

Original Research Article

Assessment of knowledge, attitudes and practices toward prevention of hepatitis B virus infection among healthcare workers of Mashhad University of Medical Sciences, Iran

Afsoon Barzegar^{1*}, Farzaneh Rahimpour¹, Mona Najaf Najafi²,
Hamidreza Naderi³, Lahya Afshari Saleh¹

¹Department of Occupational Medicine, ²Department of Community Medicine, ³Department of Infectious Diseases, University of Medical Sciences, Mashhad, Iran

Received: 23 August 2019

Accepted: 04 September 2019

*Correspondence:

Dr. Afsoon Barzegar,

E-mail: Afsoon642003@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Hepatitis B virus (HBV) infection is regarded as one of the most significant occupational hazards threatening healthcare workers (HCWs). Moreover measuring knowledge, attitudes, and practices among these individuals can be assumed as one of the most important activities to develop the preventive strategies of HBV infection.

Methods: This cross-sectional study was conducted in 2017 on HCWs of teaching hospitals affiliated to MUMS. Stratified sampling method was used and the knowledge-attitude-practice questionnaire was reproduced and distributed among nine groups of HCWs based on the proportion of the individuals working in each occupational category. Then knowledge, attitudes, and practices in different sub-groups were compared using independent samples T-test or analysis of variance or even via their non-parametric equivalents.

Results: This study was performed on 681 individuals with a mean age of 30.9±6.01 years. The results also showed that 448 HCWs (79.0%) had good levels of knowledge, 389 individuals (69.5%) were endowed with favorable levels of attitudes, and 391 of them (74.9%) had good levels of practices. According to the results of Spearman's rank-order correlation, there was only a significant but weak correlation between knowledge and attitudes ($p=0.00$, $r=0.16$).

Conclusions: Based on the findings of this study, it seemed that the levels of knowledge among HCWs of MUMS was good, although about a fifth of these individuals required upgrading their status in terms of their levels of knowledge about HBV. In general, according to the results obtained from the parameters of attitudes and practices, it was assumed that levels of education concerning HBV infection were in need of improvements.

Keywords: Knowledge, Attitudes, Practices, Infection prevention, Hepatitis B virus

INTRODUCTION

HBV infection is known as one of the main general health problems in the world.^{1,2} Based on the existing estimates, about one-third of the world's population is suffering from this infection and about 300 million individuals are considered as HBV carriers.^{3,4} Moreover, HBV infection can impose heavy costs on healthcare systems in each region because not only HBV treatment is expensive but also its complications including liver failure, cirrhosis,

hepatocellular carcinoma, as well as high mortality demand high costs of treatment.^{4,6}

HBV infection is also recognized as one of the most important occupational health and safety hazards among healthcare workers (HCWs).^{7,8} Much more contacts with blood and secretions from the body, as well as needle-stick injury (NSI) are known as the main causes of HBV infection; hence, HCWs are at the risk of exposure to HBV infection about 2-10 times more than normal

populations.^{6,9,10} Moreover, the HBV capacity for survival at least for one month, even in the absence of visible blood has also largely increased the risk of the infection rates for HCWs.¹¹ Apart from the high risks of infection among these individuals, research studies have suggested that reduction in the infection rates among this group can significantly affect the prevention of the spread of this disease in the community. Therefore, preventing infection in this group is of utmost importance.^{6,12}

Nowadays, vaccination is also considered as an effective way to prevent HBV infection.¹³ However, having good levels of knowledge and favorable levels of attitudes towards the best methods of infection prevention as well as good levels of practices in the face of risk factors along with vaccination can all contribute to moderating HBV risks.¹² Besides, it seems that measuring the levels of knowledge, attitudes, and practices (KAP) among HCWs in each healthcare center can be one of the most important activities in the course of developing educational protocols for infection prevention. Moreover, providing preventive strategies for the eradication of viral hepatitis is targeted by 2030 within the strategic plan of the WHO.⁵

So far, the levels of KAP parameters among HCWs have been measured in terms of HBV prevention in different parts of the world, and the results of the related studies in this domain have been reported differently depending on study time, research context, level of prior education, and so on.^{14,19} Despite the 2% occurrence of chronic HBV during recent decades in Iran, a limited number of local studies have been conducted on HCWs.^{20,23} The majority of these surveys have also reported good levels of knowledge and favorable levels of attitudes by less than 50% as well as good levels of practices by 60% before offering an educational program about the preventive strategies for HBV.^{20,23}

