



Prevalence of Anti-HBcore Total and HBsAg among Health Care Workers in Public Hospitals, White Nile State, Sudan; 2013

Mawahib Ahmed Elawad Abu Elgasim^{1*}, Taha Ahmed Elmukashfi²,
Asma Abdelaal Abdalla², Siham Ahmed Balla², Zeinab Swareldahab²
and Abdelgadir Ali Bashir¹

¹Khartoum State Ministry of Health, Khartoum State, Sudan.

²Department of Community Medicine, Faculty of Medicine, University of Khartoum, Sudan.

Authors' contributions

This work was carried out in collaboration between all authors. Authors MAEAE and TAE designed the study. Authors AAA, SAB and ZS revised the tools for data collection. Authors MAEAE and AAA maintained the quality of data collection in the field work. Author TAE drafted the first draft of the manuscript. Authors SAB and AAB revised the manuscript for grammar and spelling. All authors read and approved the final manuscript.

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ABSTRACT

Background: HBV infection is an occupational disease where health care workers (HCW) are at high risk.

Aim: To measure the sero-prevalence of Anti-HBcore Total and HBsAg among HCWs in Public Hospitals, White Nile State, Sudan; 2013.

Methods: A cross-sectional, hospital-based study was conducted among health care workers in

*Corresponding author: E-mail: mawahibsara@yahoo.co.uk;

Public Hospitals in White Nile State, Sudan; 2013. A sample of 385 HCWs was selected using two stage cluster sampling. A pre-tested structured questionnaire was used. The HCWs signed the informed consent to fill the questionnaire and to draw 5 ml venous blood sample for HBV tests. Blood samples were investigated for Anti-HBcore Total. Positive blood specimens for Anti-HBcore Total were further investigated for HBsAg. Data was processed using statistical package for social sciences (SPSS), version 16. Descriptive statistics and non-parametric Z test for single proportion was used at 95% CL.

Results: Out of 385 HCWs, 230 (60%) were positive for Anti-HBcore Total. Out of 230 HCWs, 62 (27%) were positive for HBsAg. Prevalence for Anti-HBcore Total and HBsAg is significantly different from the expected values, $P=0.001$

Conclusion: Sero-prevalence of Anti-HBcore Total and HBsAg is high among HCWs in Public Hospitals in White Nile State, Sudan.

Keywords: Anti-HBcore total; HBsAg; HCWs; public hospitals; White Nile State; Sudan.

1. INTRODUCTION

HBV infection is defined as the presence of Anti-HBcore in the serum of an individual whether he/she is HBsAg negative or positive. So, he/she may or may not be shedding virus to others. Carrier state: It is the presence of HBsAg in the serum of an individual, whether he/she has symptoms and signs of HBV infection or not. Thus, he/she is shedding virus to others [1].

Hepatitis B virus (HBV) is a major cause of cirrhosis of the liver and hepatocellular carcinoma (HCC). About half of hepatocellular carcinoma cases and one third of liver cirrhosis are due to chronic HBV infection. Yearly, about 500000 – 700000 deaths were estimated to be due to HBV infection. Across the world, two billion individuals were infected with HBV; among whom 360 million were chronically infected [2,3].

There is a variation in the prevalence of HBV infection worldwide; regarding different areas and population in the same area. The world is divided into: (i) Hyper-endemic area with a prevalence of 70% - 90% of Anti-HBcore and 8% of HBsAg; where 45% of the population lives (South-Eastern Asia and sub-Saharan Africa). (ii) Moderate endemic area with a prevalence of 2% – 7% of HBsAg (Southern countries of Central and Eastern Europe, Mediterranean basin, the Amazon's sink, Middle East, and Northern Africa) (iii) Low endemic area with a prevalence less than 2% of HBsAg (North-Western Europe and North America) [4,5].

A study was carried in Tamil Nadu, Southern State of India, it showed HBV carrier rate of 5.7% (CI 4.6- 6.8) among 1981 respondents [6].

