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Knowledge about hepatitis B among nurses in the governmental healthcare sector in southern West Bank, Palestine

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Abstract

Health care workers (HCWs) represent a high-risk population for hepatitis infection. The study aimed to assess the level of knowledge of nurses regarding hepatitis B virus (HBV) infection. A cross-sectional study was conducted from September 2020 to November 2020. A total of 300 nurses were included in the study. Data were collected using a self-administered structured questionnaire, and analyzed by using SPSS (22). The results revealed that the mean knowledge score among nurses was 62.55% of the information tested in our questionnaire. Most of the correct answers were in the nature section (78.4%), while answers were poor on vaccination (46.9%). About 118 (40%) of the nurses aged between 20-30 years, 157 (52%) were females. Two hundred fifty (83%) respondents reported taking the HBV vaccine, and 96.1% reported having titers >10U/I. Based on our findings, nursing knowledge about HBV in prevention and vaccination was unsatisfactory compared with the nature, treatment and transmission. Continuous training programs toward viral infection are highly recommended.

Keywords: Nurse, Hepatitis B virus, Knowledge, southern West Bank, Palestine.

تقييم مدى المعرفة عن التهاب الكبد الوبائي (ب) لدى ممرضي القطاع الحكومي الفلسطيني في جنوب الضفة الغربية

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المخلص:

يعدُّ العاملون في مجال الرعاية الصحية (HCWs) كالتلاميذ من الفئات العالية الخطورة للإصابة بعدوى التهاب الكبد الفيروسي. حيث يعد فيروس التهاب الكبد (ب) (HBV) مشكلة صحية عامة عالمية وخطيرة. ويقدر عدد المصابين في العالم ببليون شخص، كما يعاني ما يقارب من 350 مليون شخص من الالتهاب المزمن لهذا المرض. هدفت الدراسة إلى تقييم مستوى معرفة التلاميذ في القطاع الحكومي في فلسطين / جنوب الضفة الغربية فيما يتعلق بالإصابة بفيروس التهاب الكبد ب. أُجريت دراسة مقطعية في أيلول/ سبتمبر 2020 إلى تشرين الثاني/ نوفمبر 2020 ودُعي جميع الممرضين في القطاعات الحكومية في جنوب الضفة الغربية في فلسطين للمشاركة في الدراسة، وتمَّ جمع البيانات باستخدام استبيان منظم ذاتي وتم تحليلها باستخدام (SPSS (22). استجاب ما مجموعه 300 من الممرضين العاملين في الرعاية الصحية المؤهلين للدراسة. حيث أجاب حوالي 62.6% من المشاركين في الدراسة على الأسئلة بشكل صحيح مع خطأ معيار يقدره 0.6، وكان متوسط معرفة الممرضين بالمعلومات التي تم اختبارها في الاستبيان 62% - 63.2%، بينما كان النطاق العام 27% إلى 85% مع معدل استجابة 100% بين 300 مشارك لدينا. لم يتم العثور على فروق ذات دلالة إحصائية بين متوسط درجات المعرفة حول طبيعة المرض، وطرق انتقاله، ولكن تمَّ العثور على فروق ذات دلالة إحصائية بين متوسط درجات المعرفة نحو الوقاية والعلاج والتطعيم لهذا المرض. بناء على النتائج التي توصلنا إليها، كانت معرفة الممرضين حول التهاب الكبد (ب) خاصة في الوقاية والعلاج والتطعيم غير مرضية مقارنة بمعرفتهم حول طبيعة المرض وطرق انتقاله. لهذا يُوصى بشدة إعطاء دورات تثقيف صحي مستمرة؛ لتحسين المعرفة والممارسات الطبية للتلاميذ، والحد من انتشار التهاب الكبد الفيروسي وتحسين الوعي الصحي حول هذا المرض.

الكلمات المفتاحية: ممرض، التهاب الكبد الفيروسي ب، معرفة، جنوب الضفة الغربية- فلسطين.