In addition, in the single nationwide study conducted in Iran on medical students, the results associated with the levels of KAP parameters have not been reported satisfactory and many academic centers in eastern Iran have not been investigated.¹²

Given the few investigations conducted to this point in Iran as well as the lack of such a survey in eastern Iran and considering the probability of obtaining different results in terms of space and time, it seemed there were still more needs to measure the levels of knowledge, beliefs, as well as heal-seeking behaviors in populations of HCWs at the risk of this disease. Furthermore, doing this type of local studies could be the first step in finding operational strategies for the development of preventive strategies for HBV as highly recommended by the WHO.²

The aim of the study was to assess the levels of KAP parameters toward HBV infection prevention among the HCWs of Mashhad University of Medical Sciences in east part of Iran.

METHODS

Study design and setting

This cross-sectional study was conducted between April and December 2017 on HCWs of teaching hospitals affiliated to Mashhad University of Medical Sciences. To this end, stratified cluster sampling method was used to select the study samples. So, Ghaem (AS) Hospital and Imam Reza (AS) Hospital as two main referral hospitals located in the city of Mashhad were chosen as two clusters and the samples were selected among the HCWs referring to the Occupational Medicine Clinic for periodic examinations. Then, the Knowledge-Attitude- Practice Questionnaire was reproduced and distributed based on the proportion of the people working in each occupational category in the mentioned hospitals. Due to lack of cooperation in some occupational categories, maintaining the proportion of the number of questionnaires collected with the number of employees in each category was not possible.

Inclusion and exclusion criteria

The inclusion criteria in this study were all the HCWs dealing with patients and having more than two years of work experience.

The exclusion criteria were also incomplete questionnaires in one or more parameters.

Sampling and sample size determination

To select the HCWs employed in the given hospitals, stratified sampling method was used. The sub-groups (strata) included general practitioners, specialists, assistants, nurses, midwives, paramedics and nurse aides, operating room and anesthesia technicians, medical emergency personnel, and hospital orderlies. Then, considering the number of people employed in each sub-group (strata); convenience and continuous sampling methods were performed on each sub-group (strata) to achieve the desired sample size. The sample size needed for this study was calculated by 800 individuals based on the correlation between the levels of KAP in individuals derived from the investigation by Duerink et al taking $\alpha=0.05$ and $\beta=0.2$ into account.³ Considering the probability of sample loss, a total of 800 questionnaires were distributed.

Questionnaire design

After studying and reviewing the available sources in the field of HBV infection prevention, the study questionnaire was designed. Then, it was submitted to three faculty members of the Department of Infectious Diseases, two specialists of Occupational Medicine, and two specialists of Social Medicine in order to give their opinions on the necessity, relevance, transparency, and simplicity of the items and the statements. Then, content

validity ratio (CVR) using the formula $CVR = \frac{no-N/2}{[N/2]}$ was calculated and content validity index (CVI) for the parameters of necessity, relevance, transparency, and simplicity was measured for each questionnaire item. The significance levels for CVR and CVI were considered by 0.75 and the items with scores less than 0.75 were excluded from the questionnaire.

Then, the questionnaire was submitted to 30 individuals of the target group in order to specify its ambiguous items (face validity and content validity). Ultimately, after the items were corrected, the questionnaire was reproduced and it was given to 30 other individuals in the target group to measure its reliability. Then, after two weeks, the same questionnaire was returned to those 30 participants and their responses received at this stage were corresponded with the first-stage responses and consequently the reliability of the questionnaire was accepted using the intra-class correlation coefficient (ICC) and Kuder-Richardson (K-R) 20/21 formula. After that, the questionnaire was reproduced and it was distributed among the HCWs in coordination with hospital administrators and directors to measure the levels of KAP parameters among the sample population. Due to more difficult access to specialists and assistants in hospitals, Google's online electronic questionnaire was used to collect their responses.

The given questionnaire was developed in four parts. In the first part, background characteristic information containing age, gender, occupational category, work experience, and shiftwork was recorded. Then, individuals' levels of KAP in relation to HBV infection prevention were measured in the second, the third, and the fourth parts. The second part i.e., levels of knowledge was comprised of 20 items with three-choice options of true/false/I do not know associated with the modes of transmission, prevention, complications, and treatments. The third part was concerned with levels of attitudes and consisted of 10 items with a Likert-type scale from totally agree to totally disagree regarding how to deal with patients suffering from HBV and other problems about this disease. The third part, that is, levels of practices with 9 items were about the use of personal protective equipment, vaccination status, and measures taken after infection. For each correct answer in the second, the third, and the fourth parts and for any incorrect answers, scores 1 and 0 were assigned; respectively.

