Research Article

Study of Anti-hepatitis B antibody titers in vaccinated Students of Zahedan Dental School in 2012

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Abstract: Hepatitis B is one of the most common infections in the world and one of the major health problems in Iran. Staffs and students of health centers are constantly exposed to infection with hepatitis B virus. The aim of this study is to evaluate the anti-hepatitis B antibody titers in vaccinated students of Zahedan Dental School in 2012. This descriptive and analytical study was conducted by providing questionnaires and serological tests. After completing the questionnaire, the samples from blood of130 eligible students were tested by ELISA test for, HBs Ag and Anti- HBc Anti- HBs testing. The conditions of Anti-HBs titers were divided into three categories: Anti-HBc≤10 (negative), Anti-HBs <100> 10 (good positive), Anti-HBs≥100 (high positive). The relation between titer and some variables was studied. Data were analyzed with Fisher's Chi-square statistical models. In results in this study, 21.5% (n = 28) of students had negative titers (titer less than 10), 19.2% (n = 25) positive titers (with titers ranging from 100 to 10) and 59.2% (n = 77) of students had higher positive titers (titer greater than 100), respectively. Also, none of the variables except history of previous examination Antibody titer, had a significant relation with the antibody. Only 15.4% of the examined people had measured the antibody titers of anti-hepatitis B. in conclusion According to the results of this work, more than 75% of college students had acceptable safety level against hepatitis B. The students with vaccination history whose safety levels were not acceptable had to receive this vaccine again.
Keywords: hepatitis B virus, hepatitis B vaccine, antibodies against hepatitis B.

INTRODUCTION:

Hepatitis B is transmitted through the body fluids of people carrying hepatitis B virus [1, 2]. This virus is a major cause of acute liver disease and Cirrhosis among dentists [3-5]. One-third of the world population (two billion people) is exposed to this virus, which is estimated to have 400 million active infections [6]. Annually,1 million people lose their lives due to liver cancer and cirrhosis caused by chronic hepatitis B infection [7, 8]. Hence, in order to reduce the risk of HBV infection in patients with high risk, immunization against the virus and use of protective equipment are recommended [8]. Hepatitis B vaccine has been available since 1982 and it had been recommended for employees who are included in high-risk activities such as exposure to blood since 1990 [8& 9]. Hepatitis B vaccine is available in two types: a type is obtained from human plasma of infected people with chronic infection with hepatitis B. The second and recently produced type is recombinant HBV vaccine which is produced by using yeasts [10]. However, 10.5% of normal people didn't gain the antibodies against the virus (Anti-HBs), after a standard course of vaccination for Hepatitis B (6-1-0 months) [6,11,12]. The immunity continuity duration resulted from this vaccine is unknown and there is no standard method to confirm, control and maintain of it. About10 % of vaccinated patients who respond to the vaccination have lost their Anti-HBs after 5 years. A study indicated that the majority of vaccinated healthcare workers, don't measure their Antibody titer after immunization [13]. Studies in other countries show that the safety of this vaccine alters from 40.3% to 97% [19- 14]. Moreover, the ratio of dentists having HBs antibody titer was also 36.5- 47.9% [17 & 20]. A study in Brazil showed that only 73.1% of dentists have received three doses of the vaccine [21]. Decreasing of Anti-HBs titers is associated with decrease in immunity against hepatitis

B, and in this way, vaccination programs will not have their own affect, virtually. Hence, measuring the immune antibody titer in high risk population groups of the society, in order to estimate their safety and determine the best protocol revaccination is useful in these groups [10].While there is limited information about affected factors in the success of HBV vaccination and immune status of dentists [22].

Due to its importance and high prevalence of the infection in developing countries, the aim of this study was to investigate the Anti-HBs titers, in vaccinated students of Zahedan Dental School in 2012. In a study conducted by Vera Lucia et al. in Brazil in 2010, only 73.8 % of dentists had been received three doses of the vaccine and only 14.8 % of these patients, did antibody titers check after being received three doses of vaccine [22].