INTRODUCTION

Hepatitis B virus (HBV) is the prototype virus of the *Hepadnaviridea* family that has a small, enveloped, spherical virion (virus particles) and a circular double-stranded DNA molecule with a single strand region (Tang et al., 2018; Yuen et al., 2018). HBV is among the common viral infectious agents of public health importance globally. It has been estimated that around 240 million suffer from HBV in low- and middle-income countries (Al-Amleh, 2020). Once the chronic infection is established, HBV may persist in the liver for a lifetime, which not only causes severe HBV-related sequelae such as cirrhosis and hepatocellular carcinoma and constitute the reservoir of the virus (Noverati et al., 2022). HBV kills 820,000 people annually, and approximately 296 million people are living with HBV around the world (CDC, 2022).

HBV can be transmitted through blood and bodily fluids including vaginal fluids or semen. It can also be transmitted from mother to baby during pregnancy and childbirth (Li et al., 2018; Tran, 2016), and through injecting equipment including: needles, syringes, spoons, swabs, tourniquets, water, and filters. In situations where people are injecting, small amounts of blood may be present on a person's finger, on a tourniquet, or a benchtop or tabletop, and transmission may occur even if people do not share or re-use needles. Increased access to safe injecting paraphernalia, condoms and personal hygiene equipment could reduce the spread of HBV (Smith et al., 2017). To minimize the risk of HBV transmission from patients to healthcare workers (HCWs), they should adhere to standard precautions including: hand washing before and after contact with patients or their body fluids, wearing gloves, avoiding recapping used needles, and disposing of contaminated sharp instruments in puncture resistance containers (Abeje & Azage, 2015; Lewis et al., 2015).

Acute hepatitis B refers to a short-term infection that occurs within the first six months after someone is infected with the virus. Chronic hepatitis B refers to a lifelong infection with HBV, which can lead to cirrhosis, liver failure or liver cancer (Otero et al., 2018). Treatment for chronic hepatitis B may include,

antiviral medications, interferon injections, RNA silencing-based therapy, and liver transplant (Fanning et al., 2019; Tsai, 2021).

Prevention against any disease is proportional to the knowledge, attitude and practice (KAP) of the population and reflection of the importance that is paid to the health-related issue by society. HCWs should familiarize themselves with “universal precautions,” which is defined by the Centers for Disease Control and Prevention (CDC) as precautions designed to prevent transmission of human immune deficiency virus (HIV), HBV, and other blood-borne pathogens when providing first aid or health care. Under universal precautions, blood and certain body fluids of all patients are considered potentially infectious (CDC, 2021)

The hepatitis B vaccine is the mainstay of HBV prevention (Mohanty et al., 2020). The World Health Organization (WHO) recommends that all infants receive the hepatitis B vaccine as soon as possible after birth, preferably within 24 hours (Hepatitis B, WHO, 2022). The hepatitis B vaccine has been available since 1982, and by the year 2008, more than 177 countries had established HBV vaccination programs. In 2014, the WHO reconfirmed the necessity for HBV vaccines to become an integral part of national immunization schedules. The WHO recommends a birth dose within 24 hours of birth to prevent perinatal and early horizontal HBV transmission. The birth dose should be followed by 2 or 3 monovalent or multivalent HBV vaccines (Schweitzer et al., 2017). Most regulatory authorities approved the three and four dose schedules for vaccination. The four doses schedule should be considered when rapid protection is required in high-risk groups such as HCWs (Abeje & Azage, 2015; Fan et al., 2017).

Palestine is considered an intermediate to the high endemic area of HBV carriers. The Palestinian Ministry of Health implemented an obligatory HBV vaccination program for infants in 1992. The vaccination program was expanded to cover all household contacts of HBV carriers and other high-risk groups such as health care workers and patients with blood transfusion. Although the HBV vaccination program was implemented, the prevalence of HBV is still around 1.8%. This confirms the necessity to check whether a booster dose is needed, especially in high risk groups (Dumaidi & Al-Jawabreh, 2015).

