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Original Article

Hepatitis B Surface Antigen-Prevalence, Knowledge, Attitude and Vaccination Status among Healthcare Workers in a Tertiary Health Facility

Obu DC[1*], Asiegbu UV[1], Ezeonu CT[1], Una AFI [2], Arua-Iduma CE[1], Edafioghor LO[3] .

[1]Department of Paediatrics, [2]Department of Community Medicine and [3]Department of Nutrition and Dietetics, Alex-Ekwueme Federal University Teaching Hospital Abakaliki, Ebonyi State

***Correspondence**: Obu Dorathy Chinwe. Department of Paediatrics, Alex Ekwueme Federal University Teaching Hospital Abakaliki, Ebonyi State*
***Phone:** +2348037511272. **Email:** obudora@yahoo.com*

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ABSTRACT

Healthcare workers (HCWs) are at increased risk of acquiring hepatitis virus B infection through occupational exposure. Having adequate knowledge and proper attitudes toward hepatitis B virus infection are crucial for its prevention. This study assessed the knowledge, attitude, and hepatitis B virus vaccination status of health care workers. A descriptive cross-sectional study among 120 healthcare workers that attended the World Hepatitis B-Day Celebration in June 2018 was undertaken. Data were obtained with a self-administered questionnaire on socio-demographic characteristics, knowledge, attitude towards HBV infection, and practice of hepatitis B vaccination. Commercial enzyme-linked immunosorbent assay kits were used to determine the prevalence of hepatitis B surface antigen. Data were analyzed using computer software SPSS version 22. The prevalence of HBsAg among the subjects was 4.5%. Only 53(47.7%) of the respondents had good knowledge of hepatitis B virus infection. The majority of respondents 91(82.0%) demonstrated a positive attitude towards hepatitis B virus infection and vaccination. Over 30% of respondents were aware of their hepatitis B virus infection status, and 29(26.1%) of them had received the hepatitis B virus vaccine. The major reason for the poor uptake of hepatitis B virus vaccination was not knowing where to get the vaccine in 40(57.1%) of them. Good knowledge of HBV infection had a statistically significant association with the age of respondents and their years of experience ($p<0.05$). It is recommended that a healthcare worker should be provided with more education and information on hepatitis B virus infection and vaccination. Also, hepatitis B screening and vaccination should be made mandatory as part of the pre-employment exercise of all healthcare workers with follow up screening before any upgrade or promotional examination exercise.

Keywords: Attitude, Healthcare workers, Hepatitis B, Knowledge, Vaccination status

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INTRODUCTION

Hepatitis B virus (HBV) infection is an important public health problem that affects about 10% of the world population.[1] WHO estimates that in 2015, 257 million people were living with chronic hepatitis B infection and hepatitis B virus infection resulted in an estimated 887 000 deaths, mostly from liver cirrhosis and hepatocellular carcinoma.[2] There is a high prevalence of HBV infection among blacks.[1]

Healthcare workers (HCWs) are at increased risk of acquiring HBV infection due to occupational exposure.[1,3–5] In Nigeria, healthcare workers are particularly at increased risk of contracting HBV infection in their workplace due to the holoendemic nature of the disease in the country.[6] They acquire this infection through needle stick injuries, using inadequately sterilized medical equipment or contact with non-intact skin and accidental exposure to infected blood and other body fluids.[7,8] It is estimated that about a million HCWs had cut and puncture injuries per year.[9] Before the availability of the hepatitis B vaccine, the infection rate from a needle stick ranged from 6% to 30%.[10]

Preventive measures such as adherence to standard precautions, proper sterilization of medical equipment, proper wastes management system, and vaccination against occupational exposure of HCWs to blood-borne pathogens have been well documented.[11] The application of standard precautions as a preventive measure against HBV infection in many health facilities in Nigeria is limited by inadequate knowledge and poor attitude, unavailability of necessary personal protective equipment (PPE) such as gloves and proper needle-disposal facilities and other organizational problems.[12] Findings from studies conducted in health facilities across Nigeria show a high rate of injury from sharps and accidental exposure to potentially infected blood and body fluids, while the use of PPE was found to be low due to unavailability, inadequate or irregular supply of materials and equipment needed for protective and hygienic practices in most of the health facilities.[13,14]

