

Vaccination and Immunity Status against Hepatitis B among Students of Nursing and Midwifery Faculty of Kurdistan University of Medical Sciences in 2013

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Abstract: Hepatitis B is a common infection in the world and one of the main health problems in our country. Over 350 million people are infected with hepatitis B virus in the world and are chronic carriers of this infection. Health care workers and medical group students are always at risk of being infected with hepatitis B (HBV). This study was aimed at determining hepatitis B vaccination coverage and HBs antibody level among the students of the nursing and midwifery faculty of Kurdistan University of Medical Sciences. **Material and Methods:** This analytic-cross sectional study was conducted in 2013 on 163 third- and fourth-year students of nursing and midwifery faculty. Blood samples were taken from each individual and tested for HBs antibody by Elisa Method. Those who had anti HBs titer >10 ul/ml were considered as positive. Data were analyzed using SPSS 17.0 Software and Chi-Square, Fisher and T-test (p<0/05). **Results:** The results showed that 30.7 % of the subjects were male and 69.3% were female. And a total number of 115 subjects (72.3%) had completed their vaccination (three dose and more). Moreover, 108 individuals (70%) had regarded (0, 1, 6) standard protocol. Results of also showed that 135 (86%) had protective immunity . The average HBs antibody in subjects was 103.97 ul/ml. There was a significant correlation between HBs Ab level and educational field but there was no significant correlation between HBs Ab level and variables such as sex and regarded 0-1-6 protocol. **Conclusion:** Medical students are exposed to hepatitis B in work and occupational environment. Therefore, it is suggested that medical group students' anti HBs level should be measured; and non-immune ones must be revaccinated based on the specified protocol (0-1-6).

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Introduction

Viral hepatitis is one of the five infection factors causing early death of human beings in the world. A minimum of one million people die of hepatitis B every year. This disease is one of the most common types of viral hepatitis which more than two billion people have once been infected with and over 350 million people are carriers of the virus. Every year a minimum of 800,000 people die of this disease and its side effects around the world (1). According to the conducted research, hepatitis B has an average incidence in Iran and it seems that 35% of Iranians have once caught the virus and 2-3 percent of them are chronic carries of it. Because of regular vaccination of neonates from 1993 and its incidence decrease as a result of national disease and health plan, hepatitis B incidence has inclined from an average level to a low one and its recent incidence has occurred among teenagers and adults (2). HBV is the major cause of chronic hepatitis, liver cirrhosis, and hepatocellular carcinoma all of which cause thousands of people to die every year all over the world (3).

HBV transmits in different ways in different parts of the world. In regions with a high level of

incidence, the most important method of HBV transmission is from mother to the fetus. In regions with an average level of incidence, transmission takes place from infected individuals. Moreover, in regions with a low level of incidence, unsafe sex and drug injection in adults are introduced as the most common method of HBV transmission (4, 5, & 6). Hepatitis B is the first pathogen transmitted through blood occupational transmission risk of which is identified (7). Medical-health workers are the highest risk group who are exposed to pathogens transmitted through blood such as hepatitis B virus. Infection can be resulted from touching needle stick, cutting the skin with blood infected sharp devices, touching the patient's blood with unhealthy skin, or contact of infected secretions with eyes, nose, and oral mucosa. Pathogenesis after contact can be affected by different factors such as type of pathogen, type of contact, the amount of blood that the individual deals with while touching and the amount of existent virus in the patient's blood or secretion at the time of contact (2). The prevalence of hepatitis B among medical workers is reported to be 0.6 - 1.6 percent and 0.2 - 1.2 percent in the USA and Eastern Europe countries, respectively (8). In Iran, it is

reported to be 0.6 to 1.6 percent (9). In this regard, conducted research has showed that the highest degree of hepatitis B belongs to operation room personnel, transmitted through infected needle stick and secretion entrance to the eyes and contact with the skin. Risk of hepatitis B transmission among operation room personnel is 2 - 40 percent (10). Vaccination against hepatitis B is one of the most effective preventive methods that has been able to reduce the incidence of this disease and change its epidemiological pattern. In some parts of the world; however, it is still a hyper endemic disease and in some countries a large share of per capita health is devoted to its control. In our country, vaccination against hepatitis B is one of the most effective actions taken to control this disease and reduce its incidence and helps the country to move from an average level of incidence to a low one. Formed based on epidemiological data that show how the disease occurs, spread and transmits overtly or covertly among different groups of society, proactive approach and risk reduction are the most important preventive method that needs an organized structure and a growing, dynamic system (2). According to the conducted research, existent vaccines of hepatitis B are quite safe and effective in more than 90% of cases (5 & 6). In order to reduce the risk of hepatitis B, all medical personnel should be vaccinated in three phases 0-1-6 and the level of their antibody titer (HBs Ab) should be measured three months after the last vaccine is injected. If the level of HBs Ab is negative or lower than 10 units, vaccination should again be conducted in three phases with a normal dose (11). Most nursing and midwifery and operation room students who spend most of their internship in medical centers and are considered as groups that are at risk of being infected with hepatitis B claim to be unaware of their own status and conflicting reports are given about safety status of Iranian medical workers (12), the present study was aimed at identifying vaccination and safety against hepatitis B among the students of the nursing and midwifery faculty of Kurdistan University of Medical Sciences.