After vaccination, protective antibody titers are achieved in almost all recipients by 3 months. To ensure an enduring high antibody titer following rapid vaccination, a fourth dose must be given at 12 months. For routine immunization, the 0, 1 and 6 months schedule is less costly and provides excellent antibody titers and duration of protection (M.-H. Chang & Chen, 2015). In 2019, the three-dose vaccine coverage reached 85% worldwide compared to around 30% in 2000. However, coverage of the birth dose vaccine remains uneven ranging from a global rate of 43% and only 6% in the African Region (Hepatitis B Vaccination Coverage, WHO, 2021). In 2021, coverage for children under two years of age in Palestine was above 95% (Health Annual Report Palestine, Moh, 2021). An anti-HBs level of >10 mIU/ml considered protective against HBV infection, while an anti-HBs titer of <10 mIU/ml is regarded as non-responsiveness to HBsAg vaccination. Levels >100 mIU/ml are taken as a high level of immunity (Basireddy et al., 2018).

The current standard of care for the prevention of HBV infection includes an active and passive monophylaxis with HBV immunoglobulin and vaccination administered immediately after birth to neonates of HBsAg positive mothers, and referral of mothers to hepatology clinics for assessment and follow up (M. S. Chang et al., 2015; Tran, 2016). The HBV infection can be detected by several serological markers: HBsAg, HBsAb, HBeAg, HBeAb and HBcAb. Among of these markers, HBsAg is the first to appear in the blood and it is the most important marker of HBV infection (Kafeero et al., 2022). HBsAg typically appears early, 6–8 weeks after infection and before clinical hepatitis develops. Detection of HBsAg in serum samples is commonly carried out using an immunoassay (Xi et al., 2018).

HCWs including nurses and midwives are at high risk of HBV infection in the health care settings. The prevalence rate of HBV in HCWs is about 2–10 times higher than the general populations in the world (Maamor et al., 2022; Mursy & Mohamed, 2019). HCWs had a higher risk of exposure and acquiring the disease if the personal protective measures were not appropriately applied (Elseviers et al., 2014; Tatsilong et al., 2016). HBV transmission could be related to lack of

awareness about HBV prevalence and occupational safety measures such as vaccination against HBV, post-exposure prophylaxis (PEP), training and adopting safer working practices (Badawi et al., 2018; Dunkelberg et al., 2014). Handling sharps and needle stick injuries (NSI) represent major risks for unvaccinated HCWs and involve potential exposure to several pathogens, including HBV (Elseviers et al., 2014; Mursy & Mohamed, 2019). In Palestine, little information on nurses' knowledge regarding HBV is available, and to our knowledge, no related studies were conducted in the south of the West Bank. The purpose of this study was to assess the level of knowledge of nurses regarding HBV infection in the governmental sector in Palestine/ southern West Bank.

METHODOLOGY

Study sample and settings

This study included nurses employed in governmental healthcare facilities, including primary, secondary and tertiary level facilities. All the selected facilities, including government hospitals and healthcare centers, were located in the southern governorates of the West Bank (Hebron and Bethlehem). All nurses working in governmental healthcare facilities are included in this study.

Study design

A questionnaire-based cross-sectional study was conducted among nurses working in governmental healthcare facilities. Data were collected during the period between September and November 2020. A self-reported questionnaire was utilized for data collection.

Data collection and study variables

In this study, a self-reported questionnaire was used. The questionnaire was a modified version of a questionnaire originally developed by Richmond et al., then modified in a study conducted in Guilan-Iran (Joukar et al., 2017). The validity and reliability of the questionnaire were tested in a pilot study. A Cronbach's alpha coefficient of 0.4 for HBV knowledge was found. The questionnaire consisted of 44 questions divided into two sections. The first section included 12 questions about demographic data, job category, HBV vaccination status, family history of HBV and history of exposure to NSI. The

second section consisted of 26 yes/no questions that aimed to assess knowledge about HBV infection. The questions evaluated knowledge regarding the nature of the disease (6 items), modes of transmission (10 items), methods preventing HBV infection (5 items), HBV treatment (2 items), and HBV vaccination (3 items).

Ethical consideration:

Approval was obtained from the Palestinian Ministry of Health. Informed consent was obtained from all participants after explaining this research's objectives and assuring the data's confidentiality.