Considering the construct of levels of knowledge, with a minimum score of zero and a maximum score of 20, those with a total score of less than 14 were among a group of people with poor levels of knowledge and the individuals with a total score of more than 14 were grouped as those with good levels of knowledge. Regarding the parameter of levels of attitudes, with a minimum score of 0 and a maximum score of 10, HCWs with a total score of less than 7 were considered among a group of people with non-favorable levels of attitudes and those who had a total score of more than 7 were considered as a group of

individuals with favorable levels of attitudes. In terms of the construct of practices, those who had a total score of less than 7 were among a group of people with bad levels of practices and individuals whose overall score was more than 7 were assigned to a group of people with good levels of practices. The minimum and the maximum scores in this domain were considered zero and 9; respectively.

Research ethics

This study was approved by the Ethics Committee of the Vice-Chancellor's Office for Research affiliated to Mashhad University of Medical Sciences. As well, the questionnaires were completed anonymously and the researchers placed the relevant questionnaires after completion in special cases designed for this purpose, so that the respondents were ensured that the questionnaires had been merely prepared for a research project and the responses would be reported collectively. Moreover, the participation of the individuals in this research study was on a voluntary basis and there were no obligations by the researchers to make them complete the questionnaires.

Statistical analyses

The continuous variables were illustrated in the form of mean \pm SD and the quantitative ones were displayed in the form of frequency and percentage. To compare the scores between the two groups of gender as well as the groups of occupational categories, work experience, and shiftwork; independent-samples t-test or analysis of variance (ANOVA) were used in case of normal distribution of data but Mann-Whitney U Test or Kruskal-Wallis Test were employed if the distribution was not so. To calculate the correlation of the scores obtained from the parameters of KAP (two-by-two), at least one variable from Pearson Correlation Coefficient was used in the case of a normal distribution, and if none of the two variables were normally distributed, Spearman Rank-Order Correlation was employed. In all the calculations, the 0.05 significance level was considered and the statistical analyzes were performed using Statistical package for social sciences (SPSS) software (version 16.0, Chicago, SPSS Inc.).

RESULTS

A total of 800 questionnaires were distributed to conduct this study; of which, 720 (90%) questionnaires were returned. Moreover, 39 incomplete questionnaires in which the items related to one or more parameters had not been answered were excluded and finally 681 individuals were recruited in this study. The mean age of the participants was 30.9 \pm 6.01 years and the majorities of these individuals were women (64.7%), HCWs between 25 and 35 years of age (60.9%), and those who were married (74.3%) (Table 1). Also, among the occupational categories, nurses (43.8%), as well as individuals with rotational shifts in terms of type of shiftwork had the

highest frequencies (52.6%) in the study sample (Table 1).

Table 1: Background characteristics of HCWs in the present study.

Variables	n (%)
Age (years)	<25 109 (18.1)
	25-35 367 (60.9)
	>35 112 (18.6)
Gender	Female 403 (64.7)
	Male 220 (35.3)
Marital status	Single 155 (25.7)
	Married 448 (74.3)
Occupation	Nurse 297 (43.8)
	Midwife 77 (11.4)
	Operating room / anesthesia technician 61 (9.0)
	Nurse aide 24 (3.5)
	Hospital orderly 31 (4.6)
	Medical emergency personnel 76 (11.2)
	General practitioner 27 (4.0)
	Specialist 25 (3.7)
	Assistant 60 (8.8)
Shiftwork	Morning 125 (19.7)
	Night-morning 131 (20.7)
	Night 44 (7.0)
	Rotational 333 (52.6)

Besides, 448 participants (79.0%) had good levels of knowledge, 389 individuals (69.5%) were endowed with

favorable levels of attitudes, and 391 of them (74.9%) had good levels of practices.

Among the underlying variables examined, a statistically significant relationship was only found between age and occupational status. In other cases, there was no statistically significant relationship between age, gender, marital status, occupation, shiftwork, and work experience and levels of KAP parameters (Table 2).