Vaccines have been developed for the prevention of HBV infection, but this is poorly utilized among healthcare workers in different geographical locations.[15] This is observed more among HCWs in developed countries. Complete vaccination against hepatitis B virus is achieved by administration of a three-dose regimen, with the second and third doses being given one and six months after the initial dose.[16] Having enough knowledge and proper attitudes toward the infection is crucial in preventing its occupational exposures.

The dearth of literature on knowledge, attitude, and hepatitis B virus vaccination status of healthcare workers especially in southeast Nigeria constitutes a major limitation to the prevention and control of the disease among this high-risk group. This study was therefore conducted to bridge this gap in knowledge in our locality, Abakaliki, southeast Nigeria.

MATERIALS & METHODS

Study location

The study was conducted at Alex Ekwueme Federal University Teaching Hospital Abakaliki, a tertiary health facility located in Abakaliki, the capital of Ebonyi State, Nigeria. It is a merger of the former Federal Medical Centre, Abakaliki, and Ebonyi State University Teaching Hospital, Abakaliki which took place on the 1st of January 2012. It has a total bed space of 502. The hospital takes care of the health needs of the Ebonyi people and other persons from neighboring states and provides preventive, curative, and rehabilitative services in addition to laboratory services apart from being a research centre.

Study design. This was a descriptive cross-sectional study among health care workers at the Alex Ekwueme Federal University Teaching Hospital Abakaliki who attended the World Hepatitis B-Day Celebration in 2018 organized by the Institute of Child Health of the same hospital. The study population was all categories of staff

of the institution which included doctors, nurses, laboratory staff, health attendants, pharmacists, and other administrative staff.

A convenience sampling method was used to enroll all health care workers that participated in World hepatitis day activities. A pre-tested, semi-structured, self-administered questionnaire which was adapted from other similar published studies[5,17,18] was used to collect information on socio-demographic characteristics, composite information for the computation of knowledge of HBV infection and attitude towards HBV as well as the practice of hepatitis B vaccinations.

Study Instrument/ Scoring of outcome variables

Knowledge of HBV infection among study participants was assessed using 14-items questions some of which had multiple responses cumulating in 21 answers. Each correct response was allotted one point while a wrong or none response was allotted zero points. A composite score was computed thereafter using the 14 questions. From the composite score, the knowledge base was categorized into two – good and poor knowledge. Cut off mark was half of the total score (10.5). Those that scored <10.5 were considered to have poor knowledge while those that scored ≥10.5 were considered to have good knowledge. The proportions of those with good or poor knowledge were converted to percentages.

The attitude of study participants towards HBV infection was assessed using a 9-items questionnaire. Each positive response was allotted one point while negative or no response was allotted zero points. A composite score was computed thereafter. From the composite score, their attitude was categorized into two – positive and negative attitudes. Cut off the mark was half of the total score (4.5). Those that scored <4.5 were considered to have a negative attitude while those that scored ≥4.5 were considered to have a positive attitude. The proportions of those with positive or negative attitudes were converted percentages.

The practice of HBV vaccination was obtained using 7-items questions, some with multiple responses. Scores in percentages (%) for all the respondents were also reported.

Laboratory techniques using commercial enzyme-linked immunosorbent assay (ELIZA) kits were used to determine the prevalence of hepatitis B surface antigen among the respondents. Sample with a cut-off index greater than or equal to 1.0 was considered positive for HBsAg.