Sudan belongs to Sub-Saharan countries with high HBV sero-prevalence. Among the general population; infection rate (positive Anti-HBcore) varied from 47% to 78%, while carrier rate (positive HBsAg) prevalence ranged from 6.8% in Central Sudan to 26% in Southern Sudan [7,8].

The spectrum of clinical manifestations of HBV infection varies in both acute and chronic status of the disease. During the acute phase, manifestations range from subclinical or anicteric hepatitis to icteric hepatitis and, in some cases, fulminant hepatitis. During the chronic phase, manifestations range from an asymptomatic carrier state to chronic hepatitis, cirrhosis, and hepatocellular carcinoma. Extra hepatic manifestations can occur with both acute and chronic infection [9].

HCWs are more prone to acquire blood-borne diseases as occupational hazard and the degree of their exposure determines the rate of HBV infection [10,4].

A sero-epidemiologic survey of HBV markers among health care workers (HCWs) in Public Teaching Hospitals in Khartoum State, Sudan; showed that HBVs infection and carrier rates were 57% (CI_{95%}: 53%–60%) and 6.0% (CI_{95%}: 4.0%–8.0%) respectively, $P < 0.05$ [11].

Aim of the study: To measure the prevalence of Anti-HBcore (infection rate) and HBsAg (carrier rate) among health care workers (HCWs) in Public Hospitals in White Nile State, Sudan; 2013.

2. METHODS

2.1 Study Design

This is a cross-sectional, hospital- based study.

2.2 Study Area

White Nile State lies south to Khartoum City and it is traversed by White Nile River and composed of eight localities with seventeen public hospitals.

2.3 Study Population

HCWs that working in the Public Hospitals in White Nile State for more than 45 days. The total number was 1808 health care workers.

2.4 Sample Size and Selection Procedure

The overall sample size was determined by the formula:

$$n = \frac{Z^2 PQ}{d^2}$$

n = the desired sample size.

z = confidence coefficient = 1.96

p = prevalence rate. p = 50% or 0.5

q = 1-p = 1-0.5=0.5, d = the degree of accuracy, was set at 0, 05

Accordingly

$$n = \frac{1.96 \times 1.96 \times 0.5 \times 0.5}{0.05 \times 0.05} = 384.6 = 385$$

A cluster sampling was used. The hospitals were divided into groups according to the number of specialties in them. It was selected proportionally; every hospital was given a proportion of the sample HCWs according to the total number of health workers. The target sample size was 385; it was distributed as follow:

Group A: Hospitals with all specialties; with 1182 health care workers (HCWs) (sample size = 252).

Group B: Hospitals with one specialty; with 157 health care workers (HCWs) (sample size = 33)

Group C: hospital with no specialty; with 469 health care workers (HCWs) (sample size = 100)

2.5 Data Collection, Analysis and Processing

Data was collected using pre-tested structured questionnaire. Structured questionnaire is a quantitative method of research, which includes the low level of involvement of the researcher and high number of respondents (the individuals who answer the questions). Pre-testing used to

be carried out in a situation similar to that of the study, in order to identify difficulties and problems that related to the questions and also to train the data collectors. The questionnaire was composed of socio-demographic variables. Five ml venous blood was drawn after the signature of the informed consent and before filling the questionnaire. Blood sera was separated and stored at -20°C, until testing. Using ELISA tests with 99.64% sensitivity and 99.64% specificity; all specimens were tested for anti-HBcore total; positive specimens for anti-HBcore total were tested for HBsAg.

Data was processed using statistical package for social sciences (SPSS), version 16. Descriptive statistics and non parametric Z-test for single proportion was used. The P-value ≤ 0.05 was considered statistically significant for the results.

2.6 Ethical Issue

The study was approved by the ethical committee of Sudan Medical Specialization Board.

3. RESULTS AND DISCUSSION

3.1 Health Care Workers (HCWs) Distribution and Prevalence of anti-HBcore total and HBsAg among Them is Presented in Fig. 1

Fig. 1 indicates that the most representative localities in the study were Kostee, with 94 HCWs (24.4%) followed by Algeteena and Rabak, with 80 HCWs (20.8%) and the least localities were Alsalam and Kenanna with 11 HCWs (2.9%) for each. From the same Figure we noticed that the highest percentage of HBV infection (24.4%) is among HCWs in Kostee locality; the least one (2.9%) is in Alsalam and Kenana localities. For the carrier rate, Kostee and Aldweam localities have the highest percentage; while Tandalti and Alsalam localities have the least.