The HCWs with good levels of knowledge compared with those with poor levels also had a higher mean age ($p=0.024$) and the frequency of the individuals with poor levels of knowledge in the occupational categories of paramedics and hospital orderlies was reported higher ($p=0.001$) (Table 2).

Examining the correlation based on Spearman's rank-order correlation, a significant but weak correlation was found between levels of knowledge and attitudes ($p=0.001$, $r=0.16$); however, there was no significant correlation between levels of knowledge and practices ($p=0.073$, $r=-0.016$) as well as levels of practices and attitudes ($p=0.072$, $r=0.017$).

DISCUSSION

The purpose of this study was to measure the levels of KAP parameters concerning HBV prevention among HCWs of Mashhad University of Medical Sciences. In this respect, the results of this study showed that about 80% of the participants had good levels of knowledge, approximately 70% of these individuals were endowed with favorable levels of attitudes, and nearly 75% of them had good levels of practices.

Table 2: Comparison of the underlying variables of HCWs in different levels of KAP parameters.

Variables	Knowledge			Attitude			Practice		
	Poor	Good	P value	Non-favorable	Favorable	P value	Bad	Good	P value
Age (years)*	29.6±6.1	31.2±5.7	0.021	30.4±6.4	30.6±5.3	0.821	30.7±6.0	31.0±6.2	0.623
Gender**	Female 68 (20.8)	259 (79.2)	0.230	101 (32.6)	209 (67.4)	0.302	82 (26.4)	229 (73.6)	0.562
	Male 48 (25.7)	139 (74.3)		55 (28.2)	140 (71.8)		40 (24.0)	127 (76.0)	
Marital status**	Single 30 (22.6)	103 (77.4)	0.912	42 (33.3)	84 (66.7)	0.403	27 (24.3)	84 (75.7)	0.691
	Married 83 (22.9)	280 (77.1)		106 (29.4)	255 (70.6)		92 (26.2)	259 (73.8)	
Occupation**	Nurse 43 (18.1)	195 (81.9)		66 (29.2)	160 (70.8)		51 (22.5)	176 (77.5)	
	Mid-wife 12 (18.5)	53 (81.5)		18 (34.0)	35 (66.0)		16 (25.4)	47 (74.6)	
	Operation room technician 18 (38.3)	29 (61.7)		20 (37.7)	33 (62.3)		19 (38.0)	31 (62.0)	

Continued.

Variables	Knowledge			Attitude			Practice		
Healthcare worker									
Nurse	10 (62.5)	6 (37.5)	0.001	8 (34.8)	15 (65.2)	0.510	0	18 (100)	0.132
aid									
Hospital orderly	14 (60.9)	9 (39.1)		12 (46.2)	14 (53.8)		7 (30.4)	16 (69.6)	
Medical emergency personnel	16 (24.6)	49 (75.4)		21 (30.4)	48 (69.6)		16 (28.6)	40 (71.4)	
General practitioner	2 (7.7)	24 (92.3)		7 (26.9)	19 (73.1)		4 (28.6)	10 (71.4)	
Specialist	1 (4.0)	24 (96.0)		6 (24.0)	19 (76.0)		5 (25.0)	15 (75.0)	
Assistant	2 (3.3)	38 (96.7)		13 (22.8)	44 (77.2)		11 (22.9)	37 (77.1)	
Work experience (years)*	5.9±5.1	6.4±4.9	0.423	6.3±5.2	6.0±4.9	0.523	5.8±4.7	6.5±5.2	0.234

*mean±SD **n (%)

In a study on the HCWs of a teaching hospital in the city of Tehran conducted about 10 years ago in Iran, poor levels of knowledge was reported among these individuals and favorable levels of attitudes were also by 50%.²⁴ The comparable point was that, the favorable levels of attitudes among the HCWs in the present study was about 50%, while approximately 60% of them had also good levels of knowledge which probably indicated the importance of emphasizing in-service training for HCWs over the past ten years.²⁴ In another study within the Iranian context, the levels of KAP parameters concerning HBV were examined among 60 HCWs in urban and rural health community centers in the city of Najafabad and the results demonstrated desirable levels of KAP by 50%. It was not possible to compare such results with the findings of the present study due to lack of clarity in terms of educational and occupational compositions of the HCWs in the given study.²⁵