The data were entered, coded, cleaned and analyzed by using Statistical Package for Social Sciences (SPSS) version 22. Demographic variables were reported as frequencies and percentages. Knowledge scores were calculated as the sum of correct answers. Each correct answer was given one point, while wrong answers were given zero points. The total score was converted to percentage. Results were reported as mean values. A mean knowledge score toward hepatitis B was reported. Knowledge scores were compared based on sex, age, education level, work experience, organization, department types, locality, history of vaccination and history of needle stick injury (NSI).

Results

Sociodemographic Characteristics

A total of 300 nurses working in governmental healthcare facilities participated in the study. About 118 (40%) participants were between 20-30 years old, and 157 (52%) were females. Only 19 (6%) nurses were above 50 years old. More than 97.2% had a history of immunization. Regarding educational level, 193 (64%) had a bachelor's degree, 66 (22%) had a diploma, and only 41 (14%) had a post-graduate degree (Master's or Ph.D). The majority of the participants 153 (50%), lived in urban areas. About 125 (42%) lived in rural areas, while 17 (6%) lived in refugee camps, and 5 (2%) reported living in other types of localities. Based on self-reported data, 250 (83%) of the respondents were vaccinated against HBV at the time of the study (**Table 1**). The younger nurses (<50 years) had better knowledge scores about HBV than the older (>50 years).

Table 1: Baseline demographic characteristics of the study subjects

Parameter	Category	Frequency (n)	Percentage (%)
Gender	Male	143	48
	Female	157	52
Age(years)	20-30	118	40
	31-40	109	36
	41-50	54	18
	Above 50	19	6
Educational level	Diploma	66	22
	Bachelor degree	193	64
	Post-graduate	41	14
Type of locality	City	153	51
	Village	125	42
	Camp	17	6
	Other	5	2
HBV vaccination status	Yes	250	83
	No	50	17

Assessment of nurses’ knowledge towards HBV

In general, the mean knowledge score among nurses in this study was 62.55% ranging between (26.5% - 90.3%) More than 80% of the responders correctly answered three questions related to the nature of the disease and the mode of transmission. More than 60% knew that the HBV vaccine develops immunity. The percentage of correct answers was below 80% regarding prevention and treatment (**Table 2A**).

Table 2A: Questions measured nurses' knowledge about viral hepatitis B

<i>Domain</i>	<i>Statement</i>	<i>Correct response N (%) responders (%)</i>	<i>Wrong response N (%)</i>	<i>Total score</i>
Nature	1. Hepatitis B is a bacterial disease.	270(90.0)	30(10.0)	6 points
	2. Hepatitis B is a contagious disease.	270(90.0)	30(10.0)	
	3. Hepatitis B can lead to cirrhosis.	271(90.3)	29(9.7)	
	4. Hepatitis B is associated with an increased risk of liver cancer.	226(75.2)	74(24.8)	
	5. If you have hepatitis B, you cannot get it again because you have been immunized against the disease.	181(59.7)	119(40.3)	
	6. The symptoms of hepatitis B appear on the patient in a short period.	198(65.2)	102(34.80)	
Transmission	7. Hepatitis B can spread through close personal contact such as kissing or talking.	91(29.9)	209(70.1)	10 points
	8. Hepatitis B can spread through sharing injecting equipment, such as needles and operation tools or sharing teeth brushes.	254(84.6)	46(15.4)	
	9. Hepatitis B can be transferred from mother to fetus.	227(75.6)	73 (24.4)	
	10. Hepatitis B can spread by mosquitoes.	147(48.8)	153(51.2)	
	11. Hepatitis B spreads through blood-to-blood contact.	249(83.0)	51(17.0)	
	12. Hepatitis B spreads through air in an enclosed environment (e.g., crowded buses and elevators).	237(78.9)	63(21.1)	
	13. Sexual transmission is a common way hepatitis B spreads.	219(72.9)	81(27.1)	

