Research Article

iMedPub Journals
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Health Science Journal
ISSN 1791-809X

2022
Vol. 16 No. 5: 943

DOI: 10.36648/1791-809X.16.5.943

Factors Influencing Hepatitis B Virus Co-Infection among HIV Patients Attending Health Care Services in Mungula Health Centre IV Adjumani District, West Nile Region Uganda. Hospital-based cross-sectional study

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Citation: Drazidio J, Kirabira SP, Atuhairwe C, Alege JB (2022) Factors Influencing Hepatitis B Virus Co-Infection among HIV Patients Attending Health Care Services in Mungula Health Centre IV Adjumani District, West Nile Region Uganda. Hospital-based cross-sectional study. Health Sci J. Vol. 16 No. 5: 943.

Abstract

Background: Hepatitis B virus is the primary leading cause of morbidity and mortality among HIV patients and remains a remarkable public health burden. The global prevalence of co-infection is 7.4%, 23% in Uganda, and 1.68% in the Adjumani district. In 2016, The World Health Assembly endorsed the global health sector strategy on viral hepatitis, which calls for the elimination of viral hepatitis as a public health threat by 2030. As a measure, Uganda adopted WHO guidelines that recommend hepatitis B testing in all HIV-infected patients, but only 46% of them have screened. Therefore, this study assessed factors influencing HBV co-infection among HIV patients attending ART clinics in Mungula health Center IV, Adjumani district.

Methods: The study employed a hospital-based cross-sectional study design where 226 respondents were interviewed using researcher administered technique. Purposive and simple random sampling techniques were used to select the study unit and respondents. In the analysis, the Chi-square test established the level of association between each independent variable and HBV-co-infection while binary logistic regression analysis determined factors accountable for co-infection in HIV patients using an odds ratio at 95% confidence interval.

Results: 14.16% out of 226 respondents were found co-infected. The factors found associated included HBV screening [OR=3.29, 95%CI: 1.071-10.137, p-0.02], Vaccination against HBV [OR=12.018, 95%CI: 1.93-74.825, p-0.004)]. Expenses in accessing vaccination services [OR=6.137, 95%CI: 2.025-18.601, p-0.018] were contributing factors to the co-infection;

Conclusion: Extension of HBV screening and treatment services to all HIV clients through community outreaches.

Keywords: HIV; HBV; HIV/HBV co-infection

Received: 25-Apr-2022, Manuscript No. Iphsj-22-12755; **Editor assigned:** 27-Apr-2022, PreQC No. Iphsj-22-12554 (PQ); **Reviewed:** 11-May-2022, QC No. Iphsj-22-12755, **Revised:** 16-May-2022, Manuscript No. Iphsj-22-12755(R); **Published:** 23-May-2022, DOI: 10.36648/1791-809X.16.5.943

What is already known on this topic: Approximately, 35 million (32.2–38.8 million) individuals worldwide are HIV carriers, of which 3 to 6 million had chronic hepatitis B (CHB) with an estimated HBV co-infection incidence of 5–20%. Although co-infection with HIV and HBV is recognized as being common, there are limited data to provide an international perspective on this HBV co-infection among HIV patients in Adjumani, therefore this research study contributed to the identification of major determinants of HBV co-infection and established the exact frequency of the co-infection.

What this study adds; our study finding revealed that the prevalence of HBV co-infection among HIV patients in the Adjumani district is very high as compared to the national prevalence.

How this study might affect research, practice or policy; when appropriate interventions such as mandatory screening of HIV patients for HBV and vaccinations are not done, there is will high HBV related mortality, constraints health resources allocation because the HIV patients are treated with two different chronic diseases.