In the study of Hofman *et al.;*, developed in 2009, the indicators of success hepatitis B vaccination in healthcare workers in Germany were investigated, in this study, the incidence of HBV infection and clinical illness HB in people with the full course of HB vaccination was examined [23].

In Nagao *et al.;*, infection of HBV and HCV were investigated among dental staff of Japan. In this study, 141 people (including dentists, hygienist's dental co-Dental) were examined, and Anti-HBs, HBs Ag Anti-HCV, Anti-HBc of these people were measured by a surgeon [24]. In the work of Tanzi in 2000, the survival of antibodies induced by vaccination against hepatitis B in 445 immune men against the disease, were examined [25].

Barash *et al.;* studied the state of Anti HBs titers in vaccinated healthcare staffs, and HBs Ag, Anti HBc, Anti HBs were measured in this study [13]. In order to evaluate the response to hepatitis B vaccine in health personnel, a survey was carried out by Alimonos[26],

Methods and Materials:
This Analytical, descriptive and cross-sectional work has been conducted using questionnaires and Serological testing. There were 245 dental students, among them 130 student participated on the test

voluntary, on the basis of entry and exit criteria, who were 94 (72.3%) male and the rest were female. Entry criteria: Vaccinated students of Zahedan Dental School who have received a minimum standard of vaccination for Hepatitis B (6-1-0).Exclusion criteria: patients with systemic diseases or conditions of weakening the immune system, people who use depressant drugs or immune reminder vaccines. People with HBs Ag and Anti HBc, those didn't agree with test, were excluded. Designed questionnaire included: demographic characteristics such as age, weight, gender, medical history, history of medicine, smoking history, history of needle stick, hepatitis history of main family members, a history of immunoglobulin hepatitis B consumption, reminder vaccination, injection of the full course vaccine, the date of last antibody titer vaccination in the past and measurement history, history of blood transfusions or other blood products, dental works, hospitalization, blood spraying in mucus, alcohol and psychoactive materials use. After completing questionnaires by students, 5 cc of students' blood were taken and the samples in the tubes with gel, were sent to the blood transfusion service in standard conditions in order to measure HBc Ab, HBs Ag, Anti- HBs titers. Testing was performed through ELISA and HBc Ab, HBS Ag, Anti-HBs titer were done numerically. Accordingly, the considered people were divided into three categories: lack of response (antibody titer less than 10 MLU / ml), with a positive response (with antibody titers between 10 and 100 and equal with any values) with excellent response (titer of 100) respectively. In this work a continuous quantitative variable convert to ranking variables and almost all their assessing is implemented in two independent groups. To measure the difference between the two groups, chi-square statistic test is used and analyzing the differences in titration ranks between the two groups in the chi-square is done indirectly. All analyzes were performed using SPSS, 16 version.

Results& Discussion:
According to Table 1, Anti-HBs measurement and titration were performed on all participants, who 28 patients (21.5%) had titer less than 10 (unanswered), 25 people (19.2%) with a titer between 10-100 (yes, ok response) and 77 people (59.2%) had a titer greater than 100 (excellent) respectively.

Table-1: Distribution and Abundance of the Anti-HBs

Abundance / Anti HBs titer	Number	Percentage
Less than 10	28	21.5 %
Ranging between 10 – 100	25	19.2 %
More than 100	77	59.2 %

Table 2 shows that, about 41.5 % (54 people) of men and 17.7 % (23 people) of women had HBs titer more than 100, which according to the ratio of women to men in the study (1 to 3),approximately, this amount of titer is the same among women and men. In addition, the chi-square test was based on this similarity as well , and no significant statistical difference was observed between the two genders. (Pval> 0.05).

