



RESEARCH ARTICLE

Knowledge, attitude, and practice survey concerning hepatitis B and C and among migrant populations from sub-Saharan Africa

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ABSTRACT

Background: Hepatitis B and C virus infections are serious blood borne diseases with global health concern particularly in developing countries. The association between survey participant's knowledge, attitude, and practices (KAP) about HBV and HCV infection is rarely studied, particularly among migrants seeking resettlement. Libya is a main transit station for migrants northward toward Europe and the flow is increasing into Al Kufra from neighboring countries that have endemic intermediate and high HBV and HCV prevalence. The purpose of this exploratory descriptive study in Al Kufra was to assess the level of participating migrant's KAP, regarding cause, transmission, prevention, and treatment of viral hepatitis due to HBV and HCV.

Method: A cross-sectional study was conducted among 674 sub-Saharan African migrants in Al Kufra, Libya from January to October 2021. Migrant's KAP about HBV and HCV infection was assessed by interview questionnaire. Statistical and data analysis used SPSS version 25.

Results: Out of 700 questionnaires distributed, 674 were returned with a response rate of 96.3%. The study population included 580 (86.1%) males, mean age of 29.6 ± 7.2 SD years. A majority, 508 (75.4%) were illiterate or had basic education only. Positive significant linear correlations were found between knowledge-attitude ($r = 0.524$, $p < 0.01$) knowledge-practice ($r = 0.123$, $p < 0.01$) and attitude-practice ($r = 0.278$, $p < 0.01$). Ethnicity and education variables were significantly associated with mean KAP. Gender identity and marital status were both significantly associated with mean knowledge and attitude. **Conclusion:** The migrant population from the neighboring and sub-Saharan African countries have inadequate KAP about HBV and HCV to limit infection.

Keywords: knowledge attitude practice (KAP), hepatitis B (HBV), hepatitis C (HCV), migrants, sub-Saharan Africa

Introduction

Viral hepatitis B and C are blood borne viruses that infect millions of people worldwide. Infections with hepatitis B virus (HBV) and C (HCV) virus are leading causes of chronic liver disease, cirrhosis, liver cancer and associated morbidity and mortality worldwide and are a primary indication for liver transplantation¹. Chronic HBV and HCV infections are responsible for nearly 57% of liver cirrhosis cases (HBV 30%, HCV 27%) and 78% of hepatocellular carcinomas (HBV 53%, HCV 25%), the third most common cause of cancer deaths worldwide²⁻⁴.

The endemicity of HBV is high in developing areas, including Africa, the Middle East and Southeast Asia, where at least 8% of the population are HBV chronic carriers^{3,5}. The largest burden of morbidity and mortality from chronic liver disease continues to be in nations of the developing world. For example, 5–10% of the adult population in East Asia and sub-Saharan Africa are estimated to have chronic HBV infection⁶. The highest reported prevalence of chronic HCV is in Africa. Egypt has the highest prevalence of HCV, with some studies reporting HCV antibody positive rates of up to 15%, with an estimated 10% with chronic viremia^{7,8}. Viral hepatitis disproportionately affects sub-Saharan Africans populations⁹⁻¹⁴ with high rates of migration from countries where childhood HBV vaccination has only recently been implemented¹⁵.

The hepatitis B vaccine is the mainstay of HBV prevention¹⁶. No vaccine is available for HCV, dictating the importance of education and precautions¹⁶. These viruses are blood- and bodily fluid-borne, transmitted most commonly through sharing of injection equipment, reuse or poorly sterilized of medical equipment, especially syringes and needles and sharp objects, sexual contact, and mother to child transmission¹⁷⁻¹⁹.

Countries of high HBV & HCV prevalence are often economically disadvantaged and areas of conflict that are a source of migrants seeking stable high-income regions including Europe and North America. This poses challenges to the public health and immigration systems in host nations⁶ and countries along migration routes²⁰. In 2020 the total of international migrants was 280.6 million, making this group the 5th most populous nation^{16, 21}. Many migrants move into and remain part of ethnic minority groups maintaining traditional social and cultural behaviors that are reinforced and persist and may have adverse implications for exposure to HBV and HCV²².

Countries such as Libya along migration routes from countries with high prevalence of viral hepatitis, e.g., sub-Saharan African countries, have special problems. Migrants typically suffer from infectious diseases that are more prevalent in countries of origin^{7, 20}. Migrants from neighboring and sub-Saharan African countries have been cited as one of the major factors spreading the chronic liver disease and hepatocellular carcinoma with risks of disease transmission to the local population²³⁻²⁵. Lack of access to health care services, lack of basic knowledge, poor to nonexistent personal hygiene, and the inability to obtain information about the transmission and prevention all contribute to the importance of defining issues leading to improvement.