In other investigations in Saudi Arabia and India, good levels of knowledge were also observed in 80% of medical students similar to those reported in the present study. Besides, the levels of attitudes were reported favorable but the levels of good practices were illustrated with low frequency as those concluded in the present study.^{15,26} Likewise, the results of another study conducted among Ethiopian medical students indicated that the levels of knowledge among 80% of the participants was good which were in agreement with findings of the present study although, in this report, the favorable levels of attitudes were reported about 10% higher than that in the present study.⁶ The findings of another survey in 2017, as one of the comprehensive studies on the measurement of the levels of KAP

concerning viral hepatitis around the world on 2500 Iranian medical students also demonstrated that the participants' score for the construct of levels of knowledge was 7.35 (out of 10), that was 4.88 for the parameter of levels of attitudes (from -20 to +20), and such a value was 5.67 (out of 9) for the construct of levels of practices which illustrated a bad status, especially in the parameters of levels of attitudes and practices.¹²

Remarkably, the results of the given study showed that approximately 95% of the students had received HBV vaccination based on Iran's National Health Reform Plan even though only about one-third of them were sure of their antibody titer status; the issue that had been reported to be roughly 3% in other studies on dental students in Iran.^{20,22} Besides, there was no significant difference between the findings of the present study and those reported in other investigations; however, the slight difference reported could be attributed to various causes including discrepancies in the research populations examined. It should be noted that HCWs were investigated in the present study, while students had formed the main research population in the majority of other surveys.^{6,15,20,22,27} The other difference between the findings was the dispersion of the countries carrying out such research projects such as the United States, Cameroon, Ethiopia, Senegal, Saudi Arabia, India, and Iran. The impact of such differences in various countries on the results obtained could be accredited to this issue. It was also possible that different countries would implement specific intervention and prevention programs and plans based on the priorities of their health systems, so variations in the levels of KAP could be attributed to this factor.^{15,26,27} In addition, the difference in study time,

especially comparing Iranian investigations with one another, could be assumed as one other reason for the differences between the findings.^{12,20,22} However, in the overall conclusion, it seemed that the frequency of good levels of knowledge among HCWs and medical students in the majority of the studies conducted in developing countries was about 80% which seemed to be desirable despite being mathematically distant from the ideal status of 100%.^{6,15,17,18,23,24,26} However, it was assumed that appropriate measures were needed to be taken to improve the low frequency of good levels of practices and favorable levels of attitudes in this domain. The common point among the majority of the investigations was that the favorable levels of attitudes and good levels of practices were generally distinct from good levels of knowledge suggesting that the existing education was likely to be effective in improving levels of knowledge but not those of practices and attitudes.

The results of this study revealed that levels of knowledge had improved roughly consistent with higher levels of academic education and academic status of individuals, so that the frequency of good levels of knowledge in those with doctoral or higher degrees including general practitioners, assistants, and specialists was more than 92%, and it was equal to 82% for those with a postgraduate degree including nurses and midwives.

The levels of good knowledge in medical emergency personnel and operating room technicians holding associate's degrees were usually reported about 61-75%. The effect of occupational status on levels of knowledge also became much bolder when levels of knowledge concerning hepatitis in service groups of the HCWs including paramedics and hospital orderlies was reported down by about 37.5-39% which was significantly far from the desirable status. However, it is interesting to note that the status of hospital orderlies and paramedics had dramatically improved and reached 65-65% for favorable levels of attitudes and also changed into 70-100% for good levels of practices, while it had reached to about 75% for favorable levels of attitudes and good levels of practices in the group of physicians. This meant that there was likely to be a disruption in the educational system associated with the transfer of knowledge to the parameters of levels of attitudes and practices, and this became more intense when the findings of this study showed a weak and often insignificant correlation between the levels of KAP parameters.

Among the studies reviewed, no investigation with a similar design was found in order to evaluate the findings in the present study with, particularly in terms of the generalizability of occupational and educational status, as well as levels of KAP. In a study, it was only revealed that postgraduate students had higher levels of knowledge about HBV compared with undergraduate ones.²⁸ Also, it was found that higher academic years had led to an increase in Syrian medical students' levels of knowledge about HBV.²⁹ In addition, another survey found that

medical students enrolled in their 12th semester had received more vaccinations than those in their 4th academic year, which could also indicate the status of the levels of KAP parameters in them.²⁷