Data analysis

Data were analyzed using SPSS version 22 computer statistical software package. Descriptive statistics were conducted and reported in frequencies and tables. Bivariate analysis (Chi-square test of statistical association) was done to determine the statistical relationship between the outcome variables (knowledge of and attitude towards HBV infection) and other independent variables. $p<0.05$ was considered statistically significant

RESULTS

Socio-demographic characteristics

A total of 120 questionnaires were administered, with 111 filled giving a response rate of 92.5%. The respondents were predominantly females, 86 (77.5%). The majority of them, 52 (51.0%) were in their third decades of life. Most of the respondents were married, 92 (82.2%), and were Christians, 108 (97.3%). Their mean work experience was 10.20±0.88, ranging between 1-35 years of service and 38.7% had worked for less than 6 years (Table 1).

Table 1: Socio-demographic profile of respondents

Variables	Frequency (%)
Age group in years (N=102)	
<30	13(12.7)
30-39	52(51.0)
40-49	21(20.6)
≥50	16(15.7)
Gender	
Female	86(77.5)
Male	25(22.5)
Total	111 (100.0)
Marital Status	
Ever Married	92(82.2)
Never Married	19(17.8)
Total	111 (100.0)
Religion	
Christianity	108(97.3)
Islam	3(2.7)
Total	111 (100.0)
Educational qualification	
SSCE	17(15.3)
Diploma/NCE	19(17.1)
Degree	75(67.6)
Total	111 (100.0)
Work experience (in years n=97)	
<6	43(38.7)
6-10	22(19.8)
11-15	11(9.9)
16-20	11(9.9)
>20	10(9)

Respondents' Knowledge and attitude towards Hepatitis B virus infection

A total of 53(47.7%) of the respondents had good knowledge of hepatitis B virus infection while 91(82.0%) demonstrated a positive attitude towards hepatitis B virus infection and vaccination.

Table 2: Respondents' knowledge and attitude towards Hepatitis B virus infection

Variables	Frequency (%)
Grading of knowledge	
Poor	53 (47.7%)
Good	58 (52.3%)
Grading of attitude	
Negative	20 (18.0%)
Positive	91 (82.0%)

Respondents' practice of hepatitis B virus vaccination and HBsAg status

Majority of the respondents 102(91.1%) considered hepatitis B virus vaccination important. Few of the subjects 34(30.6%) were aware of their hepatitis B virus infection status. Only 29(26.1%) of them had received the hepatitis B virus vaccine. Out of respondents that received the hepatitis B vaccine, 26(89.7%) of them completed the recommended 3 doses of vaccines. Only 3(2.7%) of the respondents received post-exposure prophylaxis for hepatitis B virus infection exposure. The major reason for the lack of hepatitis B virus vaccination was not knowing where to get the vaccine in 40(57.1%) of respondents while 1(1.4%) of them were too busy at work, therefore, could not access the vaccine (Table 3). The prevalence of HBsAg was found to be 4.5% (figure 1).

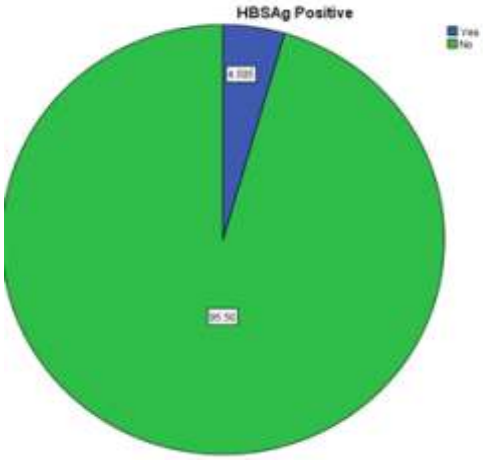

Figure 1: Prevalence of HBsAg among respondents

Table 3: Evaluation of participants' practice of hepatitis B virus vaccination and HBsAg status