Introduction

Hepatitis B virus is among the primary causes of morbidity and mortality among HIV patients. World health organization [2] report revealed that about 2.6 million out of 36 million people living with HIV are co-infected with chronic hepatitis B virus. Hepatitis B virus co-infection has a significant association with reduced survival, increase risk of progression to liver cancer, and increased risk of hepatoxicity associated with antiretroviral therapy. In addition [3] revealed that HBV endemic countries accounted for 25% of co-infection from 350-400 million HIV-infected individuals. This co-infection occurs during childbirth due to a lack of resources for diagnosis and management of blood-borne viruses in pregnancy and per partum period. However, the prevalence of co-infection in Sub-Saharan Africa is attributed to shared risk factors and co-transmission events like sexual co-acquisition, unsafe injection, and traditional scarification practices [4].

In Brazil, a study conducted by [5] revealed that a number of sexual partners, practice of oral sex and anal sex influenced HBV co-infection among HIV patients. Furthermore, a consistent study conducted in central Nigeria revealed that heterosexuals among HIV patients were the risk factor influencing co-infection with 50% [6]. The result of risk factor analysis showed that infection through male homosexual contact had the highest rate, 64 (74.4%), and 16 (18. 6%) were IDUs. Similarly, a study conducted in Uganda indicated that having greater number of sexual partners was over represented in male population that had significant association with HBV co-infection [7]. Furthermore, a cohort study conducted among pregnant women in Nigeria showed a statistically significant association between multiple sex partners and rate of co-infection. In the sixty sub-Saharan African countries, the prevalence of HBV co-infection among HIV patients was 14.9% [8]. Higher than 7.4% in South Africa and Zambia and 7.0% among HIV patients in Botswana [9]. The difference in variation was due to perinatal transmission, close households contacts, medical, and cultural procedures, such as scarification and tattoos.

In Ghana, a hospitalized cohort study conducted among HIV positive patients at a tertiary care institution in Kumasi by [10]. Revealed that the prevalence of co-infection was 16.7%. This was due to health worker's knowledge on management of HBV.

Furthermore, several studies were conducted to scrutinize the epidemiology of HIV and HBV independently in sub-Saharan African countries, where both diseases have hit so hard. The study findings revealed that the prevalence of HBV co-infection in HIV patients was 9.9% in Zambia [11] as compared to the 17.5% in Malawi [12]. The variations of the estimates obtained from different areas of sub-Saharan Africa clearly demonstrated lack of on-going surveillance activities and screening services to determine presence of co-infection.

A study done in Nigeria revealed that pregnant women aged 36-40 years were more co-infected as compared to those 16-20 years [13]. On the contrary, a study done in Ghana revealed that HIV patients aged 31-40 years reported very high co infection rate 4.4% without cases observed in those 21 - 30 years age [14]. In the same study children below 18 years were more infected 30.7% compared to adults 7.8%.

In Uganda, the national prevalence of HBV co-infection was 3.9% attributed to low vaccination coverage against HBV and lack of awareness of the HIV patients on modes of transmission of HBV that put them at increased risk of the co-infection [15]. Meanwhile, a cohort study done in southwest region of Uganda found the prevalence rate of 3.9% among HIV patient [16] In addition, a similar study conducted in north western Uganda revealed that out of 438 respondents, 7% of the HIV infected patients were HBsAg positive. This was due to law screening and vaccination services against HBV particularly among susceptible HIV adults. On the other hand, a study conducted in north western Uganda revealed that men had a significant relationship with co-infection unlike their female counterparts 6.2% vs 2.95 (54/886) and (55/1934) [17].

In Adjumani district, the prevalence of HBV co-infection among HIV patients was 1.68% irrespective of availability of its free screening services and vaccination installed by the government in all health centers, IIIs and IV (HMIS 080 2017). At present, there is limited information on prevalence of HBV co-infection and its associated factors among HIV patients in Uganda especially Adjumani district due to limited research study conducted. To the best of my knowledge, this is the first study conducted to determine the prevalence and factors associated with hepatitis

Table 1. Types of oral clefts according to Spina et al. (1972) classification modified by Silva-Filho et al. (1992).