3.2 Socio-demographic Characteristics of the Respondents

The sample composed of 154 males (40%) and 231 females (60%). Most of them were in the age group 27-36 years (30.9%), followed by 47- 56 (20.0%) and the least one was the age group of 57+ (13.2%).

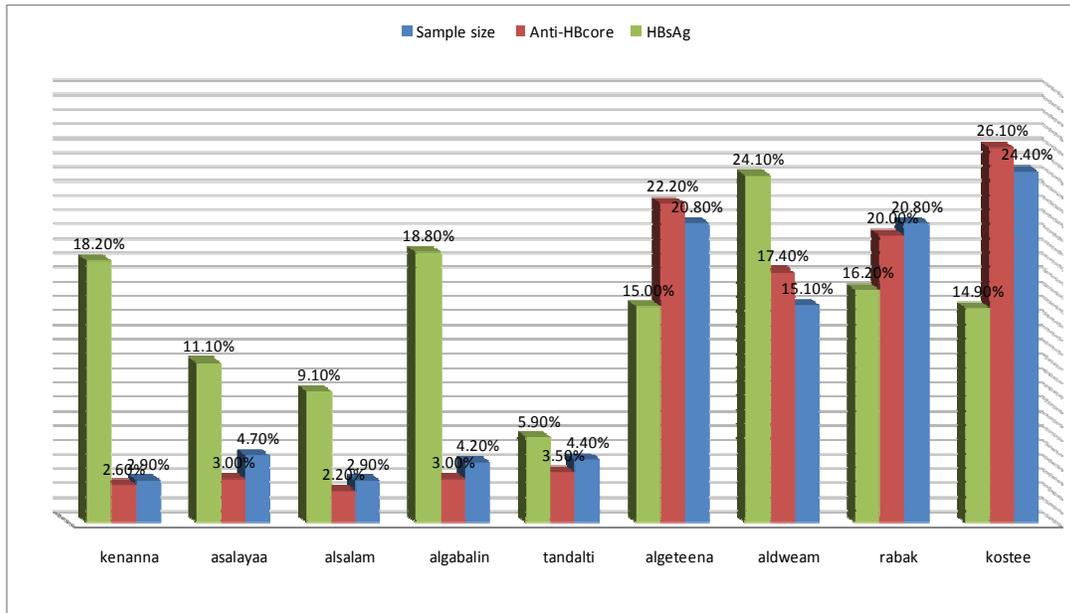


Fig. 1. Health Care Workers (HCWs) distribution for the survey of anti-HBcore total and HBsAg, by localities (n = 385); and the prevalence of anti-HBcore total (n = 385) and HBsAg (n = 62) among them in Public Hospitals, White Nile State, Sudan, 2013

For marital status, 215 HCWs (55.8%) were married, 150 HCWs (39%) were single, and 11 HCWs (2.9%) were widowed, while 9 HCWs (2.3%) were divorced.

The level of education was as follows: 149 HCWs, (38.8%) were university, 95 HCWs (24.7%) were high secondary and 6 HCWs (1.6%) were Quranic school.

Regarding occupation of the sample population; 121 (31.4%) were labour, 107 (27.8%) were nurses, 60 (15.6%) were doctors, 49 (12.7%) were technicians in labs and blood banks, 15 (3.9%) were nurse midwives, 12 (3.1%) were pharmacists, 11 (2.9%) were theatre attendants and 10 (2.6%) were Village midwives.