	14. Some people with hepatitis B were infected through unsterile tattooing.	248(82.7)	52(17.3)	
	15. Hepatitis B Can be transmitted by sharing dishes.	81(26.5)	219(73.5)	
	16. Urgent doses of hepatitis immune globin should be given to the fetus during the period of birth to prevent transmission of the virus from the mother to the fetus.	233(77.4)	67(22.6)	
Prevention	17. Hepatitis B can be prevented by regular exercise.	222(74.0)	78(26.0)	5 points
	18. Hepatitis B can be prevented by healthy diet.	168(56.0)	132(44.0)	
	19. Hepatitis B can be prevented by hand washing.	182(60.5)	118(39.5)	
	20. Hepatitis B can be prevented by condom.	207(68.9)	93(31.1)	
	21. The degree of protection provided by the vaccine against viral hepatitis B is lower in older people.	173(57.1)	127(42.9)	
Treatment	22. There is a pharmaceutical treatment available for hepatitis B.	111(36.6)	189(63.4)	2 points
	23. Special diet is recommended for patients with Hepatitis B.	95(31.7)	205(68.3)	
Vaccination	24. Vaccination of pregnant women with viral hepatitis B helps prevent transmission of HIV Infection to the fetus.	103(34.1)	197(65.9)	3 points
	25. Hepatitis B vaccine cause immunity.	186(62.0)	114(38.0)	
	26. Hepatitis B vaccine is given as 2 shots.	132(44.6)	164(55.4)	
Total				26 points

To summarize the nurses' knowledge items, the mean values were calculated for each domain (**Table 2B**). The majority of the mean score of responders (>70%)

had good knowledge regarding the nature, transmission and treatment of HBV. A lower percentage of respondents (46.9%) knew about vaccination for HBV infection.

Table 2B: Summary of the nurses’ knowledge scores about HBV

Domain	N	Minimum %	Maximum %	Mean %
Nature	300	59.7	90.3	78.4
Transmission	300	26.5	84.6	70.7
Prevention	300	56	74	63.3
Treatment	300	31.7	36.6	70.3
Vaccination	300	34.1	62	46.9

Nurses’ knowledge means of HBV by demographic variables

Other demographic variables such as job title, years of experience, department and type of organization were listed in (Table 3). Most of the sample were legal nurses, 173 (57.7%). In terms of experience, most respondents reported having below five years of experience, 110(36.7%). There were nine different departments where the nurses worked; 11 (3.7%) low frequency reported working in the orthopedic section and the great majority of the respondents, 56 (18.7%), reported working in a surgical section. The majority of the respondents, 229 (76.3%), reported working in a governmental hospital. Based on the vaccination history of the respondents, the majority answered they were vaccinated 250 (83%), and they indicated that none of their family members had the disease before 267 (89.6%) or had been exposed or tinged with a needle contaminated with viral HBV 218 (73.9%) (Table 4). Of those who were asked if they had been tinged with a needle contaminated with HBV or others, 54.8% of nurses informed the officials and filled out a work injury form (data not shown).

Table 3: Sample distribution by job related variables

Job	Categories	Counts	Percentages %
Job of participant	Head of department [*]	29	9.7
	Procurator head of department ^{**}	22	7.3
	Legal nurse ^{***}	173	57.7
	Qualified nurse ^{****}	76	25.3
Years of experience	Below 5	110	36.7
	5-10	89	30.0
	Above 10	100	33.3
Work Department	Department of internal medicine	47	15.7
	Surgical Department	56	18.7
	Pediatric Department	41	13.7
	Obstetrics and Gynecology-Department	31	4.3
	Orthopedic Department	11	3.7
	Intensive Care Unit	20	6.7
	Cardiology Department	29	9.7
	Neonatal Department	12	4.0
	Preventive Medicine Department	23	7.7
	Other	47	15.7
Type of organization	Governmental hospital	229	76.3
	Primary health care center	55	18.3
	Emergency center and primary delivery	10	3.3
	Other	6	2.0

^{*}A nurse manager is an advanced nursing role that includes both managerial and clinical work.

^{**} Assists the head of the nursing staff in all his/her duties and monitors nursing performance.

^{***} The legal nurse monitors the condition and assesses their needs to provide the best health care and advice and perform routine procedures such as measuring blood pressure and giving injections.

^{****} Qualified nurse obtained sufficient experience in the field of nursing, which qualifies him/her to become a qualified legal nurse and works on studying the medical records of patients.