Variables	Frequency (%)
Is vaccination with HBV necessary (n=110)	
Yes	102 (91.9)
No	8 (7.2)
Awareness of HBV status (n=111)	
Yes	34 (30.6)
No	77 (69.4)
Vaccination status (n=111)	
Vaccinated	29 (26.1)
Not vaccinated	82 (73.9)
Received recommended 3 doses (n=29)	
Yes	26 (89.7)
No	3 (10.3)
Received PEP for HBV exposure (n=111)	
Yes	3 (2.7)
No	108 (95.5)
Reasons for lack of vaccination (n=74)	
Not at risk	5 (7.1)
Vaccines not being recommended	12 (17.1)
Fear of side effects of vaccines	10 (14.3)
Don't know where to get a vaccine	40 (57.1)
Not routinely offered by the hospital	2 (2.9)
Too busy at work	1 (1.4)

Analysis of association between the sociodemographic profiles of respondents and knowledge of HBV

A significant statistical association existed between good knowledge of hepatitis B virus infection and the age of respondents as well as their years of experience at work ($p<0.05$). Also a significant association ($p=0.001$) was seen between knowledge of HBV infection and the profession/department of the respondents. The staff of the administration department had the greatest proportion of respondents with poor knowledge compared to other professions. However, no association was found between good knowledge of hepatitis B virus and other studied socio-demographic characteristics (Table 4).

Table 4 : Analysis of association between the socio-demographic profiles of respondents and knowledge of HBV

Variables		Knowledge n(%)		χ^2 (P)
		Poor Knowledge	Good Knowledge	
Age				
	<30 years	8(61.5)	5(38.5)	*10.81(0.01)**
	30-39 years	29(55.8)	23(44.2)	
	40-49 years	12(57.1)	9(42.9)	
	≥50 years	2(12.5)	14(87.5)	
Gender				
	Female	44(51.2)	42(48.8)	*0.18(0.82)*
	Male	14(56.0)	11(44.0)	
Educational qualification				
	SSCE	8(47.1)	9(52.9)	*2.34(0.31)*
	Diploma/NCE	13(68.4)	6(31.6)	
	Degree	37(49.3)	35(50.7)	
Religion				
	Christian	56(51.9)	52(48.1)	*FT(1.00)*
	Islam	2(66.7)	1(33.3)	
Marital status				
	Ever married	48(52.2)	44(47.8)	*0.001(0.59)*
	Never married	10(52.6)	9(47.4)	
Work experience (in years)				
	< 6 years	29(67.4)	14(32.6)	*14.17(0.005)**
	6-10 years	8(36.4)	14(63.6)	
	11-15 years	6(54.5)	5(45.5)	
	16-20	4(36.4)	7(63.6)	
	>20 years	1(10.0)	9(90.0)	
Occupation				
	Doctors	2(13.3)	13(86.7)	*17.5(0.001)**
	Nurses	16(42.1)	22(57.9)	
	Pharmacists	1(50.0)	1(50.0)	
	Administrative staff	39(69.5)	17(30.4)	

** significant*

A review of association between the socio-demographic profile of the respondents and their Attitudes towards HBV infection

There was no significant statistical association between studied socio-demographic characteristics and positive attitude (*p>0.05*). Similarly, there was a strong positive correlation (*p=0.007*) between attitude towards HBV infection and profession of the respondents with the staff of administration departments showing a more negative attitude (Table 5).

Table 5: Association between the socio-demographic profile of the respondents and their Attitudes towards HBV infection