The knowledge, attitudes, and practices (KAP) about viral hepatitis transmission, prevention, and liver disease progression among immigrant populations from the neighboring and sub-Saharan African countries are likely to have significant bearing on transmission. Studies show that awareness of chronic HBV or HCV in most populations is low but that among migrant populations it tends to be even lower^{22, 26}. A combination of factors contributes to disease propagation, including poor knowledge of the diseases, their risk factors and symptoms, lack of access to healthcare and health information, stigma associated with disease, as well as the lack of symptoms from the early stages of liver disease such as viral hepatitis^{12, 22, 27}. General knowledge in immigrant populations is not adequate to avoid blood borne diseases. Social and cultural norms, unsafe sexual intercourse, exposure to the blood or body fluids of an infected person, and intravenous drug use may increase the risk of HBV and HCV infection. Furthermore, minimal education and resources, isolation, and stress contribute the refugee's tendency to engage in risky behavior, increasing the risk of these infections⁶. The purpose of this study is to describe the state of knowledge, attitudes, and practices related to HBV and HCV, transmission, consequences, treatment and prevention.

Methods

The study was conducted from January 1 to October 31, 2021 at the Libyan Red Crescent, Al Kufra branch laboratory in a high migrant area. The study area is located in the southeast of Libya having borders with Egypt to the East and with Sudan and Chad to the South. It is 1700 km from Tripoli, the capital city of Libya and 900 km South of the nearest Mediterranean port. The study population included all migrants ≥ 18 attending at the Libyan Red Crescent Al Kufra branch laboratory willing to be interviewed upon informed consent. From a total of 700 eligible individuals 674 agreed to participate including apparently healthy males and females, aged 21–52 years. Knowledge, attitudes, and practices related to HBV and HCV infection were assessed by questionnaire specially designed to permit literacy-independent answers. Questions concerned awareness, beliefs, and attitudes focusing on the causes, transmission, prevention, and treatment of viral hepatitis (Appendix 1-3). Subject categories included behaviors contributing to infection risk with both HBV and HCV; sociodemographic data; and practices of the study population regarding viral hepatitis. A pre-designed, structured questionnaire sheet was completed inside the laboratory by direct personal interview with each migrant individually. The questionnaire was developed and adapted through extensive literature review in English language^{11, 28-31}. Questions in the knowledge section were further divided into 3 main sections (see Appendix A): the first 19 knowledge questions were general on viral hepatitis diseases; seven significant viral hepatitis transmission risk factors were included in question 20. Question 21 includes eight common complications of HBV and HCV infections. The attitude and practice section of questionnaire consist of 13 and 12 questions, respectively. The demographic items included age, gender, education level, and ethnicity.

STATISTICAL ANALYSIS

Data were analyzed using Statistical Package for Social Sciences (SPSS) v. 25.0. The relationship between independent categorical variables and the main outcomes of the study (knowledge, attitude, and practice related to transmission and prevention of HBV and HCV infection) were tested using Chi-square test. The p-value < 0.05 was considered to be significant. Descriptive statistics were used to illustrate migrants' demographic characteristics. Categorical variables were measured as percentages while continuous variables were expressed as mean \pm standard deviation. Normality of data was tested using Kolmogorov-Smirnov test. Inferential statistics involving Chi-square test, Mann-Whitney U test, Kruskal Wallis H test were used to assess the difference while Spearman's rank correlation coefficient was used to evaluate the relationship between the study variables. Cronbach's alpha was calculated as an indication of internal consistency.

ETHICS APPROVAL

Written informed consent was obtained from the study participants after they had been clearly briefed about the objective of the study. They were informed about their right to refuse to participate in the study.

Results

Each item in the questionnaire is listed in Appendix Tables A1, A2, and A3. Descriptive statistics are provided for the 674 participating migrants from sub-Saharan Africa; 43.8% Eritrean, 26.6%, Somalian, 21.7%, Ethiopian, and 8% Sudanese, (Table 1). Among the 674 participants, 87.5% were married, 86.1% were male and 13.9% female. The age range was 21–52 years old with a mean age of 29.6 years. A majority of the participants, 75.4%, were illiterate or had a basic education level, while 24.6% of participants had a high school level or above (Table 1).