3.3 Testing the Prevalence of Infection Rate of HBV (Anti-HBcore total) and that of Carrier of HBV (HBsAg) against Values of test Probability of 0.5 among Health Care Workers (HCWs) is Presented in Table 1

As Table 1 shows, 230 (60%) of the tested HCWs showed positive Anti-Bcore total marker, while 155 (40%) were negative for Anti-HBcore

total marker. The *P*-value of the Z- test was 0.001, which indicates a significant statistical difference between the prevalence of 60% and the tested rate of 50% (i.e. 0.5). So, there is a high infection rate of HBV (measured by Anti-HBcore total) among HCWs in Public Hospitals, White Nile State, Sudan. The outcome of the test was that the prevalence of past or current infection with HBV among HCWs in Public Hospitals, White Nile State, Sudan, was 60%. The lower and the upper bound of Anti-Bcore total prevalence at 95% confidence level was 56% and 62% respectively, *P*-value = 0.001.

Regarding carrier rate; Table 1 shows, 62 (27%) of the tested HCWs showed positive HBsAg, while 168 (73%) were negative for HBsAg marker. The *P*-value of Z- test was 0.001, which indicates a significant statistical difference between the prevalence of 27% and the tested rate of 50% (i.e. 0.5). So, there is a high carrier rate of HBV (measured by HBsAg) among HCWs in Public Hospitals, White Nile State, Sudan. The outcome of the test was that the carrier rate (measured by HBsAg) among the respondents was 27%. The lower and upper bounds of the prevalence of HBsAg was 26% and 31%, respectively; *P*-value = 0.001.

Table 1. Testing the prevalence of infection rate of HBV (Anti-HBcore total) (n = 385) and that of carrier of HBV (HBsAg) (n = 230) against values of test probability of 0.5 among health care workers (HCWs) in Public Hospitals, White Nile State, Sudan, 2013

Markers*	Category	N	Observed prob.	Test prob.	P-value	Conclusion
Anti-HBcore	+ ve	230	0.60	0.5	0.001	Significant difference
Total	- ve	155	0.40			
	Total	385	1.00			
HBsAg	+ ve	62	0.27	0.5	0.001	Significant difference
	- ve	168	0.73			
	Total	230	1.00			

*Test used was Z test for single proportion

3.4 The Relation between Sero-positivity of (Anti-HBcore Total and HBsAg) and the Various Demographic Factors among Health Care Workers (HCWs) are Presented in Table 2

Looking at Table 2 there is no statistical association between the various demographic factors and the prevalence of Anti-HBcore total and HBsAg among HCWs in Public Hospitals in White Nile State; Sudan.

4. DISCUSSION

The study was an observational hospital base study. Three hundred and eighty five HCWs in Public Hospitals, White Nile State, Sudan, were enrolled. As shown by Z-test for single proportion there was a statistical difference between the expected (50%) and actual (60%) prevalence, p-value = 0.001, indicating that the difference was statistically significant. Sudan is one of the high endemic countries with HBV [12-15]. There is a high rate of HBV infection among HCWs in

Kostee and Aldweam localities in comparison to other localities; while carrier rate measured by HBsAg is high among HCWs in Kostee locality. These are the heavily populated localities in White Nile State and they have the more established hospitals in this State with regard to other localities. So, the high prevalence of both Anti-HBcore and HBsAg among HCWs may be due to their exposure to blood and body fluids of patients in this high endemic area. The result was consistent with many national studies as reported in Public Teaching Hospitals in Khartoum State, Sudan, where the infection and carrier rates are high [1,16,17]; the Gezira State of Central Sudan, a community base study indicates a high carrier rate among the general population [18]; and international studies as that of Hepatitis B and E viral infections among Nigerian healthcare workers [7,1,15,19-21]; and Southern State of India [6] There is no statistical association between the different demographic variables and the studied markers. This may be due to high endemicity of the disease in this area.