Groups	Classification	Structures	Involved	Sub classification
Group 1	Pre-foramen fissures incisive for man	primary palate, lip and/or alveolar ridge without exceeding the incisive foramen	Unilateral Bilateral Mediana	Complete or incomplete right Complete or incomplete left Complete or incomplete Complete or incomplete
Group 2	fissures incisive transform amen	primary palates and secondary, spanning from the lip to soft palate	Unilateral Bilateral Mediana	Right or left
Group 3	Post foramen fissures incisive	exclusively palate	-	Complete or incomplete
Group 4	Rare cracks of face	nose and cheekbones		

B virus co-infection among HIV infected persons in Adjumani district. Therefore, the purpose of this study was to identify possible areas of intervention and strategic policy directions to the screening of all HIV patients for HBV. However, it was crucial to determine the proportion of HIV patients co-infected with HBV at Mungula health Centre IV for better allocation of resources to enhance preventive and treatment measures. Additionally, the findings obtained will provide important information for stakeholders within and out Adjumani district involved in the fight against HBV and HIV care and treatment.

Methodology

Study design and setting

This was health facility based analytical cross-sectional study conducted at Mungula health Centre IV at ART clinic between July and August 2017. In this study, both qualitative and quantitative data were collected using structured and open-ended questions. A quantitative questionnaire was design to capture information on socio-demographics, economic factors, and life style and knowledge factors influencing HBV co-infection among HIV patients. Mungula health Center IV is government health facility that serves both nationals and refugees in Mungula refugee's settlement.

Study population

The study population was HIV positive clients diagnosed in the past three months attending ART clinic in Mungula health Centre IV, Adjumani district. The sample size was determined using Taro Yamane formula of 1973 at 95% level of confidence and the proportion of attribute available in the study population was taken at a 5% with 10% non-response rate of the study participants. This formula was used based on known population of N vs n where N is the number of HIV patients attending ART clinic at Mungula health Centre IV.

The formula is written as $\mathbf{n = \frac{N}{(1 + N e^2)}}$

Where N is the total population of HIV patients attending ART clinic, n= is the required was the required sample size. e^2 is the margin of error allowed at 95% level of confidence.1 is a constant in the formula. But N= 420 HIV patients (hospital record 2017).

Therefore, $n = \frac{420}{(1+420*0.05*0.05)} = 205$

None response rate of 10%= 205*0.1 gives 21; Therefore, n= 205+21 gives 226 participants.

The respondents were recruited using the inclusion of criteria of age 18 years above but below 70 years. This was done using ART register to conform that the patient had been registered/ enrolled on ART at the clinic. However, simple random sampling technique was used to select the study respondents and purposive non probability sampling technique was used to select five key informers.

Interviews

The interviews were conducted using structured questionnaire and key informant interview guide to obtain information ranging from demographic characteristics (Age, sex, marital status, religion, education level and occupation), Knowledge factors (Knowledge of co-infection causes, knowledge of co-infection services, knowledge of co-infection treatment, and knowledge of co-infection prevention).

Socio-demographic variables

The socio-demographic variables included in the analysis were age, sex, marital status, religion, level of education and HBV screening status and its test result.

Knowledge variables

The knowledge factors examined in this analysis were Knowledge of causes of HBV co-infection, knowledge of services for co-infection, knowledge of treatment of co-infection and knowledge of co-infection prevention.

Data handling and statistical analysis

The data was entered using EPIdata version 3.1 and analyzed using statistical package for social sciences version 24.0. The proportion of HBV co-infection among HIV patients was expressed using percentages with corresponding frequencies. Pearson chi-square was used to determine the level of association between each independent variables and HBV co-infection at 95% confidence level. However, fisher exact test was used to establish the level of association for variables whose cell counts were less than 5 at 95% confidence level. Multiple logistic regressions was used to determine independent predictors that significantly contributed to HBV co-infection among HIV patients using probability value (p-value) ≤0.05. At multivariate analysis, only variables that were statistically significant at bivariate analysis were fitted in the model.