Moreover, among Indian dental students and Ethiopian health sciences students, those in higher academic years had demonstrated a better understanding of HBV.^{30,31} Like the present study, another investigation showed that medical students were endowed with higher levels of knowledge and attitudes than nursing, midwifery, and anesthesia students.⁶ The main difference between the investigation conducted in Ethiopia and the present study was that the given survey was administered on employed personnel in different occupational categories, while only students working in different educational groups were compared in the study in the Ethiopian context.⁶ Besides, another study in Iran demonstrated that levels of knowledge concerning HBV among nursing students was much better than that among midwifery, operating room, and anesthesia students.²⁰ However, several studies also showed no relationship between the field of study and the levels of knowledge; but, overall, it seemed that the status of levels of KAP in higher educational and occupational categories was more favorable based on the findings obtained from the majority of studies.³²

In the present study, no difference was observed between men and women in terms of the levels of KAP. However, considering the parameter of good levels of knowledge and non-favorable levels of attitudes, the frequency of women was reported by 5% higher than men, which was not statistically significant. Moreover, there was no significant difference between the two gender groups regarding levels of practices, and only about 2.5% of men had better levels in this parameter. According to two other investigations in an Iranian context, such as the present study, no relationship was observed between levels of knowledge and gender in dental students.^{22,28} However, the levels of attitudes and practices in women were reported higher than those in men in Iranian studies.¹² In a report from Ethiopia, men's levels of knowledge were higher than those in women.³¹ In another study, conducted among medical students in northern Iran, the levels of knowledge about HBV were reported higher in women than in men.²¹ Due to the diversity of the findings among various studies, it seemed that the relationship between gender and levels of KAP parameters could not be concluded, i.e. it was not possible to find an exact relationship between levels of KAP and gender.

Considering the relationship between age and levels of practices, no significant relationship was also found in a study by Mesfin and Kibret. However, the findings of the study by Pathoumthong et al. were in line with the results of the present study, and individuals over 25 years old had higher levels of knowledge than those below the age of 25 years, while no correlation was reported between age and levels of practices.^{28,31} Interestingly enough, in

the study by Karimi-Sari et al students enrolled in lower academic years probably with a lower age also had lower levels of knowledge than those in higher academic years which suggested the necessity to prioritize educational interventions, especially in the early years of admission into universities.¹² In the present study, the levels of KAP in terms of the mean age of the individuals were in a desirable status although the difference was only statistically significant for levels of knowledge. Individuals with good levels of knowledge in this study were about 2 years older than those with poor levels of knowledge. With respect to levels of attitudes and practices, such an age difference was less than half a year. As expected, along with the relationship between increased age and higher levels of knowledge, such a statistically insignificant relationship was also observed between years of work experience and levels of knowledge, so that those who had better levels of knowledge and practices had more work experience, although this relationship was not seen in relation to levels of attitudes. However, it seemed that the possible reason for the improvement of the status of levels of KAP due to increased age was the individuals' exposure to direct and indirect education; although this was merely a possibility and it had not yet been confirmed in any other study.

Since the prerequisite for any interventions to improve a situation is its evaluation, the present study could better shed light on levels of KAP concerning HBV among HCWs. The significance of the findings of this study could be further determined by aligning it with the priorities of the WHO. According to the WHO, eradicating viral hepatitis by 2030 is considered as one of the most important health-related issues and the undesirable levels of KAP can be among the obstacles to achieving it.⁵

One of the strengths of the present study was to examine the status of KAP in relation to various occupational categories of HCWs. The study design was not also previously observed in the related literature and this study was the first among HCWs of a center wherein levels of KAP parameters in different occupational categories were investigated, to the best of authors' knowledge. There were similarly some limitations to this study. The first limitation was the single-centeredness of the study context which could reduce the generalizability power of the findings. The second point was that, in the present study, students from various medical sciences, as important members of HCWs working in teaching hospitals were not included in this study. Thirdly, given that the names of those who had not completed the questionnaires were not included, it was not possible to track the reasons for some unanswered items, so the scores of those who had not answered the items in one domain could not be calculated in summing up the overall scores. Another limitation was that the design of the present study was cross-sectional and analytical, and this type of study design was inherently characterized by a

weakness in the establishment of causal relationships for the data collected from one-time section. This meant that the reason for the difference in the levels of KAP parameters could not be associated with differences in age and occupational status, but such variables were only related to the levels of KAP parameters and their relationships could be identified in other types of study designs.