Variables	Attitude n (%)		
	Negative Attitude	Positive Attitude	χ^2 (p)
Age (years)			
<30	2(15.4)	11(84.6)	4.56(0.21)
30-39	12(23.1)	40(75.9)	
40-49	4(19.0)	17(81.0)	
≥50	0(0.0)	16(100)	
Gender			
Male	6(24.0)	19(76.0)	0.78(0.56)
Female	14(16.3)	72(83.7)	
Educational qualification			0.68(0.76)
SSCE	4(23.5)	13(76.5)	
Diploma/NCE	4(21.1)	15(78.9)	
Degree	12(16.0)	63(84.0)	
Religion			
Christian	19(17.6)	89(82.4)	FT(0.45)
Islam	1(33.3)	2(66.7)	
Marital status			
Ever status	18(19.6)	74(80.4)	0.001(0.59)
Never married	2(10.5)	17(89.5)	
Work experience (years)			
<6	10(23.3)	33(76.7)	5.64(0.23)
6-10	2(9.1)	20(90.9)	
11-15	3(27.3)	8(72.7)	
16-20	1(9.1)	10(90.9)	
>20	0(0.0)	10(100.0)	
Occupation			
Doctors	0(0.0)	15(100.0)	14.1(0.007)*
Nurses	3(7.9)	35(92.1)	
Pharmacists	0(0.0)	2(100.0)	
Administrative staff	17(30.4)	39(69.9)	

** significant*

DISCUSSION

In this study, the respondents showed a general poor knowledge of hepatitis B infection which may be because the non-medical staff were involved in addition to doctors and nurses. Administrative staff tends to receive little or no information concerning HBV infection compared to doctors and nurses and might have contributed to poor knowledge observed in this study. This finding was comparable to the reports from a study by Abiola *et al.*[17] in Lagos and Abeje *et al.*[1] in Ethiopia but lower than that observed from other studies performed in other parts of

Nigeria and beyond.[5,7,19,20] This calls for the provision of more awareness and education to all healthcare workers in hospitals, especially non-clinical staff.

Older respondents with more years of work experience had better knowledge than younger respondents with fewer years of work experience. This could be because such respondents may have received frequent health talks on HBV infection during their work period. This was similar to findings from a study conducted among healthcare workers in a secondary health facility in Lagos.[17]

Despite having poor knowledge of HBV infection, the majority of them still showed a positive attitude towards HBV infection which may help reduce the stigma towards hepatitis B positive patients and increase acceptance of the HBV vaccine. This agreed with reports from other studies in Nigeria, Ethiopia, and India.[17,19,21] On the contrary, this finding was higher than an observation made in a study done in Sudan.[20]

A greater number of respondents knew that HBV vaccination was important. This might be due to an awareness campaign on immunization recently embarked upon by the institute of child health of the institution. This finding is higher than the report by Akibu *et al*.[21] The Majority of the respondents agreed that hepatitis B vaccination is important for the prevention of hepatitis B infection. This was similar to that observed by other researchers.[5,22,23]

The acceptance of the hepatitis B vaccine is strongly related to social influence from relatives, role models and stakeholders in the society such as physicians, supervisors, friends, and spouse and knowledge of the disease and vaccine.[24] However, few of the respondents were aware of their hepatitis B status. Other researchers also made a similar observation.[3,21,25] Hussain *et al*.[26] reported that the majority of the subjects in their study were aware of the hepatitis B status while Suckling *et al*.[18] reported that none of the participants knew their hepatitis B status. Therefore increasing their awareness status may help in the behavioral modification in terms of reducing the prevalence of the infection and increasing acceptance of vaccination. There is a need to remind healthcare workers of the importance of knowing their status as this may further increase the uptake of the vaccine.

Despite considering hepatitis B vaccination important in preventing HBV infection and Nigeria being holoendemic for hepatitis B infection, few of the respondents received the hepatitis B vaccine. This could be attributable to inadequate knowledge about hepatitis B infection, nonchalance attitude on the part of the healthcare workers, forgetfulness, and not knowing where to get the vaccine. This calls for the regular provision of information and support to them. This finding was comparable to reports of Ibekwe and Ibeziako[25] in Enugu and Awosan *et al*.[5] in Lagos. Several studies[17,20,21,27] reported higher vaccination uptake while Abeje *et al*.[1] and Suckling *et al*.[18] reported even lower vaccination rates. Differences in vaccine availability and accessibility across countries, the relatively late addition of hepatitis B vaccine into national immunization program; and certain variability between the socio-demographic characteristics of the respondents may explain the varying observations made by these researchers.