Table 1. Sub-Saharan African migrant study population demography (n=674)

Migrants Characteristics	N (%)
Age (Mean \pm SD)	29.6 \pm 7.2
Gender identity	
Male	580 (86.1%)
Female	94 (13.9%)
Ethnicity	
Eritrean	295 (43.8%)
Somalian	179 (26.6%)
Ethiopian	146 (21.7%)
Sudanese	54 (8%)
Marital Status	
Single	84 (12.5%)
Married	590 (87.5%)
Education level	
Illiterate/Basic education	508 (75.4%)
High school and above	166 (24.6%)

Of the 700 distributed questionnaires, 674 were returned with a response rate of 96.3%. The Kolmogorov-Smirnov test revealed non normal distribution of the data. The Cronbach's alpha of the questionnaire was 0.76 for individual domains, maximum Cronbach's alpha was for attitude section followed by practices and knowledge section. The reason for low Cronbach's alpha for knowledge domain might be due to the number of questions as compared to attitude and practices sections.

Overall, knowledge regarding HBV and HCV was poor, Table 2a. more than 40% of participants answered Don't know to the 37 questions reflecting understanding. Most (34 of 37) questions had an answer either correct or not, of these, only 16% of migrants' answers were correct. For questions of overall indicative knowledge, more than 8 out of 10 migrants, 83.0%, had never heard of viral hepatitis. Less than 1 out of 10 migrants, 7.9%, could identify hepatitis B and C as viral infections (Table 2a). More than 90% of participants had no knowledge about the transmission of HBV and HCV and did not know that a simple test could identify HBV and HCV infections.

Table 2a. Knowledge segment, KAP study of migrant African populations regarding HBV and HCV infection in Al Kufra, Libya, 2021 (n = 674; 609 male (M), 94 female (F))

2a. Knowledge assessment questions	Item	Yes (%)	No (%)	% Correct	(%) Don't know
General questions:					Avg (33.8)
1. Have you ever heard about viral hepatitis?	1	115 (17.1%)	472(70.0%)	na	87(12.9%)
2. Are Hepatitis B and C viral infection diseases?	2	53 (7.9%)	500(74.2%)	7.9	121(18.0%)
3. Can hepatitis B or C be transmitted by contact with open wound/cut?	3	41 (6.1%)	490(72.7%)	6.1	143(21.2%)
4. Can hepatitis B and C virus be spread by someone who looks healthy?	4	58 (8.6%)	405(60.1%)	8.6	211(31.3%)
5. Is there a test that shows whether or not someone is hepatitis B or C positive?	5	62 (9.2%)	304(45.1%)	9.2	308(45.7%)
6. Do you think people with hepatitis B can be infected for life?	6	36 (5.3%)	411(61.0%)	5.3	227(33.7%)
7. Is there a vaccine for HBV?	7	37 (5.5%)	298(44.2%)	5.5	339(50.3%)
8. Can hepatitis B be cured?	8	202(30.0%)	91 (13.5%)	30.0	381(56.5%)
9. Can hepatitis C be cured?	9	130(19.3%)	319(47.3%)	19.3	225(33.4%)
10. Can HBV and HCV infection be passed from mother to child?	10	117 (17.4%)	205(30.4%)	17.4	352(52.2%)
11. Can HBV and HCV be spread through social contact (e.g. shaking hands, sharing food or sneezing)?	11	362(53.7%)	68(10.1%)	10.1	244(36.2%)
12. Can hepatitis infection cause death?	12	147 (21.8%)	196(29.1%)	21.8	331(49.1%)
13. Can people with Hepatitis B or C donate blood?	13	411 (61.0%)	166 (24.6%)	24.6	97 (14.4%)
14. Can HCV infection be prevented?	14	427 (63.4%)	126 (18.7%)	63.4	121(18.0%)
15. Can HBV infection be prevented?	15	234(34.7%)	247(36.6%)	59.1	193(28.6%)
16. Can Hepatitis B and C be transmitted through air and water?	16	398 (59.1%)	97 (14.4%)	14.4	179(26.6%)
17. Have you ever been screened for HBV and HVC?	17	115 (17.1%)	559 (82.9%)	na	0 (0.0%)
18. Have you been vaccinated against hepatitis B?	18	11 (1.6%)	663 (98.4%)	na	0 (0.0%)
19. Is a vaccine for Hepatitis C available?	19	413 (61.3%)	93 (13.8%)	13.8	168 (24.9%)
Significant risk factor questions:					Avg (48.0)
20. Can HBV and HCV be transmitted by un-sterilized syringes and needles?	20	66 (9.8%)	298 (44.2%)	9.8	310 (46.0%)
21. Are HBV and HCV passed through contact with infectious blood, blood products and body fluids?	21	39 (5.8%)	290 (43.0%)	5.8	345 (51.2%)
22. Can viral hepatitis B and C be transmitted by sharing needles for use drug?	22	70 (10.4%)	404 (59.9%)	10.4	200(29.7%)
23. Can viral hepatitis B and C be transmitted by tattooing or body piercing?	23	44 (6.5%)	294 (43.6%)	6.5	336 (49.9%)
24. Can viral hepatitis B and C be transmitted by sharing personal care items like toothbrush or razor?	24	60 (8.9%)	198 (29.4%)	8.9	416(61.7%)
25. Can hepatitis B and C be transmitted through sexual contact?	25	83 (12.3%)	229 (34.0%)	12.3	362 (53.7%)
26. Can HBV and HCV be transmitted by a lack of sanitation services like bathrooms?	26	257 (38.1%)	121(18.0%)	38.1	296 (43.9%)
Common complications questions:					Avg (53.3)
30. Can a person be a carrier of HBV and HCV and can infect others without knowing it?	30	88 (13.1%)	310 (46.0%)	13.1	276(40.9%)
31. Can HBV and HCV infections result in chronic hepatitis?	31	112(16.6%)	223 (33.1%)	16.6	339 (50.3%)
32. Can HBV and HCV infections result in liver cancer?	32	97 (14.4%)	174 (25.8%)	14.4	403 (59.8%)
33. Can HBV and HCV infections lead to liver cirrhosis?	33	78 (11.6%)	198 (29.4%)	11.6	398 (59.1%)
34. Can HBV and HCV infections lead to fulminant hepatitis?	34	57 (8.5%)	157 (23.3%)	8.5	460 (68.2%)
35. Can HBV and HCV infections cause yellow skin and eyes (jaundice)?	35	72 (10.7%)	234 (34.7%)	10.7	368 (54.6%)
36. Can HBV and HCV infections cause liver failure?	36	112 (16.6%)	262 (38.9%)	16.6	300 (44.5%)
37. Can HBV and HCV infections cause death?	37	58 (8.6%)	287 (42.6%)	8.6	329 (48.8%)