Method

This analytic-cross sectional study was conducted in the nursing and midwifery faculty of Kurdistan University of Medical Sciences in 2013. Subjects consisted of all of the third- and fourth-year nursing and midwifery and operation room students. The sample size was 163 students (80 nursing students, 39 midwifery students, and 44 operation room students). Convenience sampling was conducted.

In this study, first permission was gained from the nursing and midwifery faculty. Then, the

questionnaires were distributed among the subjects and 2.5 milliliter venous blood was taken from those who liked to and the blood samples were sent to the biochemistry laboratory of the faculty in order to specify their hepatitis B antibody titer. After centrifuge processes and detaching the serum, blood samples were stored in the refrigerator. After all samples were collected, antibody titer was specified using Elisa method and 96 leading kit. Then the collected data from the questionnaire were recorded. The questionnaires were designed in three sections. The first section contained demographic information; the second part contained some questions about vaccination coverage, the number of injected vaccines, the interval between the last injection and the current one; and the third section contained questions about experience of contact with risk factors (e.g., infected secretions, tattoo, contact with infected needle stick, disease in the family, etc.) and methods of vaccination against hepatitis B in occupational environment. Content validity method was applied to determine the validity of the instrument, so the questionnaire was given to some members of the university scientific board and their modifying viewpoints were applied in the final draft of the questionnaire. The latest guidelines of the Ministry of Health and Medical Education were used to specify the subjects' level of safety (1). Therefore, based on hepatitis B antibody titer, subjects were divided into three groups as follow:

1. HBs Ab titer < 10 ul/ml (negative safety)
2. 10 < HBs Ab titer < 100 ul/ml (average safety)
3. HBs Ab titer > 100 ul/ml (suitable safety)

Collected data were inserted into SPSS 17.0 software and analyzed using chi square, Fisher, variance analysis tests on significance level of $P < 0.05$.

Results

The results of the study showed that over 97 percent of the students aged from 20 to 24, 91.4 percent were single, and 69.3 percent were female. Hepatitis vaccine injection record was reported by 96.3 percent of the subjects. About 72.3 percent of subjects had had three or more injections, 11.3 percent had had it twice, and 3.8 percent had had it once. Furthermore, 12.6 percent of subjects did not remember the number of vaccinations. Although the time interval of 0-1-6 is important, only 70 percent of the subjects declared that they had considered time interval of vaccination against hepatitis B. A total number of 82 subjects stated that they had had contact with hepatitis B risk factors and 35 percent claimed to be unaware about this issue (See Table 1). Regarding the most important factors affecting failure to have complete vaccination against hepatitis B, the results showed that lack of adequate information (36.6%), lack of access to vaccines

(22%) and work pressure (19.5%) are reported as the most important factors. Due to the importance of personal protection equipment in preventing hepatitis B, complete use of gloves, masks, and glasses in the clinical environment was reported to be 46.3%, 27.5%, and 6.1%, respectively. For other students, using occupational protection equipment was reported to take place “sometimes” and “seldom”. No significant relation was observed between using personal protection equipment and fields of study ($P=0.62$). Regarding hepatitis B antibody titer, according to analysis of 6 blood samples, out of 157 subjects, 22 people (14%), 63 people (40.1%), and 72 people (45.9%) were diagnosed to lack safety (less than 10 ul/ml), have an average safety (10-100 ul/ml), and have suitable safety (more than 100 ul/ml), respectively. There was no significant relation between the type and the antibody titer. Average antibody was 116.53 ul/ml in the men and 98.27 in the women. This difference; however, was not statistically significant ($P=0.192$). According to Table 2, the highest degree of hepatitis B antibody titer (144.55) was observed among the operation room students. Variance analysis test proved the difference to be significant ($P=0.0001$). Figure 1 shows the subjects’ scattered antibody titer and its relation with the last injection interval. Statistical tests showed no significant relation ($P=0.365$). Regarding the relation between field of study and contact with hepatitis B risk factors, the results showed that the highest degree of contact was related to nursing students. Chi square test proved a significant relation ($P=0.04$) (See table 3). Results of the study showed that there was no significant relation between other variables such as field of study, gender, and semester with the level of using personal protection equipment. Moreover, no significant relation was observed between gender and field of study with consideration of injection time interval.