Interestingly, a greater number of those that received vaccination for the hepatitis B virus completed the three recommended doses. However, more information needs to be provided to all HCW to address nonchalance attitude, carelessness, forgetfulness, and misconceptions of having full protection with less than three doses of the vaccine. This will further encourage the completion of the three required doses of the hepatitis B vaccine among HCWs. This report was higher than the observation from other studies conducted in Nigeria and beyond.[1,4,7,21] Ibekwe and Ibeziako[25] in an earlier study conducted in a tertiary hospital in Enugu had reported that only 3% of the subjects received three doses of the vaccine. The improvement in completion of three doses of vaccine observed in this study showed that with regular vaccine campaign and support of HCWs, that most of them would comply with the recommended three doses of the vaccine.

Very few health care workers who were exposed to the hepatitis B virus received post-exposure prophylaxis.

Similarly, other researchers had noted that none of the exposed HCWs received post-exposure prophylaxis.[8,25] This practice further highlights the respondents' knowledge of transmission of Hepatitis B virus infection and the importance of its prevention and buttresses the need to provide continual education on this disease entity.

Not knowing where to get the vaccine, vaccine not being recommended and fear of side effects of the vaccine were the common reasons stated by the respondents for not receiving the hepatitis B virus vaccine in this study. Reports show that campaigns regarding vaccination improved vaccine coverage.[28] This observation will serve as a pointer\ for stakeholders in the hospital to improve the vaccination practice of the health care workers. Similar to our findings, Ibekwe *et al.* in Enugu[25] and Almustafa *et al.* in Sudan[20] reported a lack of opportunity as the commonest reason for lack of vaccination among HCWs in their studies while Abeje *et al.*[1] reported vaccine unavailability and cost of a vaccine as their common reasons. Akibu *et al.*[21] reported high cost of vaccine, vaccine unavailability through government channel, and not giving concern about the disease as the common reasons. These varying reasons may be due to different geographical locations, the number of available functional health care facilities, living conditions, and different enlightenment programs available in these countries.

The prevalence of hepatitis B virus in this study was 4.5%. Previous studies conducted in Nigeria showed a higher prevalence of HBsAg.[25,29] Other researchers have reported an even lower prevalence of HBsAg compared to finding from the present study.[17,26,30] Constant training of health workers on infection prevention control practice and improved adherence to universal precaution when providing care to patients may have contributed to this reduction.

CONCLUSION

Poor knowledge of hepatitis B virus infection exists among health workers in our setting despite a positive attitude towards HBV vaccination. There was a low prevalence of HBsAg as well as low uptake of HBV vaccine and post-exposure prophylaxis practice to HBV infection. Not knowing where to get the vaccine, vaccine not being recommended and fear of vaccine side effects hampered hepatitis B vaccination practice in this study.

Recommendation

It is recommended that health care workers should be enlightened more on hepatitis B virus infection with an emphasis on its prevention through the conduction of workshops, symposiums, and training. Information about where to get the vaccines should be frequently communicated to them through radio jingles, posters, notice boards, and during their various routine academic activities or departmental meetings. Hepatitis B virus screening and vaccination should be made mandatory as part of the pre-employment/promotion exercises of all health care workers.