Table 2: The relation between Anti-HBs titers based on the participants gender

Anti- Hbs titer Gender	Less than 10		10 – 100		More than 100		Total	
	number	percentage	number	Percentage	number	percentage	number	Percentage
male	23	17.7	17	13.1	54	41.5	94	72.3
female	5	3.8	8	6.2	23	17.7	36	27.7
total	28	21.5	25	19.3	77	59.2	130	100

Pval = 0.41

In Table 3, it has been shown that, 12 participants in the plan were smokers. Distribution of the smokers was divided into three groups, based on the Anti-HBs titers. This distribution shows no not worthy difference between these groups. Note that, this distribution is such that there is no considerable difference even with non smokers, as well. Furthermore, statistical Fyshrhych test on the distribution shows no significant differences between smokers and non-smokers in these three groups (Pval> 0.05).

Table 3: The relation between Anti-HBs titers and smoking in participants

Anti- Hbs titer Smoking	Less than 10		10 – 100		More than 100		Total	
	number	percentage	number	Percentage	number	percentage	number	Percentage
Yes	5	3.8	3	2.3	4	3.1	12	9.2
No	90.8	118	56.2	73	16.9	22	17.7	23
Total	100	130	59.2	77	19.2	25	21.5	28

Based on the results set in Table 4, the number of people with a history of dental practice and a titer more than 100is approximately equal with number of people who have had similar titer, despite not having dental work, and this means that at least in the examined samples of this work, there is no difference between the rate of titration of blood and dental work or lack of it. As well as, Chi-square test did not show any considerable difference between the two groups (P> 0.05).

Table 4: Relation between participants Anti-HBs titers and dental work history

Anti- Hbs titer History Of dental surgeries	Less than 10		10 – 100		More than 100		Total	
	Number	percentage	number	Percentage	number	percentage	number	Percentage
Yes	15	11.5	16	12.3	43	33.1	74	56.9
No	13	10	9	6.9	34	26.2	56	43.1
Total	28	21.5	25	19.2	77	59.2	130	100

In Table 5, it is considered that, 28.5 % of the participants in the project have had a history of hospitalization, and 14.6 % had titer higher than 100.Considering the number and the percentage of the people with hospitalization history, it can be understood that, half of these subjects (44.6% of 71.5 %) were set in this rate of titration. Chi-square statistical test showed no significant differences in distribution between the ranks of two groups.

Table 5: The relation between participants Anti-HBs titers and history of hospitalization

Anti- Hbs titer History Of hospitalization	Less than 10		10 - 100		More than 100		Total	
	Number	percentage	number	percentage	number	percentage	number	percentage
Yes	13	10	5	3.8	19	14.6	37	28.5
No	15	11.5	20	15.4	58	44.6	93	71.5
Total	28	21.5	25	19.2	77	59.6	130	100

It can be observed from Table 6 that, 23.1 % of participants in this work had history of mucus secreted by the blood of the patient or someone else, and 14.6% of these people and also the 44.6 % of group without such a history, had titer higher than 100. At last, the chi-square test showed no significant differences between the distributions of ratings in two groups.

Table 6: The relation between participants Anti-HBs titers and history of blood splattering and contact of it with person's Mucosa

Anti- Hbs titer / History of Exposure to blood mucus secretion	Less than 10		10 - 100		More than 100		Total	
	number	percentage	number	percentage	number	percentage	number	percentage
Yes	6	4.6	5	3.8	19	14.6	30	23.1
No	22	16.9	20	15.4	58	44.6	100	76.0
Total	28	21.5	25	19.2	77	59.2	130	100

Table7, shows the distribution of individuals with history of living together with people who had hepatitis HBs, based on their titration. Fisher's test did not indicate any correlation between the groups (P> 0.05).

Table 7: Relation between participants Anti-HBs titers and history of living with a person with hepatitis B

Anti- Hbs titer / History Of living with Person with hepatitis B	Less than 10		10 - 100		More than 100		Total	
	number	percentage	number	percentage	number	percentage	number	percentage
Yes	0	0	1	0.8	1	0.8	2	1.6
No	28	21.5	24	18.5	76	85.5	128	98.5
Total	28	21.5	25	19.2	77	59.2	130	100

Table 8 shows the age distribution of project participants based on their HBs titers. Chi-square statistics did not show any correlation between the groups (P> 0.05).