CONCLUSION

Based on the findings of the present study, it seemed that levels of knowledge among HCWs particularly paramedics and hospital orderlies needed to be upgraded although appropriate levels of knowledge observed among physicians. The levels of attitudes and practices, as two parameters different from knowledge, also required more planning and education among all HCWs of Mashhad University of Medical Sciences. Since people of lower age groups had poor levels of knowledge, it was assumed much more necessary to have educational interventions for younger people. Furthermore, it was suggested to conduct further studies in the future using a multicenter format. In addition to examining the levels of KAP, it was also recommended to measure the effectiveness of an educational intervention on the levels of KAP with an emphasis on the parameters of attitudes and practices.

ACKNOWLEDGEMENTS

This article was the result of the research project which financially supported by the Vice-Chancellor's Office for Research at Mashhad University of Medical Sciences, Iran as well as the specialty thesis fulfilled by Dr. Afsoon Barzegar with the code number T4920. We, hereby, appreciate and express our gratitude to all the personnel of various departments of the selected hospitals as the study context of this research project for their help in collecting the required information.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Mirminachi B, Mohammadi Z, Merat S, Neishabouri A, Sharifi AH, Alavian SH. An update on the prevalence of hepatitis C virus infection among Iranian general population: A systematic review and meta-analysis. *Hepatitis Monthly*. 2017;17(2).
2. Organization WH. Manual for the development and assessment of national viral hepatitis plans: A provisional document: World Health Organization. 2015.
3. Allain J-P. Global epidemiology of occult HBV infection. *Annals of Blood*. 2017;2(5).