Table 1. Frequency Distribution of the Subjects according to their Experience of Contact to Hepatitis B Risk Factors

Experience of Contact to Hepatitis B Risk Factors	Frequency	Percentage
Infected Secretions	42	51.2
Needle Insertion	27	33
Blood Injection	7	8.5
Other	6	7.3
Total	82	100

Table 2. Hepatitis B Antibody Titer in the Students

Field of Study	Frequency	Average Hepatitis B Antibody Titer (Unit)	Standard Deviation	P
Nursing	74	77.24	63.167	0.0001
Midwifery	39	108.91	79.48	
Operation Room	44	144.55	92.39	
Total	157	103.97	81.04	

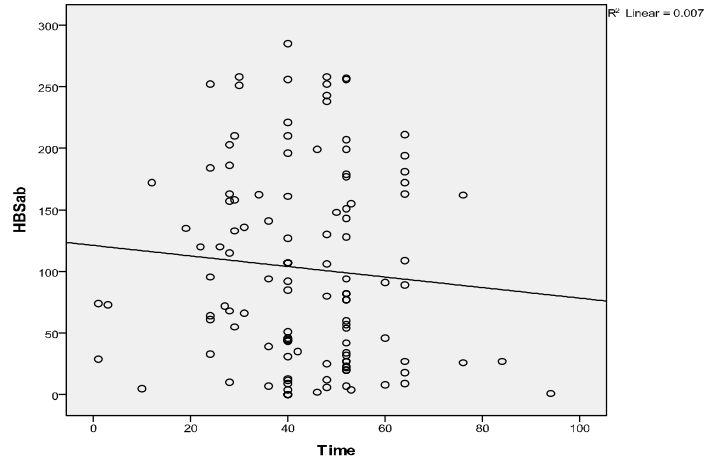


Figure 1. Students Distribution of Hepatitis B Antibody Titer based on the Last Injection Interval (Month)

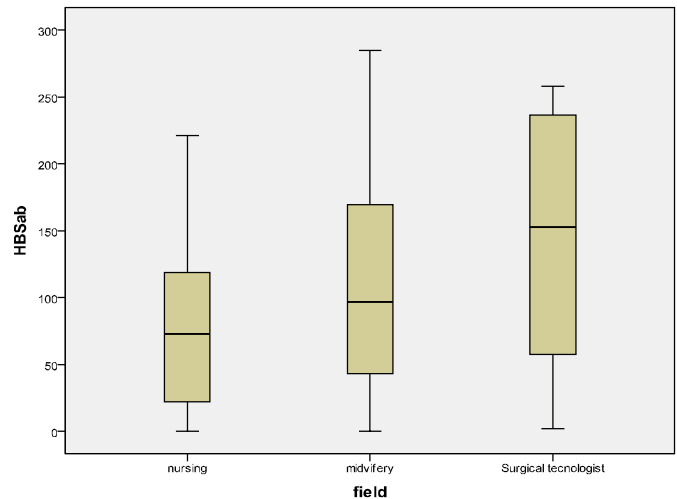


Figure 2. Students’ Antibody Titer based on their Fields of Study

Table 3. Specifying the Relation between the Students' Fields of Study and their Experience of Contact with Hepatitis B Risk Factors

Experience of Contact with Risk Factors Field of Study	Yes		No		I don't know.		Total		P
	N.	%	N.	%	N.	%	N.	%	
Nursing	32	40	23	28.8	25	31.3	80	100	0.04
Midwifery	21	53.8	9	23.1	9	23.1	39	100	
Operation Room	14	31.8	7	15.9	23	52.3	44	100	
Total	67	41.1	39	23.9	57	35	163	100	

Discussion

The present study showed that vaccination coverage against hepatitis B (three times and more) was 72.3% which is partially in agreement with the results of the studies on students and medical workers conducted by Hajibagheri (12), Hosseini Shokuh (13), and Izad Panah (14) vaccination coverage was reported to be 79.8%, 69.8%, and 72.91%, respectively. Although the time interval of 0-1-6 is important, only 70 percent of the subjects declared that they had considered the standard time interval of vaccination against hepatitis B. In the studies on the students of University of Medical Sciences conducted by Hosseini Shokuh *et al* (13), Mansour Ghana'i *et al* (15) and Sohrabi *et al* (16), vaccination in determined intervals was 81.5%, 55.3%, and 82.1%, respectively. In students' viewpoints, the most important factors affecting lack of complete vaccination against hepatitis B are reported to be insufficient information, lack of access to vaccine, and work pressure. According to researchers other factors such as vaccination is not compulsory, some participant students were from low terms, and they feel no need to conduct vaccination. Therefore, due to the importance of the issue, it is necessary for the authorities to dispel the mentioned barriers. According to the results of the study, 33% of the students were exposed to risk factors of hepatitis B. The same finding about experience of injury with needle stick was reported by Hosseini Shokuh (13) and Agha Janlu *et al* (17) to be 18.8% and 52.7%, respectively. The results of a study conducted in Nigeria by Okiki *et al* (2008) showed that 48% of medical students had had experience of injury with needle stick (18). In this regard and due to the large number of contacts with risk factors of hepatitis B and also lack of complete coverage of vaccination in about 28% of the students and insufficient safety in 14% of them, it is necessary to pay more attention to students' vaccination and measurement of their safety against hepatitis B and observance of safety principles to prevent the disease should be highlighted in medical centers. Beside vaccination, regarding prevention against hepatitis B infection, utilizing personal protection instruments is important.