A majority, 86.5% falsely believed that hepatitis B could be cured (or didn't know), while nearly half, 47.3% believed that hepatitis C is not curable although a third (33.4%) 'did not know'. The vast majority, 98.4% did not know that an HBV vaccine existed and only 1.6% of the

migrants had been vaccinated. Moreover, 82.9% had never been screened for HBV.

Knowledge of risk factors was also very poor. The overwhelming majority had no understanding that HBV

and HCV could be transmitted by mechanisms including: by un-sterilized syringes, 90.2%; by blood products and body fluids, 94.2%; and by sharing needles, 89.6%. Furthermore, similarly high majorities did not understand that both HBV & HCV could be transmitted by tattooing, 93.5%, sharing personal care items 91.0%, and through sexual contact, 87.7%. Among the 674 migrant participants, only ca. one in 10 understood that complications of chronic hepatitis include liver cancer, liver cirrhosis, fulminant hepatitis, and liver failure.

Results of attitude assessment indicated that nearly 90% of the migrants were not concerned about being infected with HBV or HCV and did not consider the infections a

public health problem (Table 2b). Only about 20% believed that they could get HBV or HCV infections and 15% were not worried about it. Only 15% agreed that migrants should be tested and less than 10% of participants agreed that the HBV vaccine is safe and effective (Table 2b). Similar to the knowledge response (Table 1a), less than 10% of participants believed or didn't know that HBV was not curable. Reflecting lack of concern, more than 90% of participants felt comfortable living with people with hepatitis B or C, while 34.3% of the migrants believed that HBV and HCV infection could be transmitted by food. More than two thirds of participants showed a negative attitude towards vaccination (Table 2b).

Table 2b. Attitude assessment of the migrant population regarding HBV and HCV.