Table 2. Relation between sero-positivity of (Anti-HBcore total and HBsAg) and the various demographic factors among health care workers (HCWs) in Public Hospitals in White Nile State, Sudan; 2014; (n= 385)

Demographic factors	Test	P- value	Conclusion
Localities	Anti-HBcore total	.228	Insignificant
	HBsAg	.569	
Gender	Anti-HBcore total	.832	
	HBsAg	.390	
Education level	Anti-HBcore total	.279	
	HBsAg	.193	
Marital status	Anti-HBcore total	.092	
	HBsAg	.174	
Occupation	Anti-HBcore total	.373	
	HBsAg	.463	

5. CONCLUSION AND RECOMMENDATION

The outcome of this study concluded that the infection and carrier rates of HBV were high among HCWs in Public Hospitals, White Nile State, Sudan. Further study to address the possible risk factors is highly recommended.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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ANEX 1

Questionnaire

Serological and molecular characterizations of HBV, HDV and HCV among Health Care Workers in Public Hospitals, in White Nile State, Sudan; the year 2013

0 QUESTIONNAIRE IDENTIFICATION DATA

001 QUESTIONNAIRE IDENTIFICATION NUMBER |__|__|__|

002 CITY-----

003 HOSPITAL-----

004 DEPARMENT-----

005 TELEPHONE NO.-----

Introduction: “My name is..... I'm working for a group of researchers at the Department of Community Medicine, Faculty of Medicine, University of Khartoum. We're interviewing people here in [name of hospital or department.....] in order to find out the serological and molecular characterization of HBV, HDV and HCV among Health Care Workers in Public Hospitals, in White Nile State. Have you been interviewed in the past few weeks [or other appropriate time period] for this study? **IF THE RESPONDENT HAS BEEN INTERVIEWED BEFORE DURING THIS ROUND, WE DO NOT INTERVIEW THIS PERSON AGAIN.** WE tell them we cannot interview them a second time, thank them, and end the interview. If they have not been interviewed before, continue:

Confidentiality and consent: “I'm going to ask you some personal questions. Your name will not be written on this form. You do not have to answer any questions that you do not want to answer, and you may end this interview at any time you want to. However, your honest answers to these questions will help us better understand the situation of HBV among HCWs in Khartoum State Public Civil Teaching Hospitals. We would greatly appreciate your help in responding to this survey. The survey will take about XX minutes to ask the questions. Would you be willing to participate?”

(Signature of interviewer certifying that informed consent has been given verbally by respondent)

Interviewer visit

Date	
Interviewer	
Result	

Result codes:

Completed 1; Respondent not available 2; Refused 3; partially completed 4.

005 INTERVIEWERS: Code [__|__] Name _____

006 DATE OF INTERVIEW: __ \ ____ \ ____

007 CHECKED BY SUPERVISOR: Signature _____ Date _____

The HCWs questionnaire includes the following sections:

Section 0 – Questionnaire identification data ((7) codes)

Section 1 – Background characteristics	(9) Questions
Section 2 – Knowledge, believes, and attitudes.	(28) Questions
Section 3 – Knowledge about vaccination against HBV and HDV	(6) Questions
Section 4 – Past Medical History	(5) Questions
Section 5- Occupational Exposure.	(5) Questions
Section 6: infection control measures	<u>(10) Questions</u>
Total number of questions:	(63) Questions

Section 1: Background characteristics

No.	Questions and filters	Coding categories
Q1	Gender	1. Male 2. Female
Q2	Age/ years	
Q3	Original Residency	1. South 2. North 3. East 4. West 5. Central
Q4	Marital Status	1. Married 2. Not married 99. No Response
Q5	Educational Level	1. Illiterate 2. Khalwa 3. Primary 4. Secondary 5. Higher 6. Graduated 7. Postgraduate 99. No Response
Q6	Occupation	1. Doctor 2. Nurse 3. Midwife 4. Lab +blood bank technicians 5. Labor 6. Theatre attendants 7. Manager 99. No Response
Q7	If you are a doctor, what is your classification?	1. Consultant 2. Registrar 3. Medical officer 4. House officer
Q8	What is your department?	1. Surgery 2. Obs. & Gyn. 3. Dentistry. 4. Others
Q9	Your duration of work in this hospital?	1. Less than 1 year 2. 1 - 2 years 3. More than 2 – 5 years 4. More than 5 – 10 years 5. More than 10 – 20 years 6. More than 20 year 88. Don't know 99. no response