In this regard, the Ministry of Health and Medical Education has introduced water impervious gloves as the best instrument of personal protection and emphasized on wearing glasses and mask wherever there is the possibility of bursting infected materials (2). In the present study, students' complete use of gloves, mask, and glasses in clinical environment is respectively reported to be 46.3%, 27.5%, and 6.1%. The results of the study conducted by Nazari *et al* showed that regarding prevention of hepatitis B, most nursing students (65%) had average arrangements (19). Al-Ayat *et al* have conducted a research in Egypt the results of which showed that applying safety principles to prevent infectious diseases among nursing students in less than 80 percent (21). Factors affecting partial utilization of personal protection equipment by the students include lack of enough instruments in medical wards, students' viewpoint about methods of personal protection, and their belief about the negative effect of the instruments on their performance. In this regard, the authorities and clinical instructors' role in providing required instruments and creating positive attitude in students is a necessity. In the present study, 14 percent of the subjects did not have protective safety against hepatitis B (HBs titer < 10 ul/ml), and 86 percent of them had protective antibody titer (HBs titer > 10 ul/ml) 40.1 percent of whom had an average safety (10 < HBs titer < 100 ul/ml), and 45.9 percent of them had suitable safety (HBs titer > 100 ul/ml). The results showed that the based on field of study, average HBs titer difference was significant so that the highest HBs titer (144.55) and the lowest one (77.24) were observed among operation room students and nursing students, respectively. These results are quite in line with those of Hajibagheri's (2006) study on medical workers of Kurdistan province hospitals, which showed that protective safety and lack of safety against hepatitis B were 87% and 13 percent, respectively (12). The results of another study conducted on students of the University of Medical Sciences in 2007 (15) showed that 91.6% of students are protected (HBs titer > 10 ul/ml). In other studies, the subjects' HBs titer differed more and a minor percentage of participants were reported

to be safe (21 & 22). Difference in level of safety can be resulted from number of injected vaccines, type of applied kit to assess HBs titer, genetic difference of the participants, obesity, age, place and method of injection, geographical and regional differences, observance of cold chain for vaccine storage, and vaccination intervals. There was no significant relation between HBs titer and participants' gender. In their study, Hajibagheri *et al* (12), Kazemi *et al* (23), and Momen Haravi (21), there was no significant relation between HBs titer and participants' gender, either. In the present study, no significant relation was observed between the last injection interval and the created safety. This finding is in line with those of Hajibagheri in Kurdistan (12) and Kazemi in Tehran (23) while in opposition to those of Mansour Ghana'i in Guilan (15), Amini in Tehran (24), and Zanganeh (25), i.e. in their studies they concluded that extending the injections intervals caused protection against hepatitis B to drop. The reason for this discrepancy can be related to race and genetic backgrounds, level of endemicity of hepatitis B infection in different communities, suffering natural infection and as a result stimulation of risk cells, the individual's immunity system status, possibility of recall error by the participants regarding the last injection time, and how to do the injection regarding time intervals, method of injection, place of injection, etc.

The results of the study showed that there was a significant relation between the participants' fields of study and their exposure to risk factors of hepatitis B so that the highest exposure and the lowest one reported to be related to nursing students and operation room students, respectively. The results of the study conducted by Hosseini Shokuh *et al* also proved the same difference in students of different Army University of Medical Sciences majors regarding exposure to risk factors (13). In the researcher's view, the reason for this issue can be found in the nature and principles of different fields of study, for instance in operation room using protection instruments such as gloves, masks, and glasses in a compulsory; however, in other wards it is not a must. And other factors such as unavailability of occupational protection instruments, personnel and students' viewpoint about utilizing the equipment, and clinical instructors' supervision play a significant role.

Conclusion

Regarding HBs titer, the results of the study showed that 14 percent of the students lacked protective safety, 40.1 percent had average safety, and 45.9 percent had suitable safety. According to the results mentioned above and most students' failure to take advantage of personal protection equipment and

the vaccination coverage of 70 percent against hepatitis B, it is highly recommended that all of the students who lack safety or have incomplete vaccination should be vaccinated and their HBs titer should be measured.

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