Table 8: The relation of Anti-HBs titers and participants' age

Anti- Hbs titer / age	Less than 10		10 - 100		More than 100		Total	
	number	percentage	number	percentage	number	percentage	number	percentage
Less than 30 years	12	9.2	19	14.6	48	36.9	79	60.8
30- 45 years	14	10.8	5	3.8	23	17.7	42	32.3
More than 45 years	2	1.5	1	0.8	6	4.6	9	6.9
Total	28	21.5	25	19.2	77	59.2	130	100

In Table 9 weight of the project participants is ranked into groups with15 kg difference, and it is distributed in three groups with Anti-HBs titers. Fisher's test that was performed to assess the relation between weight and titration rank showed no significant correlation (P> 0.05).

Table 9: The relation between Anti-HBs titers and weight

Anti- Hbs titer / weight	Less than 10		10 - 100		More than 100		Total	
	number	percentage	number	percentage	number	percentage	number	Percentage
Less than 45 Kg	3	2.3	0	0	3	2.3	6	4.6
45- 50 Kg	8	6.2	9	6.9	23	17.7	40	30.8
60- 75 Kg	8	6.2	6	4.6	27	20.8	41	31.5
75 – 90 Kg	6	4.6	7	5.4	20	15.4	33	25.4
More than 90 Kg	3	2.3	3	2.3	4	3.1	10	7.7
Total	28	21.5	25	19.2	77	59.2	130	100

Pval>0.58

Table 10, shows the distribution of the latest vaccination time in groups based on the Anti-HBs titers. As it can be seen from the Table, only 5.8 percent had less than 3 months passing time over the last vaccination, while near a year had passed over the last vaccination of more than 83 % of the participants and 43% of these individuals had the titers above 100. In total, assessment of the relationship between the distributions of groups using Fisher's statistical test showed no considerable correlation (P> 0.05).

Table 10: The relation between Anti-HBs titers and the time passed over the latest vaccination of participants

Anti- Hbs titer The time passed over the latest vaccination	Less than 10		10 - 100		More than 100		Total	
	number	Percentage	number	percentage	number	percentage	number	percentage
Less than 3 months	2	1.5	2	1.5	7	5.4	11	8.5
4-6 months	1	0.8	1	0.8	2	1.5	4	3.1
7- 12 months	3	2.3	0	0	3	2.3	6	4.6
13- 24 months	2	1.5	2	1.5	9	6.9	13	10
25- 50 months	6	4.6	13	10	35	26.9	54	41.5
61- 120 months	8	6.2	3	2.3	12	9.2	23	17.7
More than 120 months	6	4.6	4	3.1	9	6.9	19	14.6
Total	28	21.5	25	19.2	77	59.2	130	100

Pval=0.46

Table 11 shows that 33.8 of participants of the project have had a history of needle stick. But this point had no significant effect on the amount of their antibody titer. Chi-square test showed no statistical correlation between the history of needle and the amount of people's titers (P> 0.05).

Table 11: **The relation between history of needle stick and Anti-HBs titers in participating people**

Anti- Hbs titer History Of needle stick	Less than 10		10 - 100		More than 100		Total	
	number	percentage	number	percentage	number	percentage	number	Percentage
Yes	9	6.9	8	6.2	27	20.8	44	33.8
No	19	14.6	17	13.1	50	38.5	86	66.2
Total	28	21.5	25	19.2	77	59.2	130	100

In Table 12, It has been shown that, only 3.8% of the participants have expressed the history of Begin their past. Fisher's statistical test indicated no considerable relation between the distribution of people in terms of their H big history and amount of titration (P> 0.05).

