS

this descriptive and analytical study was done in 2015, in which 102 people from the hospital staff were recruited to participate in the study voluntarily. Examples included hepatitis B vaccination for all people who were permitted to receive. In order to collect the required data a questionnaire was designed and confirmed by public health experts, physicians and immunologists to verify its validity. 4 cc blood was taken from each individual and antibody determined and quantified by ELISA test, Then, according to antibody responses were divided in to three categories: 1- normal protection level group (antibody levels more than 100 Iu / ml), 2- low protection level group (antibody levels between 10-100, 3- no protection group (antibody levels less than 10Iu / ml). Statistical analysis was done by chi-square test, linear regression, t-test and ANOVA and the level of error was taken into account using SPSS software, version 14 that was 0.05

RESULTS

In this study, a total of 102 subjects (55.8% Female and 44.2% Male) of hospital staff were studied. The mean age of men $35 \pm .87$ and women were $28 \pm .22$ years. Most job fields in men were service jobs (39.1%), nurse (21.7%) and in women most job fields were respectively Nurse (44.8%) and midwives (12.1 percent).

Table-1: Mean, standard deviation and the confidence interval antibody levels in the studied subjects in terms of gender

gender	Male			female		
	mean	Standard deviation	Confidence Interval 95%	mean	Standard deviation	Confidence Interval95%
antibody levels						
(mIU/mL)	312.45	43.35	(78.399 -12.225)	208.64	925.29	(57.268-72.148)

Table-2: compares the frequency distribution of antibody levels in the interval from the last dose of vaccine in healthy adults

antibody levels	0-10(mIU/mL)		11-20(mIU/mL)		20>(mIU/mL)		P	
	frequency	percentage	frequency	percentage	frequency	percentage		
Vaccination interval(year)	1-5	8	0.1	4	5.5	61	83.6	0.0008
	6-10	1	5.3	2	10.5	16	84.2	
	≥11	5	50.0	1	10.0	4	40.0	
gender	male	7	.6.15	3	6.7	35	77.8	890
	female	7	12.3	4	7.0	46	80.8	
smoking	yes	13	13.0	7	7.0	80	80.0	430
	no	1	0.50	-	-	1	0.5	

The relationship between age - BMI in the subjects with antibody levels using linear regression analysis shows increasing one year to the age of subjects' which will result in serum antibody reduction about $-2/804$ mIU / mL that was not significant ($P=0.34$). In addition, the more increase in each unit in BMI participants', the upper amount of to the serum antibody level 5.17 mIU / mL ($P= 0.5$).

Table-3: The relationship between the studied variables among subjects with antibody levels

Variable		Mean	Standard deviation	T*	P
gender	male	312.45	43.35	2.02	.045
	female	208.64	29.92		
Job experience (years)	1-5	67	263.43	9140	.400
	6-10	15	305.15		

	≥11	22	139.09		
The time of vaccination (years)	1-5	75	286.08	2.556	.083
	6-10	19	210.23		
	≥11	10	102.40		
*With regard to the age variable, independent t-test was used and analysis of variance was used for the other variables.					

DISCUSSION

Hepatitis is one of the most important health problems worldwide. Strategy of the World Health Organization (WHO) is vaccination for the effective control of HBV infection with surface antigen virus (HBsAg). The mean antibody titers in men was 312.45 mIU / mL and in women, 208.64 mIU / mL, the results represented that the antibody titers were significantly different in women and men, $p = 0.045$ (table1). The results of the study have also shown that most amount of titer antibody has been 1-5 years after vaccination titer and the least one was 11 years or more after the vaccination date. In another study, the optimal safety of the vaccine has reported significantly in women 80.2 than men 19.8 % of those who less than one and three years has passed of their last vaccination in which indicates antibodies serum level is significantly reduced by pass the time [8]. Based on the results of another study in men and women, the antibody level has been < 20mIU / mL that had nothing to do with age. While in a study conducted at the University of Michigan America ages more than 50 years have had a clearly negative correlation with antibody, but not with gender [12]. In the study by Lovok et al., age has been defined as a factor in determining the response rate to hepatitis b vaccine somehow antibody titers reduce to 86 % in the fourth and reduces to 47 % in their sixth decades [13]. The results of our study show that smoking had no significant effect on antibody titers in the studied participants ($p=0.426$) (table2). While in another study it has been shown that smoking and obesity has negative effects on the antibody titer after vaccine and age has been reported as an effective factor, as after passing the time the hepatitis vaccine antibody titer level decreases. After The first year of vaccination, the antibody titer in 90% of those who has received antibody vaccine was above 10, and achieved to 50 %after eight years [7].

While in another study by Zuckerman et al in 2001 responses to vaccine was lower in obese people and smokers, and in women was higher than men. These results are not inconsistent with our findings. In general, the relationship between antibody titers and age, gender, smoking, and obesity is contradictory. Maybe these differences are related to differences in genetic and environmental factors, individual genetic vaccine, and sample size of the study [6]. The results of our study showed that antibody titers in 86.3 % of the vaccinated individuals was good and relatively in a safety level ($p=.0001$) (table3). A study by Ayyazi et al (2003) people who has received three times vaccine 3 years ago showed that 85.5% of the vaccinated people are in completely safety and immunity status and are consistent with our results [11]. The results showed that participants' serum antibody levels increased along with BMI increases, but the difference was not significant. A study by Heravi et al. showed consistent results with this study that represents the antibody titer level and the interval between the last doses of vaccine that had not significant correlation with body weight and the antibody titer [9]. Our study shows that there is no relationship between the experiences - vaccination interval with participants 'antibody titer. Safari et al study in the 2013 on 81 patients showed that after three rounds of vaccinations, 92.6% of patients had a high level of safety status and experience and vaccination interval has not any relation with individuals' antibody titer level that was not consistent with our results [10]. In general, according to our results the most

important and effective variables on the level of subjects' antibody titers were interval vaccination and gender. Therefore, it is recommended that based on the importance of vaccinating, people who expose risk of unsafe antibody titer should receive vaccination in the required and right interval.

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