2b. Attitude assessment questions	Item no.	Definitely Agree	Moderately agree	Neutral	Moderately disagree
1. I have no concern for being infected with hepatitis B or C.	1	83(12.3%)	164(24.3%)	295(43.8%)	80(11.9%)
2. Hepatitis B vaccine is safe and effective.	2	23(3.4%)	36(5.3%)	369(54.7%)	176(26.1%)
3. All African migrant populations should be tested for hepatitis B or C before they receive health care.	3	38(5.6%)	74(11.0%)	259(38.4%)	198(29.4%)
4. I don't feel comfortable living with people with hepatitis B or C.	4	20(3.0%)	64(9.5%)	446(66.2%)	121(18.0%)
5. I believe that hepatitis infections can be transmitted through food.	5	49(7.3%)	182(27.0%)	340(50.4%)	78(11.6%)
6. I think hepatitis B is a curable disease.	6	87(12.9%)	167(24.8%)	369(54.7%)	27(4.0%)
7. I think that hepatitis B and C is a serious public health problem.	7	119(17.7%)	138(20.5%)	285(42.3%)	96(14.2%)
8. I can get hepatitis infection.	8	45(6.7%)	91(13.5%)	341(50.6%)	138(20.5%)
9. Viral hepatitis is something to worry about.	9	33(4.9%)	74(11.0%)	260(38.6%)	221(32.8%)
10. I believe that vaccination could prevent transmission.	10	49(7.3%)	111(16.5%)	244(36.2%)	197(29.2%)
11. I believe that healthy people need vaccination.	11	27(4.0%)	117(17.4%)	221(32.8%)	243(36.1%)
12. I believe that you need a vaccination at your age.	12	22(3.3%)	70(10.4%)	503(74.6%)	41(6.1%)
13. I believe that vaccine can be free or low cost through certain programs.	13	34(5.0%)	38(5.6%)	267(39.6%)	188(27.9%)

Participating migrant responses to practice assessment questions indicate many unsafe practices that may result in exposure to blood- and body fluid-borne diseases.

Very few, 4.3%, indicated that they would seek further diagnosis and treatment if they tested positive for HBV or HCV (Table 2c).

Table 2c. Practice assessment of migrant the population regarding HBV and HCV

2c. Practice assessment questions	Item	Always	Frequently	Sometimes	Rarely
1. How often do you go for further investigation and treatment in case you are diagnosed with Hepatitis B or C?	1	11(0.02%)	7(0.01%)	12(0.02%)	9(0.01%)
2. How often are social networks on the internet your source of hepatitis B or C information?	2	15(0.02%)	2(0.003%)	5(0.007%)	11(0.02%)
3. How often are friends as your source of hepatitis B or C information?	3	13(0.02%)	10(0.02%)	17(0.03%)	14(0.02%)
4. How often do you use a used needle/syringe by more than one person?	4	147(21.8%)	155(23.0%)	187(27.7%)	108(16.0%)
5. How often do you share intravenous drug use?	5	134(19.9%)	144(21.4%)	173(25.7%)	127(18.8%)
6. How often are razors and shaving blades used by more than one person?	6	366(54.3%)	247(36.6%)	36(5.3%)	14(2.1%)
7. How often do you screen for hepatitis B or C?	7	5(0.01%)	11(0.02%)	97(14.4%)	2(0.003%)
8. How often have you had sex within the last 12 months?	8	147(21.8%)	175(26.0%)	197(29.2%)	80(11.9%)

2c. Practice assessment questions	Item	Always	Frequently	Sometimes	Rarely
9. How often have you used condoms with non-steady/steady sexual partners within the last 12 months?	9	5(0.01%)	2(0.003%)	7(1.0%)	2(0.003%)
10. How often do you wash hands with tap water and soap?	10	71(10.5%)	93(13.8%)	142(21.1%)	161(23.9%)
11. How often do you refuse shaving with used instruments?	11	46(6.8%)	114(16.9%)	127(18.8%)	143(21.2%)
12. How often do you share eating utensils?	12	627(93.0%)	20(0.03%)	14(0.02%)	8(0.01%)

Very few indicated a ready source of information about hepatitis B or C, social networks, 4.9%, or friends, 8.0%. Responses reflecting lack of knowledge or reliable source of information, very high proportions of participants indicated high-risk practices for transmission: 84% indicated shared use of injecting materials; 81% indicated shared intravenous drug use; almost all, 98% indicated sharing shaving materials; and with a high rate of sexual activity, ca. 90%, almost none indicated use of condoms. Reflecting lack of understanding the implications of high-risk practices, very few, ca 15%, ever went for hepatitis B or C screening.

Inferential statistics, i.e., Mann-Whitney U and Kruskal Wallis H tests were applied to compare scores of each

domain with various demographic factors (Table 3). Mean knowledge and attitude scores of male and female differed for $p < 0.05$. Male showed higher knowledge and attitude than females. Eritrean migrants had significantly higher mean knowledge and practice scores than other demographic groups. The mean knowledge scores were significantly higher among single than married migrants, while the mean practice score of married migrants was significantly higher than among single migrants. Finally, significantly higher differences were observed between mean knowledge and attitude scores for migrants with high school education compared to those with illiterate/basic education. However, those having high school education had significantly lower mean practice scores.