Table 4: History of nurses' data e about HBV infection

Variable	Categories	Count	Percentages %
Vaccination	Yes	250	83
	No	50	16.7
Does a member of your family have viral hepatitis B?	Yes	31	10.4
	No	267	89.6
Have you ever been exposed to NSI during your career?	Yes	77	26.1
	No	218	73.9

The perspective of nurses toward HBV

The respondents' perspectives about HBV are presented in (Table 5). Most of the respondents, 212 (70.7%), reported that the institution they worked at places a sticker or a warning tool to indicate that patients are infected with HBV. When they were asked about the ability to face a community and announce being infected with the virus, almost three-fourths of the sample claimed they would announce it. However, only 43% of the respondents said they have the courage to associate with someone who has the disease, and 60.5% said they measured the antibody titers after receiving the vaccination. Moreover, about 96.1% of the respondents answered that titers above 10 U/I were sufficient from the point of view of immunity, only 3.9% responded that titers below 10 U/I were not sufficient (Table 6).

Table 5: Perspectives and behavior towards viral hepatitis B

Indicators	Categories	Counts	Percentages %
The institution you work in place stickers or warning tools to indicate that this patient infected with the virus.	Yes	212	70.7
	No	88	29.3
Do you have the ability to face the community and report your viral hepatitis B infection?	Yes	213	71.7
	No	84	28.3

Is it possible to be married with a person with viral hepatitis B?	Yes	126	43.0
	No	167	57.0
Did you measure Anti HBs titer after receiving the vaccination?	Yes	181	60.5
	No	118	39.5

Table 6: Nurses’ knowledge about antibody titer sufficient for immunity

Antibody titer level	Percentages %
Below 10 U/I	3.9
10-99U/I	60.2
100-1000U/I	27.2
Above 1000U/I	8.7

DISCUSSION

HCWs in developing countries, especially nurses, are at serious risk for infection from blood-borne pathogens, particularly HBV (Liyew et al., 2020). This is due to the high prevalence of such pathogens in many poorer regions of the world. According to the WHO, among the 35 million HCWs worldwide, about 3 million receive percutaneous exposures to blood-borne pathogens each year. Two million of those to HBV may result in 70 000 HBV infections (Maida et al., 2020; McEwen & Farren, 2005). Studies have suggested that NSI poses the greatest threat to HCWs as HBV, HCV and HIV are transmitted through blood. According to WHO, NSI and sharp injuries cause about 40% of HBV infections among HCWs worldwide. The CDC estimates that about 236,000 to 384,000 hospital workers sustain NSI and sharp injuries, and nurses share 40%. Employers in governmental and public or private health-care facilities must establish exposure-control plans that include post exposure follow-up for their employees and comply with incident reporting requirements. This study assessed the level of knowledge and awareness of nurses about HBV in the governmental sector in Palestine/ southern West Bank.

In several previous studies, the HCWs' knowledge of HBV and HCV was relatively low (Mansour-Ghanaei et al., 2013; Mesfin & Kibret, 2013; Mursy & Mohamed, 2019, 2019; Pathoumthong et al., 2014). The mean knowledge score among the study participants was 62.6%, while the overall range was 27% to 85%, with a 100% response rate amongst our 300 respondents. The percentage of correct answers was below average in understanding prevention, treatment, and vaccination. Our study, in line with the previous study reported that medical students and HCWs knowledge of transmission and nature are good (Assar et al., 2022; Mesfin & Kibret, 2013)

Regarding the demographic characteristics of the respondents, there were no significant differences between male and female respondents in the overall scores. As for age, the lowest scores were observed among those above 50 years old. However, only six participants were in this group. Regarding educational level, 193 (64%) had a Bachelor's degree. In comparison, 66 (22%) had a diploma, and the rest had a post-graduate degree (Master's or Ph.D.), and only a small percentage of respondents who reported living in "other" living areas seemed to have lower scores. It was clear that nurses with a higher degree have good knowledge about HBV demonstrating the important role of education; this is in line with the previous studies (Assar et al., 2022; Shehab et al., 2002). Furthermore, most of the nurses with good knowledge about HBV were living in the cities, suggesting that nurses living in localities with high economic situations have good knowledge. There were no differences in the score regarding years of experience, job title, and type of organization. No significant differences in knowledge scores were observed based on vaccination history, family history of the disease, or having a history of being tinged with a needle contaminated with HBV or others.