Section 2: Knowledge, believe and attitude

No.	Questions and filters	Coding categories
Q10	Have you ever heard about:	
	1. HBV	1. Yes 2. No 88. Don't know 99. No respons
	2. HCV	1. Yes 2. No 88. Don't know 99. No response
	3. HDV	1. Yes 2. No 88. Don't know 99. No response
Q11	Is HBV transmitted by blood transfusion or blood products	1. Yes 2. No 88. Don't know 99. No response
	Is HCV transmitted by blood transfusion or blood products	1. Yes 2. No 88. Don't know 99. No response

	<p>Is HDV transmitted by blood transfusion or blood products</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
Q12	<p>Can a pregnant woman infected with HBV transmit the virus to her unborn child?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Can a pregnant woman infected with HCV transmit the virus to her unborn child?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Can a pregnant woman infected with HDV transmit the virus to her unborn child?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
Q13	<p>Can infected woman with HBV transmit the virus to her newborn during labor?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Can infected woman with HCV transmit the virus to her newborn during labor?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Can infected woman with HDV transmit the virus to her newborn during labor?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
Q14	<p>Can infected woman with HBV transmit the virus to her newborn by breastfeeding?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Can infected woman with HCV transmit the virus to her newborn by breastfeeding?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Can infected woman with HDV transmit the virus to her newborn by breastfeeding?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
Q15	<p>Can HBV transmitted sexually?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Can HCV transmitted sexually?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Can HDV transmitted sexually?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>

Q16	Could sharp contaminated instrument transmit HBV infection? 1. Yes 2. No 88. Don't know 99. No response
	Could sharp contaminated instrument transmit HCV infection? 1. Yes 2. No 88. Don't know 99. No response
	Could sharp contaminated instrument transmit HDV infection? 1. Yes 2. No 88. Don't know 99. No response
Q17	Is HBV transmitted by eating or drinking contaminated food and water? 1. Yes 2. No 88. Don't know 99. No response
	Is HCV transmitted by eating or drinking contaminated food and water? 1. Yes 2. No 88. Don't know 99. No response
	Is HDV transmitted by eating or drinking contaminated food and water? 1. Yes 2. No 88. Don't know 99. No response
Q18	Is HBV transmitted by cough? 1. Yes 2. No 88. Don't know 99. No response
	Is HCV transmitted by cough? 1. Yes 2. No 88. Don't know 99. No response
	Is HDV transmitted by cough? 1. Yes 2. No 88. Don't know 99. No response
Q19	Is HBV transmitted by sharing razors? 1. Yes 2. No 88. Don't know 99. No response
	Is HCV transmitted by sharing razors? 1. Yes 2. No 88. Don't know 99. No response
	Is HDV transmitted by sharing razors? 1. Yes 2. No 88. Don't know 99. No response
Q20	Do you think that healthy-looking HCWs could be a carrier of HBV? 1. Yes 2. No 88. Don't know 99. No response
	Do you think that healthy-looking HCWs could be a carrier of HCV? 1. Yes 2. No 88. Don't know 99. No response

	<p>Do you think that healthy-looking HCWs could be a carrier of HDV?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
Q21	<p>Do you think that healthy-looking person could be a carrier of HBV?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Do you think that healthy-looking person could be a carrier of HCV?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Do you think that healthy-looking person could be a carrier of HDV?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
Q22	<p>Can people protect themselves from:</p> <p>HBV? 1. Yes 2. No 88. Don't know 99. No response HCV? 1. Yes 2. No 88. Don't know 99. No response HDV? 1. Yes 2. No 88. Don't know 99. No response</p>
Q23	<p>Is protection from HBV can be by using gloves?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Is protection from HCV can be by using gloves?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Is protection from HDV can be by using gloves?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
Q24	<p>Is using sterile instrument and syringes protects from HBV transmission?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Is using sterile instrument and syringes protects from HCV transmission?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Is using sterile instrument and syringes protects from HDV transmission?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
Q25	<p>Is screening of donated blood protects from HBV transmission?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Is screening of donated blood protects from HCV transmission?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Is screening of donated blood protects from HDV transmission?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>