Table 12: The relationship between Anti-HBs titers and H big history

Anti- Hbs titer H big history	Less than 10		10 - 100		More than 100		Total	
	number	percentage	number	percentage	number	percentage	number	Percentage
YES	1	0.8	0	0	4	3.1	5	3.8
NO	27	20.8	25	19.2	73	56.2	125	96.2
TOTAL	28	21.6	25	19.2	77	59.3	130	100

Table 13 shows that only 3.8 % of the participants had a history of receiving blood or blood products, where this number was in a group with more than 100 titers. Fyshrhych test did not indicate any statistical relation among groups.

Table 13: The relationship between Anti-HBs titers and history of blood or blood products receiving

Anti- Hbs titer blood or blood products receiving History	Less than 10		10 - 100		More than 100		Total	
	number	percentage	number	percentage	number	percentage	number	Percentage
YES	0	0	0	0	5	3.8	5	3.8
NO	28	21.6	25	19.2	72	55.4	125	96.2
TOTAL	28	21.6	25	19.2	77	59.3	130	100

As it is shown in Table 14, 15.4 % (n = 20) reported having Antibody titer history, which 13.1 % gained titer higher than 100, in contrast, 84.6 % of them had no Antibody titer history, in which more than 40%

of their titers were higher than 100. Statistical test shows major relation between the amount of antibodies of the people and past titers (P> 0.05).

Table 14: Antibody titer check the connection between the headline Anti- imprisonment and a antibody titer check history of participants in the past

Anti- Hbs titer History Of Past Antibody titer check	Less than 10		10 - 100		More than 100		Total	
	number	percentage	number	percentage	number	percentage	number	Percentage
YES	3	2.3	0	0	17	13.1	20	15.4
NO	25	19.2	25	19.2	60	46.2	110	84.6
TOTAL	28	21.6	25	19.2	77	59.3	130	100

The results of this study showed that the effectiveness of the vaccine in college students (high titer 10 $U_{/MI}$) against Hepatitis B is 78.4%, in which is 19.2 % (n = 25) had a titer between (10-100 U $_{/MI}$), 59.2% (n = 77) had titers higher than (U $_{/MI}$ 100) and 21.5% (n = 28) had titers less than (10U $_{/MI}$) respectively. There was no significant statistical relation between age and gender status with Antibody titer against hepatitis B, in this work, that is similar to the study of Barash *et al.*[13]. In the study of Alimonos *et al* [26] the immunity against hepatitis B in women was higher in comparison to men, in addition, women had produced higher titers of antibodies against hepatitis B compared to men, that is contrary to our study. The reason of this difference can be related to less number of the women compared to men in our study (one to three).

In this study, no significant relation between smoking and Anti HBs titers status was found, that is similar to Alimonos *et al* study[26]. There was no considerable difference between Anti HBs titers status and the time passed over the last vaccination of patients, that was considered up to 120 months in this work, so that, it was passed less than three months over the last vaccination of only 8.5% of the participants, while, it was passed more than a year over the last vaccination of more than 74 %of people, and 43% had titers higher

than 100, so the results are consistent with Barash *et al* study[13]. Lack of significant statistical relationship between Anti HBs titers and participants' weight, was another result of this study that was similar to Alimonos *et al*. work[26]. No significant relation was found between Anti HBs titers and history of hepatitis among first degree relatives, history of dental works, hospitalization, blood spattering and contact with person's mucosa, in this study. Moreover, 15.4 % (n = 20) of patients of this study measured their antibody titer previously, that was not found any similar study in this matter.

CONCLUSION:

The high safety levels of healthcare staffs can cause reduce of infections among them. According to this study, the majority of considered students have no acceptable safety level against hepatitis B. However, some of the study individuals have no immunity against the virus that they should be taken revaccination as soon as possible. On the other hand, only 15.4% of people of project had measured their titers; therefore, it is essential to check the antibody titer of hepatitis, one to three months after the initial vaccination to ensure the response to the vaccine in people with high risk of exposure to the virus.

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