Limitation(s)

The study was limited by a small sample size. A robust study involving a larger sample size is thereby advised

Conflict of Interest

None

Funding

None

REFERENCES

1. Abeje G, Azage M. Hepatitis B vaccine knowledge and vaccination status among health care workers of Bahir Dar City Administration, Northwest Ethiopia? a cross-sectional study. BMC Infect Dis. 2015;15(30) doi.org/10.1186/s12879-015-0756-8.
2. World Health Organization. Hepatitis B Fact Sheets. July 2019 [Internet]. [cited 2019 Nov 12]. Available from: https://www.who.int/news-

room/fact-sheets/detail/hepatitis-b.
3. Adekanle O, Ndububa DA, Olowookere SA, Ijarotimi O, Ijadunola KT. Knowledge of hepatitis b virus infection, immunization with hepatitis b vaccine, risk perception, and challenges to control hepatitis among hospital workers in a Nigerian tertiary. Hepat Res Treat. 2015;(3) doi.org/10.1155/2015/439867.
4. Hamissi J, Tabari ZA, Najafi K, Hamissi H. Knowledge, Attitudes and Practice of Hepatitis B vaccination among Iranian dentists. Int J Collab Res Intern Med Public Heal. 2014;6(7):199–206.
5. Awosan KJ, Hassan M, Nasir S, Tunau K, Burodo A, Yakubu A, et al. Knowledge, risk perception and hepatitis B vaccination status of healthcare workers in Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria. J. Public Heal Epidemiol. 2016;8(4):53–59.
6. Olokoba A, Aderibigbe S, Kayode O. A community survey of practices related to risk factors for liver diseases among adults in Ilorin metropolis. Am J Sci Ind Res. 2010;1(2):118–121.
7. Kesieme EB, Uwakwe K, Irekpita E, Dongo A, Bwala KJ, Alegbeleye BJ. Knowledge of Hepatitis B Vaccine among Operating Room Personnel in Nigeria and Their Vaccination Status. Hepat Res Treat. 201; 2011:157089. doi.org/10.1155/2011/157089.
8. Hussain, Shagufta & Asher Patrick, Niveen & Shams R. Hepatitis B and C Prevalence and Prevention Awareness among Health Care Workers in a Tertiary Care Hospital. Int J Pathol. 2010;8(1):16–21.
9. Trinkoff AM, Le R, Geiger-Brown J, Lipscomb J. Work schedule, needle use, and needle stick injuries among registered nurses. Infect Control Hosp Epidemiol. 2007;28(2):156–164.
10. Sharma R, Rasania S, Verma A, Singh S. Study of Prevalence and Response to Needle Stick Injuries among Health Care Workers in a Tertiary Care Hospital in Delhi, India. Indian J Community Med. 2011;35(1):74–77.
11. Holmberg SD, Suryaprasad A, Ward JW. Updated CDC Recommendations for the Management of Hepatitis B Virus-Infected Health-Care Providers and Students. Morb Mortal Wkly Rep [Internet]. 2012 Jul 6 [cited 2020 Nov 9];61(3).Available from: https://www.cdc.gov/mmwr/pdf/rr/rr6. Accessed 29 Oct 2020.
12. Okechukwu EF, Modteshi C. Knowledge and practice of standard precautions in public health facilities in Abuja, Nigeria. Int J Infect Control. 2012;8(3) doi.org/10.3396/ijic.v8i3.10003.
13. Adesunkanmi AK, Badmus TA, Ogunlusi JOD. Accidental injuries and cutaneous contaminations during general surgical operations in a Nigerian teaching hospital. East Afr Med J. 2003;80(5):227–234.
14. Ansa VO, Udoma MS, Umoh MS, Anah MU. Occupational risk of infection by Human immunodeficiency and Hepatitis B viruses among health workers in South-Eastern Nigeria. East Afr Med J. 2002;79(5):254–256.
15. Omotowo IB, Meka IA, Ijoma UN, Okoli VE, Obienu O, Nwagha T, et al. Uptake of hepatitis B vaccination and its determinants among health care workers in a tertiary health facility in Enugu, South-East, Nigeria. BMC Infect Dis. 2018;18(288):https://doi.org/10.1186/s12879-018-3191-9.
16. World Health Organization. Hepatitis B. 2020 Jul 27. [cited 2020 Nov 9] Available from: https://www.who.int/ith/vaccines/hepatitisB/en/.
17. Abiola AO, Agunbiade AB, Badmos KB, Lesi AO, Lawal AO, Alli QO. Prevalence of HBsAg, Knowledge and Vaccination practice against Viral hepatitis B infection among doctors and nurses in a secondary health care facility in Lagos State, South-Western Nigeria. Pan Afr Med J. 2016; 23:160. Available from:

https://pubmed.ncbi.nlm.nih.gov/27303576/.
18. Suckling RM, Taegtmeyer M, Nguku PM, Al-Abri SS, Kibaru J, Chakaya JM, et al. Susceptibility of healthcare workers in Kenya to hepatitis B: new strategies for facilitating vaccination uptake. J Hosp Infect. 2006;64(3):271–277.
19. Siraj F, Fareed P, Mahajan N. Assessment of knowledge attitude and practice towards hepatitis B among health care workers in a tertiary care hospital. Int J Reprod Contraception, Obstet Gynecol. 2016;5(1):58–61.
20. Almustafa SMM, Almegdad SMA, Tariq AAA, Mutaz THAS, Awab MMAH, Moneeb HMAF, et al. Knowledge, Attitude and Practice of Hepatitis (B) among Healthcare Workers in Relation to their Vaccination Status in Khartoum, Sudan, 2015? A Cross-sectional Study. Sudan J Med Sci. 2018;13(1):22–32.
21. Akibu M, Nurgi S, Tadese M, Tsega WD. Attitude and Vaccination Status of Healthcare Workers against Hepatitis B Infection in a Teaching Hospital, Ethiopia. *Scientifica*. 2018;2018:6705305. doi.org/10.1155/2018/6705305.
22. Habib F, Khan DK, Shan-e-Abbas, Bhatti F, Zafar A. Knowledge and beliefs among health care workers regarding hepatitis B infection and needle stick injuries at a tertiary care hospital, karachi Knowledge and Beliefs Among Health Care Workers Regarding Hepatitis B Infection and Needle Stick Injuries at a. J Coll Physicians Surg Pakistan. 2011;21(5):317–319.
23. Getnet A, Adugna B, Amare S, Getachew N, Biset Ayalew M. Knowledge and attitude of health care professionals regarding hepatitis B virus infection and its vaccination, University of Gondar Hospital, Ethiopia. Hepatic Med Evid Res. 2016; 8(6312):135–142.
24. Doebbeling BN, Ferguson KJ KF. Predictors of hepatitis B vaccine acceptance in health care workers. Med Care. 1996;34(1):58–72.
25. Ibekwe RC, Ibeziako N. Hepatitis B vaccination Vaccination Status among Health Workers in Enugu, Nigeria. Niger J Clin Pract. 2006;9(1):7–10.
26. Hussain S, Patrick N, Shams R. Hepatitis B and C prevalence and prevention awareness among health care workers in a tertiary care hospital. IJP. 2010; 8(1): 16-21.
27. Dannetun E, Tegnell A, Torner A, Giesecke J. Coverage of hepatitis B vaccination in Swedish healthcare workers. J Heal Popul Nutr. 2006;63(2):201–204.
28. Dini G, Toletone A, Barberis I, Debarbieri N, Massa E, Paganino C, et al. Persistence of protective anti-HBs antibody levels and anamnestic response to HBV booster vaccination: A cross-sectional study among healthcare students 20 years following the universal immunization campaign in Italy. Hum Vaccines Immunother. 2017;13(2):440–444.
29. Belo AC. Prevalence of hepatitis b virus markers in surgeons in Lagos, Nigeria. East Afr Med J. 2000;77(5):283–285.
30. Attaullah S, Khan S, Ayaz NS, Khan SN, Ali I, Hoti N, et al. Prevalence of HBV and HBV vaccination coverage in health care workers of tertiary hospitals of Peshawar, Pakistan. Virol J. 2011;8(275) doi.org/10.1186/1743-422X-8-275.