Q26	<p>Is screening of organ donor's blood protects from HBV transmission?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Is screening of organ donor's blood protects from HCV transmission?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Is screening of organ donor's blood protects from HDV transmission?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
Q27	<p>Can people protect themselves by using HBV vaccine?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Can people protect themselves by using HCV vaccine?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
	<p>Can people protect themselves by using HDV vaccine?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
Q28	<p>Can people protect themselves by drinking clean water?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
Q29	<p>Can they protect themselves by cauterization?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p>
Q30	<p>How could pregnant woman reduce the risk of transmission of HBV to her unborn child?</p> <p>1. Take Immunoglobulin 2. Take Vaccination 88. Don't know 99. no response</p>
Q31	<p>How could pregnant woman reduce the risk of transmission of HCV to her unborn child?</p> <p>1. Take Immunoglobulin 2. Take Vaccination 88. Don't know 99. no response</p>
Q32	<p>How could pregnant woman reduce the risk of transmission of HDV to her unborn child?</p> <p>1. Take Immunoglobulin 2. Take Vaccination 88. Don't know 99. no response</p>

Q33	Did you voluntarily do: HBV test? 1. Yes 2. No 88. Don't know 99. No response if no go to question 35
	HCV test? 1. Yes 2. No 88. Don't know 99. No response if no go to question 35
	HDV test? 1. Yes 2. No 88. Don't know 99. No response if no go to question 35
Q34	When did you have your most recent, HBV test? Date [][] HCV test? Date [][] HDV test? Date [][]
Q35	Do you required having the test once in the past and you did not have it? 1. Yes 2. No 88. Don't know 99. No response
Q36	Can people protect themselves by using personal protection? (e.g. Gloves, Goggles and Gowns) 1. Yes 2. No 88. Don't know 99. No response
Q37	Are unsafe injection practices one of sources of transmission of HBV? 1. Yes 2. No 88. Don't know 99. No response
	Are unsafe injection practices one of sources of transmission of HCV? 1. Yes 2. No 88. Don't know 99. No response
	Are unsafe injection practices one of sources of transmission of HDV? 1. Yes 2. No 88. Don't know 99. No response

Section 3: Knowledge about vaccination against HBV, HCV, HDV

No.	Questions and filters	Coding categories
Q38	Is HBV infection prevented by a vaccine? 1. Yes 2. No 88. Don't know 99. No response	
	Is HCV infection prevented by a vaccine? 1. Yes 2. No 88. Don't know 99. No response	
	Is HDV infection prevented by a vaccine? 1. Yes 2. No 88. Don't know 99. No response	

Q39	<p>A. Number of vaccine doses of HBV</p> <p>1. One dose 2. Two doses 3. Three doses 4. Others()</p> <p>88. Don't know 99. No response</p>
	<p>B. Number of vaccine doses of HCV</p> <p>1. One dose 2. Two doses 3. Three doses 4. Others()</p> <p>88. Don't know 99. No response</p>
	<p>C. Number of vaccine doses of HDV</p> <p>1. One dose 2. Two doses 3. Three doses 4. Others()</p> <p>88. Don't know 99. No response</p>
Q40	<p>Have you ever been vaccinated against HBV?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p> <p>If yes, when? Date [__ __] if no go to Q 42</p>
	<p>Have you ever been vaccinated against HCV?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p> <p>If yes, when? Date [__ __] if no go to Q 42</p>
	<p>Have you ever been vaccinated against HDV?</p> <p>1. Yes 2. No 88. Don't know 99. No response</p> <p>If yes, when? Date [__ __] if no go to Q 42....</p>
Q41	<p>Source of vaccine</p> <p>1. Inside the country 2. Outside the country</p>
Q42	<p>What do you know about the vaccine</p> <p><input type="checkbox"/>HBV <input type="checkbox"/> HCV <input type="checkbox"/>HDV</p> <p>1. I do not know about the vaccine 2. I do not know where to find it 3. Expensive 4. Not interested to be immunized. 5. Others.....</p>