Our results showed that most nurses reported their exposures or injuries to the nurse in charge (54.8%), while others did not report injuries due to less faith in the system that something would be done, and some did not know how to report it. These findings are in agreement with the previous results, where (52.5%)

reported the incident of percutaneous injury and the source patients were identified in 91.5% of the cases (Mbaisi et al., 2013).

In contrast to the study conducted by Phukan et al, where only 18% of nurses understood that PEP needs to be initiated immediately to be effective (Phukan, 2014), most nurses in this study have adequate knowledge about PEP to be taken as early as possible (between 24 h and 1 week) for effectiveness. It is worth noting that most nurses have never attended any refresher training on PEP after the basic training from school, which means that the hospitals' training programs on PEP are inadequate.

Most of the respondents in our study reported that the institutions place a sticker or warning sign to indicate a patient with HBV. On the other hand, when asked about the ability to face their community and announce being infected with the virus, about three-fourths of the sample answered they would announce it. However, only 43% of the respondents said they have the courage to associate with someone who has the disease. Furthermore, 60% of the respondents reported measuring titer levels after receiving all the vaccine doses. Regarding the knowledge about sufficient titer levels, 3.9% of the respondents answered that titer levels below 10 u/I were sufficient to establish immunity suggesting a good knowledge of HBV immunity.

At present, vaccination is the surest way to avoid acquiring HBV as an occupational disease. Studies have shown that about 90 to 95% of vaccinations of healthy people would result in the development of resistance against HBV (U.S. Public Health Service, 2001). In this study, 83% of nurses had received the HBV vaccine, and 60.5% had measured the titer after vaccination. Some have completed the full schedule of immunization, while others are yet to. The post vaccination titers of those who had received all three doses have not been verified by this study. Nurses intimated that the most effective preventive measure against occupational HBV is immunization.

The large sample size of our results increases the statistical power. However, some limitations should be considered. The Cronbach's alpha value is low because only a total of 300 eligible nurses participated in the study, although all

According to the results of our questionnaire, we strongly recommend that all students in the health professions should be vaccinated prior to their entry into professional practices, as well as to keep wearing gloves as long as they work/train at the health professional institutions. In addition, the students should inform about any NSI they may experience by mistake. We also need to improve their knowledge and awareness about hepatitis B virus in specific and other blood-borne viral infection in general by developing continuous training programs. Health institutions need to appoint PEP officials who should be equipped to function adequately. Employees should be orientated to the reporting systems of the facilities. Not reporting an exposure incident means that such victims are unlikely to receive PEP and cannot be duly compensated if they develop an infection.

CONCLUSIONS

The results of this study indicate a low level of knowledge among HCWs about HBV, especially in prevention, treatment and vaccination, than the nature and transmission. The more educated workers reported better knowledge toward HBV. Despite the majority of HCWs having NSI education, more than 54% of them reported a history of NSI. Nurses should be familiarized with the principles of post exposure management as part of job orientation and ongoing job training. There is a need for a national policy on occupational safety and health, including HBV vaccination of HCWs as a requirement for appointment into the health service.

RECOMMENDATIONS

Additional service training about universal and standard precautions and the improvement of work conditions altogether can decrease the potential risks for the health professionals. Training and education in injection safety, prevention of

sharp injuries and universal precautions must be incorporated as part of ongoing job training and refresher programs.

Conduct regular tests for nurses at risk for HBV infection, and all those found to be susceptible should receive the vaccine. Such testing is likely to detect chronically infected HCWs and students. The distribution of brochures, including comprehensive information and guidelines about HBV aspects, is greatly appreciated to increase awareness among nurses and other professional health workers/ trainers.

The presence of highly qualified health care centers that ensure that blood tests are performed at the highest levels of quality and hygiene will be of importance to reduce the HBV infection level. We also recommend health institutions to appoint a preventive officer after exposure for health care worker.

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