Ethical Considerations

During our study time (year 2017 below), undergraduate students were not submitting protocols for ethical review but we were required to submit to the faculty of public health and management to approve for data collection.

Results

Two hundred and twenty-six HIV infected patients were recruited during the study period, of which 58% were female, 38.1% were aged 20 to 30 years, 49.6% were married, and 43.6% Catholics and 53.5% had non-formal education.

The study found that 53.1% of the respondents had screened for HBV, and of those 14.16% were HBV co-infected with HIV. However, results obtained from key informant interview revealed very few cases of HBV co-infection among HIV patients. One respondent was quoted" We have registered few cases of HBV co-infection among HIV patients because we started screening for HIV concurrently with HBV of recent that made us to obtain very few numbers.

The majority of those who have been diagnosed with HIV one year below (below 2017) missed HBV screening and found it hard to go back for HBV screening due to the fear that they

may be diagnosed with it which may cause discrimination and stigmatization since very few people have understood about HBV in their communities. Another challenge they faced is that when someone tests HIV positive, they hardly belief the test result, thus do not enrol in to ART and lost to follow up that makes screening for HBV difficult. (KI, IN-CHARGE ART CLINIC) (**Tables 1 and 2**).

There was statistically significant relationship observed between marital status and HBV co-infection among HIV patients in this study (p=0.018). Similarly, results obtained from key informant interview revealed that single respondent had higher chances of HBV co-infection with HIV. Quotation during key informant interview states "Majority of the respondents who are not married and young are more likely to be co-infected due to lack of resources to take care of themselves and children, they tend to involve into transactional sex to earn a living which predisposes them to HBV after HIV infection and single people do not have control from anyone thus engage in to sexual activity at any time according to their will.

He further emphasized that majority of single people are adolescents who are sexually active compared to their counterpart therefore they fill having sex is a priority and their principle is to first have sex before getting involve in to courtship and this occurs mostly at functions **(KI, ART NURSE).**

Table 1. Socio-demographic characteristics of study population (n=226).

Variables	Responses	Frequency (n=226)	Percentage (%)
Age	< 20 years	21	9.3
	20-30 years	86	38.1
	31-40 years	65	28.8
	41-50 years	27	11.9
	51 years and above	27	11.9
Sex	Male	95	42
	Female	131	58
Marital status	Single	66	29.2
	Married/cohabiting	112	49.6
	Divorced	28	12.4
	Widow/widower	20	8.8
Religion	Catholic	99	43.8
	Protestants	51	22.6
	Muslim	20	8.8
	Born again	23	10.2
	Others	33	14.6
Education level	Pre-primary	14	6.2
	Primary	62	27.4
	Secondary	21	9.3
	Tertiary	8	3.5
	Non-formal education	121	53.5
Screened for HBV	Yes	120	53.1
	No	64	28.3
	Don't know	42	18.6
Test result for HBV	Positive	33	14.6
	Negative	87	38.5
	Don't know	106	46.9
	Total	**226**	**100**

Table 2. Socio-demographic characteristics associated with HBV co-infection among HIV patients.