Section 4: Past medical history of exposure to risk factors:

No.	Questions and Filters	Coding categories
Q43	<p>Have you ever been subjected to blood transfusion</p> <p>1. Yes 2. Never 88. Don't know 99. No response</p> <p>If yes, when?</p> <p>1. Less than 45 days 2. More than 45 days</p>	

Q44	<p>Have you ever been subjected to surgical procedure</p> <p>1. Yes 2. Never 88. Don't know 99. No response</p> <p>If yes, when?</p> <p>1. Less than 45 days 2. More than 45 days</p>
Q45	<p>Have you ever been subjected to tattooing</p> <p>1. Yes 2. Never 88. Don't know 99. No response</p> <p>If yes, when?</p> <p>1. Less than 45 days 2. More than 45 days</p>
Q46	<p>Have you ever been subjected to cautery</p> <p>1. Yes 2. Never 88. Don't know 99. No response If yes, when?</p> <p>1. Less than 45 days 2. More than 45 days</p>
Q47	<p>Have you ever been having jaundice?</p> <p>1. Yes 2. Never 88. Don't know 99. No response If yes, at what age?</p> <p>1. Below 30 years 2. Between 30-49 years 3. 50 years or more</p>

Section 5: Exposure to occupational risk factors

No.	Questions and filters	Coding categories
Q48	<p>Have you ever been experienced needle stick injury?</p> <p>1. Yes 2. Never 88. Don't know 99. No response. If yes, when?</p> <p>1. Less than 45 days 2. More than 45 days</p>	
Q49	<p>Have you ever been exposed to injury with contaminated sharp instruments?.</p> <p>1. Yes 2. Never 88. Don't know 99. No response. If yes, when?</p> <p>1. Less than 45 days 2. More than 45 days</p>	
Q50	<p>Have you ever been dealing with blood?.</p> <p>1. Yes 2. Never 88. Don't know 99. No response. If yes, when?</p> <p>1. Less than 45 days 2. More than 45 days</p>	
Q51	<p>Have you ever been dealing with amniotic fluid during delivery event?.</p> <p>1. Yes 2. Never 88. Don't know 99. No response. If yes, when?</p> <p>1. Less than 45 days 2. More than 45 days</p>	
Q52	<p>Have you ever been dealing with jaundiced patient?</p> <p>1. Yes 2. Never 88. Don't know 99. No response. If yes, when?</p> <p>1. Less than 45 days 2. More than 45 days</p>	

Section 6: Infection control measures

Q53	Had you received formal training on infection control precautions 1. Yes 2. No 88. Don't know 99. No response
Q54	Do you wash or decontaminate your hands before and after direct contact with patients? 1. Yes 2. No 88. Don't know 99. No response
Q55	Do you wash or decontaminate your hands after contact with blood, body fluid, secretions or excretion? 1. Yes 2. No 88. Don't know 99. No response
Q56	Do you wash or decontaminate your hands before handling an invasive devise (\pm gloves)? 1. Yes 2. No 88. Don't know 99. No response
Q57	Do you wash your hands before gloving and before leaving the examination room?. 1. Yes 2. No 88. Don't know 99. No response
Q58	Do you wear gloves when Touching blood and body fluids? 1. Yes 2. No 88. Don't know 99. No response
Q59	Do you change gloves between tasks and procedures on the same patients? 1. Yes 2. No 88. Don't know 99. No response
Q60	Do you remove gloves immediately after use before attending to another patients? 1. Yes 2. No 88. Don't know 99. No response
Q61	Do you wear surgical masks during procedures that are likely to generate splashes or sprays of blood or other body fluids? 1. Yes 2. No 88. Don't know 99. No response
Q62	Do you wear Gowns during procedures that are likely to generate splashes or sprays of blood or other body fluids? 1. Yes 2. No 88. Don't know 99. No response
Q63	Do you wear goggles during procedures that are likely to generate splashes or sprays of blood or other body fluids? 1. Yes 2. No 88. Don't know 99. No response

That is the end of our questionnaire. Thank you very much for taking time to answer these questions. We appreciate your help.

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