Table 3. Comparison of demographic characteristics for mean knowledge, attitude, and practice scores

Demographic variables	K.score 0.794+.204 Mean rank	P-value	A.score 2.906+.380 Mean rank	P-value	P.score 2.483+.232 Mean rank	P-value
Gender identity**						
Male	355.27	0.001	343.47	0.047	335.08	0.418
Female	227.85		300.66		352.43	
Ethnicity*						
Eritrean	362.56	0.024	371.98	0.001	363.24	0.007
Somalian	320.64		288.41		317.97	
Ethiopian	309.08		305.26		331.08	
Sudanese	333.32		399.03		278.99	
Marital Status**						
Single	379.88	0.033	340.07	0.897	292.05	0.021
Married	331.47		337.13		343.97	
Education level**						
Illiterate/Basic education	291.61	0.001	305.40	0.001	352.02	0.001
High school and above	477.94		435.72		293.06	

* Kruskal Wallis Test, ** Mann Whitney Test, p -value < 0.05 is statistically significant.

A correlation between different domains of questionnaire was also assessed. The correlation revealed significant positive linear correlations between knowledge-attitude

($r = 0.524$, $p < 0.01$) knowledge-practice ($r = 0.123$, $p < 0.01$) and attitude-practice ($r = 0.278$, $p < 0.01$), as shown in Table 4.

Table 4 Correlation between knowledge, attitude, and practice scores

Variables	Correlation coefficient	P-value*
Knowledge, attitude	0.524	0.01
Knowledge, practice	0.123	0.01
Practice, Attitude	0.278	0.01

*Correlation significant at 0.01 level (2 tailed).

Using chi-square test, for knowledge scores of the study participants were divided into two categories: good, and poor. Attitude and practice scores of the study participants were divided into three categories: good,

fair and poor. On this basis, knowledge was 'Poor', $>85\%$, across all categories of gender, ethnicity, and marital status (Table 5).

Table 5 Categorization of the study African migrant populations score on KAP domains

Variable	Knowledge					p-value	Attitude					p-value	Practices					p-value			
	Good		Poor		n		%	Good		n	%		Good		Fair		n		%		
	n	%	n	%				n	%				n	%	n	%					
Gender identity																					
Male	580	70	12.1%	510	87.9%	0.486	77	13.3%	418	72.1%	85	14.7%	0.649	5	0.9%	140	24.1%	435	75.0%	0.004	
Female	94	9	9.6%	85	90.4%		10	10.6%	72	76.6%	12	12.8%		1	1.1%	34	36.2%	59	62.8%		
Ethnicity																					
Eritrean	295	26	8.8%	269	91.2%	0.188	16	5.4%	258	87.5%	21	7.1%	0.001	2	0.7%	93	31.5%	200	67.8%	0.006	
Somalian	179	26	14.5%	153	85.5%		26	14.5%	111	62.0%	42	23.5%		1	0.6%	47	26.3%	131	73.2%		
Ethiopian	146	21	14.4%	125	85.6%		34	23.3%	88	60.3%	24	16.4%		1	0.7%	25	17.1%	120	82.2%		
Sudanese	54	6	11.1%	48	88.9%		11	20.4%	33	61.1%	10	18.5%		2	3.7%	9	16.7%	43	79.6%		
Marital Status																					
Single	84	14	16.7%	70	83.3%	0.132	11	13.1%	61	72.6%	12	14.3%	0.998	1	1.2%	11	13.1%	72	85.7%	0.017	
Married	590	65	11.0%	525	89.0%		76	12.9%	429	72.7%	85	14.4%		5	0.8%	163	27.6%	422	71.5%		
Education Level																					
Basic	508	16	3.1%	492	96.9%	0	76	15.0%	429	84.4%	85	16.7%	0.001	-		146	28.7%	362	71.3%	0	
High School	166	63	38.0%	103	62.0%		64	38.6%	86	51.8%	16	9.6%		6	3.6%	28	16.9%	132	79.5%		

$P < 0.05$ was set as statistically significant

Attitudes could be considered 'Fair' for most categories. But practices were considered 'Poor' for $> 2/3$'s of participants across all categories.

Discussion:

Results of this study clearly describe a low level of knowledge with associated attitudes, and poor practices with relation to HBV and HCV infection among sub-Saharan migrants appearing at Al Kufra in remote Southeastern Libya. The importance of this information is compounded by recent work at the same location showing high levels of HBV and HCV infection in 3000 migrants tested in 2019³². The high levels of infection and lack of appreciation for their significance are a threat to local populations and populations of transit and destination regions.