Variables	Category	HBV co-infected		Total	χ2	P-value
		Yes	No			
Age	< 20 years	2(6.3%)	19(9.8%)	21(9.3%)	0.999	0.908
	20-30	12(37.5%)	74(38.1%)	86(38.1%)		
	31-40	11(34.4%)	54(27.8%)	65(28.8%)		
	41-50	4(12.5%)	23(11.9%)	27(11.9%)		
	51 years and above	3(9.4%)	24(12.4%)	27(11.9%)		
Sex	Male	14(43.8%)	81(41.8%)	95(42.0%)	0.045	0.849
	Female	18(56.3%)	113(58.2%)	131(58.0%)		
Marital status	Single	13(40.6%)	53(27.3%)	66(29.2%)	9.546	0.018*
	Married / cohabiting	14(43.8%)	98(50.5%)	112(49.6%)		
	Divorced	0(0.0%)	28(14.4%)	28(12.4%)		
	Widow / widower	5(15.6%)	15(7.7%)	20(8.8%)		
Religion	Catholic	17(53.1%)	82(42.3%)	99(43.8%)	2.13	0.729
	Protestants	5(15.6%)	46(23.7%)	51(22.6%)		
	Muslim	2(6.3%)	18(9.3%)	20(8.8%)		
	Born again	4(12.5%)	19(9.8%)	23(10.2%)		
	Never	4(12.5%)	29(14.9%)	33(14.6%)		
Education level	Pre -primary	5(15.6%)	9(4.6%)	14(6.2%)	5.015	0.249
	Primary	8(25.0%)	54(27.8%)	62(27.4%)		
	Secondary	2(6.3%)	19(9.8%)	21(9.3%)		
	Tertiary	1(3.1%)	7(3.6%)	8(3.5%)		
	Never	16(50.0%)	105(54.1%)	121(53.5%)		
Screened for HBV	Yes	17(53.1%)	103(53.1%)	120(53.1%)	8	0.016*
	No	4(12.5%)	60(30.9%)	64(28.3%)		
	Don't know	11(34.4%)	31(16.0%)	42(18.6%)		
Total		**32(100.0%)**	**194(100%)**	**226(100%)**		

Therefore, more public health intervention should be directed to the youths like forming association and creation of vocational schools that can make them earn a living instead of engaging in to cross generational and transactional sex.

In addition, the study finding revealed that having screened for HBV was found associated with its co-infection (p=0.016). this corresponds with qualitative result which revealed that most of the HIV patients after testing and being diagnosed negative with HBV influences them to engage in to more sexual act compared to those diagnosed with the disease and those who have not yet screened thus ignore the uptake of vaccination as a result HBV comes as an opportunistic infection**, (KI, ART COUNSELOR).**

This implies that vaccination should be initiated immediately after HBV screening for those who are negative and those who tested positive should be initiated on treatment as soon as possible. Furthermore, HBV vaccination should be given during community outreach program on criteria that the community members present with their previous vaccination card or books to curb the prevalence rate.

As much as level of education was found not associated with

HBV co-infection using quantitative data, results obtained from key informant interview revealed statistical relationship as evidence below. Level of education significantly influenced HBV co-infection among HIV patients because most highly educated people secondary and above feel they know more than any other person in the community as a result they ignore community outreach programs conducted on HBV prevention by health workers (**KI, NURSING OFFICER).**

This implies that there is need for conducting outreach programs in secondary schools and tertiary institutions to inform them about HBV infection.

Factors associated with HBV co-infection among HIV patients

In a multivariate analysis, having been screened for HBV was found associated with co-infection. Vaccinating against HBV, number of doses, reasons for not vaccinating and ways of preventing HBV infection was found associated with HBV co-infection. However, respondents who had screened against HBV were three more protected from co-infection as compared to those who did not screen (OR=2.294;95%CI:1.071-10.137, p=0.02). Similarly, high chances of protection from HBV co-infection were seen among respondents who had vaccinated against HBV as compared to those who did not (OR=12.018;95%CI:1.93-74.825, p=0.004). However, respondents who had received three shots (doses) had reduced odds of HBV co-infection unlike those who had one shot (OR=0.196; 95%CI: 0.049-0.784, p=0.003). Furthermore, the study found that respondents who reported expense involved as a reason for not vaccinating against HBV were six times more likely to be co-infected (OR=6.137;95%CI:2.025-18.601,p=0.018) (**Table 3**).

Table 3. Socio-demographic and knowledge variables associated with HBV co-infection among HIV patients.