4. WHO. Global hepatitis report, 2017. Available at: <https://www.who.int/publications/i/item/9789241565455>. Accessed on 18 August 2021.
5. WHO. Combating hepatitis B and C to reach elimination by 2030: Advocacy brief, 2016. Available at: <https://apps.who.int/iris/handle/10665/2>. Accessed on 18 August 2021.
6. Abdela A, Woldu B, Haile K, Mathewos B, Deressa T. Assessment of knowledge, attitudes, and practices toward prevention of hepatitis B virus infection among students of medicine and health sciences in Northwest Ethiopia. *BMC Research Notes*. 2016;9:410.
7. Moodley R, Naidoo S. The prevalence of occupational health-related problems in dentistry: A review of the literature. *Journal of Occupational Health*. 2017;17-0188-RA.
8. Mohammadnejad E, Nayeri ND, Hajiesmaeilpoor A. Live experience of nurses about occupational exposures in emergency wards. *Middle East Journal of Family Medicine*. 2017;7(10):170.
9. Sastry AS, Rajshekhar D, Bhat P. Needlestick, sharp, and splash injuries in a tertiary care government hospital of South India. *Journal of Current Research in Scientific Medicine*. 2017;3(2):94.
10. Bayatpoor ME, Karimi-Sari H, Alavian SM. Viral hepatitis elimination should receive more attention from Iranian nurses. *Research in Nursing and Health*. 2018;41:9-10.
11. Ladou J. *CURRENT Occupational and Environmental Medicine*. 5 ed: McGraw-Hill Education. 2014.
12. Karimi-Sari H, Bayatpoor ME, Khotbesara MA, Ebrahimi MS, Sattari Z, Sattari P et al. Knowledge, attitude, and practice of Iranian health sciences students regarding hepatitis B and C virus infections: A national survey. *American Journal of Infection Control*. 2017;45(11):e135-e41.
13. Ward JW, Van Damme P. *Hepatitis B Vaccines. Hepatitis B Virus and Liver Disease*. Springer. 2018;91-117.
14. Hussain SF, Ahmad SR, Muslehuddin OM, Muslehuddin HM. Knowledge, attitude, and practice regarding hepatitis B among medical students. *International Journal Of Community Medicine And Public Health*. 2016;3(11):2977-81.
15. Alhawaish MA, Alhawaish JA, Alanazi YH, Alshammari MM, Alshammari MS, Alshamari NG. Knowledge, attitudes, and practices toward prevention of hepatitis B virus infection among medical students at Northern Border University, Arar, Kingdom of Saudi Arabia. *Electronic Physician*. 2017;9(9):5388-94.
16. Adenlewo OJ, Adeosun PO, Fatusi OA. Medical and dental students' attitude and practice of prevention strategies against hepatitis B virus infection in a Nigerian university. *The Pan African Medical Journal*. 2017;28:33.
17. Jaquet A, Wandeler G, Tine J, Diallo MB, Manga NM, Dia NM, et al. Prevention and Care of Hepatitis B in Senegal; Awareness and Attitudes of Medical Practitioners. *The American Journal of Tropical Medicine and Hygiene*. 2017;97(2):389-95.
18. Ricco M, Cattani S, Casagrande F, Gualerzi G, Signorelli C. Knowledge, attitudes, beliefs, and practices of occupational physicians towards vaccinations of healthcare workers: A cross sectional pilot study in North-Eastern Italy. *International Journal of Occupational Medicine and Environmental Health*. 2017;30(5):775-90.
19. Shindano TA, Bahizire E, Fiasse R, Horsmans Y. Knowledge, Attitudes, and Practices of Healthcare Workers about Viral Hepatitis B and C in South Kivu. *The American Journal of Tropical Medicine and Hygiene*. 2017;96(2):400-4.
20. Mansour-Ghanaei R, Joukar F, Souti F, Atrkar-Roushan Z. Knowledge and attitude of medical science students toward hepatitis B and C infections. *International Journal of Clinical and Experimental Medicine*. 2013;6(3):197.
21. Karimiankakolaki Z, Baghianimoghadam MH, Gerayllo S, Samani NS, Hadipour H. A survey of knowledge, individual perceived risk, general perceived risk, and behavioral intentions regarding hepatitis B among students in the faculty of Nursing, Midwifery and Health at Shahrekord Islamic Azad University in 2014. *Hepatitis Monthly*. 2016;16(7).
22. Alavian SM, Mahboobi N, Mahboobi N, Savadrudbari MM, Azar PS, Daneshvar S. Iranian dental students' knowledge of hepatitis B virus infection and its control practices. *J Dent Educ*. 2011;75(12):1627-34.
23. Kabir A, Tabatabaei SV, Khaleghi S, Agah S, Kashani AHF, Moghimi M et al. Knowledge, attitudes and practice of Iranian medical specialists regarding hepatitis B and C. *Hepatitis Monthly*. 2010;10(3):176.
24. H A, SMM HM, F Y, A A. Knowledge, attitude, and practice regarding hepatitis B among health care practitioners of Labafinejad Hospital. *Advances in Nursing and Midwifery*. 2011;16(57):44-50.
25. Tabeshian A. Evaluation of Health Education on Awareness, Attitude and Operation of Najafabad Health Care staffs on the Prevention of Hepatitis B. *Paramedical Sciences and Military Health*. 2017;11(4):23-9.
26. Sharma S, Dixit M, Mittal H, Jain J, Jain D, Khandelwal A. Assessment of knowledge, attitudes and practices toward prevention of hepatitis B virus infection among medical students in Geetanjali Medical College, Udaipur. *International Journal Of Community Medicine And Public Health*. 2018;5(4):1509-13.
27. Noubiap JJN, Nansseu JRN, Kengne KK, Ndoula ST, Agyingi LA. Occupational exposure to blood, hepatitis B vaccine knowledge and uptake among medical students in Cameroon. *BMC Medical Education*. 2013;13(1):148.

28. Pathoumthong K, Khampanisong P, Quet F, Latthaphasavang V, Souvong V, Buisson Y. Vaccination status, knowledge and awareness towards hepatitis B among students of health professions in Vientiane, Lao PDR. *Vaccine*. 2014;32(39):4993-9.
29. Ibrahim N, Idris A. Hepatitis B awareness among medical students and their vaccination status at Syrian Private University. *Hepatitis Research and Treatment*. 2014;2014:7.
30. M R, A C, V S, A S. Hepatitis B infection awareness among dental graduate students: A cross sectional study. *International Scholarly Research Notices*. 2014;2014:6.
31. Mesfin YM, Kibret KT. Assessment of knowledge and practice towards hepatitis B among medical and health science students in Haramaya University, Ethiopia. *PLoS One*. 2013;8(11):e79642.
32. Daniali SS, Bakhtiari MH, Nasirzadeh M, Aligol M, Doaei S. Knowledge, risk perception, and behavioral intention about hepatitis C, among university students. *Journal of Education and Health Promotion*. 2015;4:93.

Cite this article as: Barzegar A, Rahimpour F, Najafi MN, Naderi H, Saleh LA. Assessment of knowledge, attitudes and practices toward prevention of hepatitis B virus infection among healthcare workers of Mashhad University of Medical Sciences, Iran. *Int J Community Med Public Health* 2022;9:2776-84.