Study results clearly show poor KAP towards HBV and HCV among the subgroups from each of the origin countries, with comparably low levels across gender and age groups. While the migrants predominantly (75%) had little or no education, those with more education had better knowledge and attitudes regarding essential features of HBV and HCV but not better practices. An overwhelming lack of knowledge about the diseases, their mode of transmission, their serious consequences, and the possibility of prevention by vaccination was observed in this population. Most of these sub-Saharan participants did not know typical ways of transmission, prevention, and development of liver disease. In addition, participants were not aware of the different types of viral hepatitis and did not have access to information about their consequences. Only just over 15% the migrants in the study had basic knowledge about HBV and HCV as a disease of liver.

Similarly, most of the migrants in this study, just over 15%, did not consider HBV and HCV as a real risk for

themselves and for their family. The low levels of knowledge and associated attitudes undoubtedly contribute to their inadequate practices. Migrants participating in this study showed poorly supported attitudes and exceedingly poor practices towards HBV and HCV reflecting their very low state of knowledge important to minimizing risk and infection. A wide range of unsafe practices are evident in the survey responses, exposing the migrants to infection by blood borne diseases.

To the best of our knowledge, no other information on either levels of infection or KAP in relation to HBV and HCV, specifically in actively migrating populations is available. Some descriptions of KAP related to HBV and/or HCV have appeared for a range of populations in relatively high endemic areas and among populations having somewhat similar characteristics. The common element among previous findings is generally deficient understanding of the diseases, essential risk factors, consequences of infection, and means of prevention and/or treatment. A previous description of refugees at a location in Ethiopia found that only 11.0% of the refugees know the relationship between liver cancer and hepatitis B and C. Ethiopia has a population-wide prevalence of 7.4 and 3.1% for HBV and HCV respectively^{28, 33}. A screening survey of recent African origin immigrants in North Central USA showed a generally poor knowledge of transmission modes, means of prevention and disease consequences²⁹. Studies describing KAP in typical urban populations in Pakistan and Indonesia found that less than half of respondents had adequate knowledge of the diseases and consequences and that despite some knowledge,

practices and behaviors with respect to risk factors and prevention were generally low^{27, 34, 35}. Even among populations having medical and health care training or blood contact occupation (barbers in urban and rural Pakistan³⁶) surveyed have been shown to have generally inadequate HBV/HCV KAP. A survey of 150 practicing doctors in largely rural Southeastern Nigeria³⁷ to assess KAP of HBV and HCV found that none had “good” knowledge, over half (56%) had “fair” knowledge and 44% “poor”. In general, practices related to personal safety were limited including not having been vaccinated against HBV. Similarly, surveys of medical students in Pakistan³⁸ and health care workers in Georgia³⁹ have described levels of knowledge and practices regarding HBV and/or HCV to be inadequate.

Given the status of KAP among groups having access to information on HBV and HCV, given the demographic origins of the migrant population in this study, severely economically disadvantaged and poorly educated, the low levels of knowledge with associated attitudes and practices observed in this population certainly are understandable and undoubtedly contribute to high rates of HBV and HCV infection that were described in a previous study of migrants at this location³².

The flow of immigrants into Libya from neighboring countries has been increasing. However, there are no post-arrival screening mechanisms for hepatitis B and C viruses to assess migrant conditions or to support public health policy or actions. Accordingly, the purpose of this study was to assess the level of participating migrant's knowledge, attitude, and practices, regarding cause, transmission, prevention and treatment of viral hepatitis due to HBV and HCV. Libyan public health professionals are concerned as the country as a whole is classified among geographical regions with low-intermediate endemicity for hepatitis B virus infection and an area of low endemicity for hepatitis C. The prevalence of hepatitis B surface antigen (HBsAg) and anti-HCV antibodies in sub-Saharan African migrants has been found to exceed 30-50% indicating significant cause for concern³². A plausible reason for this high prevalence appears related to the lack of knowledge about HBV and HCV, their health significance, their means of transmission, of actions for preventing infection.

Study Limitations

The migrant population available for this study was limited to those passing through Al Kufra and presenting at the Red Crescent clinic for documentation in order to travel further in Libya or to remain in Al Kufra. Previous work³² suggests that as few as 10-20% of migrants passing through SE Libya attend the clinic to obtain documentation.

Further, this study population was predominantly male (86%) and predominantly married (87%). This did not reflect selectivity of the study but is apparently a characteristic of the migrant population from this region in general.

That the study population and the measured KAP is typical (representative) of all migrants passing through this region must be assumed.