Variables	P-Value	OR	95% C.I. for OR	
			Lower	Upper
Marital status	**-**	-	-	-
Single	0.49	**1.725**	**0.379**	**7.85**
Widows/widowers	-	**1**	**Reference**	-
Level of education	**-**	-	-	-
pre-primary	0.391	1	Reference	-
Secondary	0.535	1.478	0.044	49.867
Tertiary	0.535	0.257	0.022	2.99
Knowledge factors	**-**	-	-	-
Done HBV screening	**-**	-	-	-
Yes	**0.02**	**3.294**	**1.071**	**10.137**
No	-	1	Reference	-
Causes of HBV co-infection	-	-	-	-
Having unsafe sex		-	-	-
Yes	0.563	1.385	0.394	4.868
No	-	1	Reference	-
Have you vaccinated against HBV	**-**	-	-	-
Yes	**0.004**	**12.018**	**1.93**	**74.825**
No	-	1	Reference	-
How many does have you received	-	-	-	-
One	-	1	Reference	-
Two	0.005	1.705	0.153	18.965
Three	**0.003**	**0.196**	**0.049**	**0.784**
Reasons for not vaccinating		-	-	-
Expense involve	**0.018**	**6.137**	**2.025**	**18.601**
Ways of preventing HBV infection	-	-	-	-
Vaccination	0.24	0.541	0.186	1.576

Discussion

The study finding revealed high (14.16%) prevalence of HBV co-infection among HIV infected patients attending ART clinic at Mungula health IV Adjumani district. This prevalence is higher than 3.9% obtained in a cohort study done in south western Uganda by [16]. Similarly, [6] revealed lower prevalence in Garuku central Nigeria (13% vs 14.6%. On the contrary, the prevalence HBV co-infection in HIV was found higher 16.7% in Ghana [10]. Our study finding is attributed to late initiation of HBV screening among HIV patients, inadequate uptake of HBV vaccinations which increased prevalence of HBV co-infection. More so, being single and having limited knowledge about HBV infection increased chances of co-infection.

The study also established what causes the spread of HBV co-infection, and the results indicated that having unsafe sex, sharing tooth brush, unsafe delivery and sharing of food and drinks were found associated with HBV co-infection with HIV. Our study finding was consistent with results obtained from Malaysia among international students which showed that being aware about HBV infection, routes of transmission had strong correlation with its co-infection among HIV patients, r 0.73, p-value<0.001 (50.3%) [17].

Furthermore, our study established that respondents that had screened for HBV had three times increased chances of being protected from co-infection unlike those who were not screened. This finding was in correspondence with result obtained in Malaysia which revealed that screening for HBV had significant influence to its co-infection among HIV patients [18]. Similarly, findings in central Nigeria indicated that inadequate screening services influenced HBV co-infection by 13% and reduce prognosis significantly [19].

Our study result showed that uptake HBV vaccination was found associated with HBV-co-infection. Thus, those who got vaccinated were 12 times most likely to be protected co-infection unlike their counterparts. This is because the vaccine inhibits the development of the virus in to an infectious organism in the body.

Our study finding revealed that being knowledgeable methods of HBV prevention were found associated with co-infection among HIV patients. For example, using sterilized medical instrument was found determinant factor of preventing HBV co-infection and having had community health talks on hepatitis B virus raises people's awareness on prevention of Co-infection. This is consistent with findings in Kenya which indicated that public health intervention strategies like health education on having safe sex, dangers of having multiple sexual partners and

avoidance of close contact with body fluid determines HBV co-infection because health education conducted raises awareness about risk factors that increases co-infection [20]. Therefore, conducting public health education about dangers of HBV co-infection can significantly influence on its co-infection among HIV patients in Mungula health Centre IV.

Conclusion

The prevalence of HBV co-infection among HIV patients was very high, emphasing the importance of screening all HIV patients for HBV in the whole district to establish the exact prevalence of co-infection for proper medical and public intervention strategies. Additionally, this study found that knowledge variables such as HBV screening, vaccination against HBV, number of doses received and expense involved significantly determined HBV co-infection among HIV patients.

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