Conclusions

In this screening study, the level of knowledge and awareness of migrant African populations transiting Libya was poor about the concepts of infectious risk associated HBV and HCV. Poor knowledge and lack of awareness of the African immigrants about HBV and HCV must contribute to the prevalence of these infections in developing countries compared with developed ones. Survey results demonstrate that knowledge on transmission is lacking, and awareness about HBV and HCV transmission to others is only fair. Lacking information about transmission and prevention, migrants are at risk of contracting HBV and HCV emphasizing the need for education to limit the spread of the blood borne disease. Opportunities exist for attention by Libyan health and immigration authorities to assist migrants seeking improved conditions. Poor knowledge and lack of awareness about HBV and HCV among sub-Saharan populations undoubtedly contribute to the spread of these infections in native countries and remains a threat to propagation within and among the population of destination regions.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Appendix

Table A1. Questions on Knowledge of study participating migrants about HBV and HCV

Knowledge Questions
<p>General questions:</p> <ol style="list-style-type: none"> 1. Have you ever heard about viral hepatitis? 2. Are Hepatitis B and C viral infection diseases? 3. Can hepatitis B or C be transmitted by contact with open wound/cut? 4. Can hepatitis B and C virus be spread by someone who looks healthy? 5. Is there a test that shows whether or not someone is hepatitis B or C positive? 6. Do you think people with hepatitis B can be infected for life? 7. Is there a vaccine for HBV? 8. Can hepatitis B be cured? 9. Can hepatitis C be cured? 10. Can HBV and HCV infection be passed from mother to child? 11. Can HBV and HCV be spread through social contact (e.g. shaking hands, sharing food or sneezing)? 12. Can hepatitis infection cause death? 13. Can people with Hepatitis B or C donate blood? 14. Can HCV infection be prevented? 15. Can HBV infection be prevented? 16. Can Hepatitis B and C be transmitted through air and water? 17. Have you ever been screened for HBV and HVC? 18. Have you been vaccinated against hepatitis B? 19. Is a vaccine for Hepatitis C available? <p>Significant risk factor questions:</p> <ol style="list-style-type: none"> 20. Can HBV and HCV be transmitted by un-sterilized syringes and needles? 21. Are HBV and HCV passed through contact with infectious blood, blood products and body fluids? 22. Can viral hepatitis B and C be transmitted by sharing needles for using drugs? 23. Can viral hepatitis B and C be transmitted by tattooing or body piercing? 24. Can viral hepatitis B and C be transmitted by sharing personal care items like toothbrush or razor? 25. Can hepatitis B and C be transmitted through sexual contact? 26. Can HBV and HCV be transmitted by a lack of sanitation services like bathrooms? <p>Common complications questions:</p> <ol style="list-style-type: none"> 27. Can a person be a carrier of HBV and HCV and can infect others without knowing it? 28. Can HBV and HCV infections result in chronic hepatitis? 29. Can HBV and HCV infections result in liver cancer? 30. Can HBV and HCV infections lead to liver cirrhosis? 31. Can HBV and HCV infections lead to fulminant hepatitis? 32. Can HBV and HCV infections cause yellow skin and eyes (jaundice) ? 33. Can HBV and HCV infections cause liver failure? 34. Can HBV and HCV infections cause death?

Table A2. Questions regarding Attitude of participating migrants about HBV and HCV

Attitude assessment questions
<ol style="list-style-type: none"> 1. I have no concern for being infected with Hepatitis B or C. 2. Hepatitis B vaccine is safe and effective. 3. All African migrant populations should be tested for hepatitis B or C before they receive health care. 4. I don't feel comfortable to live with people with Hepatitis B or C. 5. I believe that hepatitis infections can be transmitted through food. 6. I think hepatitis B is a curable disease. 7. I think that hepatitis B and C is a serious public health problem. 8. I can get hepatitis infection. 9. Viral hepatitis is something to worry about. 10. I believe that vaccination could prevent transmission. 11. I believe that healthy people need vaccination. 12. I believe that you need a vaccination at your age. 13. I believe that vaccine can be free or low cost through certain programs.

Table A3. Questions regarding Practices of participating migrants about HBV and HCV

Practice Assessment Questions
1. How often do you go for further investigation and treatment, if you are diagnosed with hepatitis B or C?
2. How often are social networks on the internet your source of hepatitis B or C information?
3. How often are friends as your source of hepatitis B or C information?
4. How often do you use a used needle/syringe by more than one person?
5. How often do you share intravenous drug use?
6. How often are razors and shaving blades used by more than one person?
7. How often do you screen for hepatitis B or C?
8. How often have you had sex within the last 12 months?
9. How often have you used condoms with non-steady/steady sexual partners within the last 12 months?
10. How often do you wash hands with tap water and soap?
11. How often do you refuse shaving with used instruments?
12. How often do you share eating utensils?