



Prevalence of hepatitis B and associated factors in the Buea Regional Hospital, Cameroon

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ABSTRACT

Introduction: Hepatitis B infection is a serious global health problem worldwide. In Cameroon, this infection shows a great variability in prevalence in the country and even within different population groups. However, the prevalence of HBV in the southwestern region is not yet known.

Objectives: This study was conducted to determine the prevalence of hepatitis B, its associated factors, and the patient's knowledge about the infection at the Buea Regional Hospital.

Method: We conducted a hospital-based cross-sectional study from March 29th to June 30th, 2021 involving participants of both sexes with ages ranging from 13 to 60+. A random sampling method was used to obtain a sample size of 113 participants as calculated using Lorentz's formula. The study questionnaires were administered to participants and their blood samples were collected by venous puncture. The blood samples were collected in non-heparinized test tube at the collection units of the Hospital. Diaspot one-step Hepatitis B Surface Antigen test strips with 99% sensitivity and 97% specificity were used to determine the status of the participants. The data were analysed using SPSS 25.0. Bivariate and multivariable analyses were used to obtain associated factors. The level of significance was set at $p \leq 0.05$.

Results: A total of 125 participants were recruited. However, only 119 provided complete data (questionnaire and blood samples). A proportion 61 (51.3%) of the participants were females in the 20–29-year age group. The prevalence of hepatitis was 8.4%. Fifty-three percent (64) of the participants had adequate knowledge of Hepatitis B. Having had more than one sexual partner in the last six months and having visited a dentist in the past was significantly associated with Hepatitis B positive status ($p \leq 0.05$).

Conclusion: The prevalence of Hepatitis B in the Buea Regional Hospital is 8.4% and 53.8% of the participants had adequate knowledge of the infection. Males were found to be 13.17 times more likely to be positive for Hepatitis B infection than females.

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1. Introduction

Hepatitis B is a potentially life-threatening but preventable disease caused by the hepatitis B virus, which is characterized by inflammation of the liver [1]. This infection can either be acute or chronic [2]. Most children who are infected with the virus remain asymptomatic but are at a higher risk of developing chronic Hepatitis B infection [3]. Approximately 30% of the world's population has serological evidence of Hepatitis B infection [4]. In 90% of adult cases, the infection is self-limited as the virus is cleared by the immune system and the remaining 10% develop chronic liver disease [5]. In many parts of the world, prenatal transmission is the most common route of infection [6]. Other routes of transmission include contact with infected blood, body fluids (sweat, saliva) and sexual intercourse [7]. The current prevalence of Hepatitis B in Cameroon is 11.2% [8]. However, sufficient sensitization and preventive measures have been applied in recent years. To ensure these efforts have better outputs, there is a need to frequently monitor the level of awareness of the infection among the Cameroonian population. The present study was therefore designed to determine the prevalence of Hepatitis B infection, the level of knowledge and other associated factors among patients in the Buea Regional Hospital to generate data that could create awareness and preventive measures.

2. Materials and methods

2.1. Study area and settings

This study was conducted at the Buea Regional Hospital. This is a teaching hospital serving as a referral centre for district hospitals in the Cameroon's southwestern region and its environs.

2.2. Study design and study period

This study was a hospital-based cross-sectional design conducted from March 29th to June 30th, 2021.

2.3. Study population

The study population comprised patients above 13 years of age and were managed at the Buea Regional Hospital.

> Inclusion criteria:

- ✓ Patients seen at the Buea Regional Hospital.
- ✓ Patients between 13 and 60+ years of age.

> Exclusion criteria:

- ✓ Mentally disabled patients.
- ✓ Patients with documented vaccination status.

2.4. Sample size calculation

The sample size was calculated using Lorentz's formula, $N = \frac{Z^2(p)(1-p)}{E^2}$.

Z (constant) = 1.96,

p (prevalence from a similar study [9]) = 9.7%, E (level of precision) = 0.05.

$N = 113$ participants +10% non-response rate = $113 + 11 = 124$ participants.

2.5. Sampling method

The random sampling method was used. The participants from 13 years and above in all the units in the hospital were approached, and does willing to participate in the study were recruited.

2.6. Data collection

2.6.1. Administration of questionnaires

Participants above 13 years of age was approached in all the units of the Buea Regional Hospital. Consent forms were signed by the participants and returned before the questionnaire was administered. The questionnaire was organised in three sections to assess the sociodemographic characteristics, the level of awareness of hepatitis B, and the risk factors for Hepatitis B. Participants who could not read or write had their answers filled out by the investigators after they were given a thorough explanation of each question verbally.

2.6.2. Blood sample testing procedure

With protective gloves covering the hand, venous blood samples were collected in a simple 5millitres venous blood collection tube. The blood samples were transferred to nonheparinized vacutainer tubes. The samples were carried from the collection unit to the

serology unit, where they were centrifuged to obtain sera. Diaspot one-step Hepatitis B Surface Antigen (HBsAg) test strips with 99% sensitivity and 97% specificity were used to determine the status of the participants. The strips were inserted into the red tube up to the mark but did not touch the red cells below. The strips with the participant's sera were placed on the workbench and left for 15 min before they were read.

The strips were interpreted as follows:

- ✓ A coloured band on the control (C) and test (T) regions indicated a positive result.
- ✓ A coloured band on only the control region indicated a negative result.

2.7. Data management and data analysis

The codes were given to each participant on their questionnaires. The data were compiled in Microsoft Excel and analysed using SPSS version 25. Bivariate and multivariable analyses were used to obtain associated factors. The p-value was set to be less than or equal to 0.05.

2.8. Ethical issues and administrative authorisation

Ethical clearance was obtained from the Institutional Review Board at the Faculty of Health Sciences, University of Buea Reference number 2021/1464-05/UB/SG/IRB/FHS of May 18, 2021. The administrative authorisation was also obtained from the Delegation of Public Health South West Region and from the Buea Regional Hospital Reference number A5/MPH/SWRDPH/BRH/IRB of April 28, 2021.

The participants were given consent forms to sign after the details (nature, risks, and benefits) of the study were explained and where necessary their decision was respected. These participants were given codes for confidentiality. The consent forms containing their names were kept separate from the data collection forms. Also, the participants were informed of no financial benefit to giving their consent or participating in the study but that the information obtained at the end of the study would improve scientific knowledge and help in the future management of Hepatitis B infection. In addition, at the end of each analysis, patients received their results with specific instructions on their follow-up.

3. Results

A total of 125 participants were recruited, of which 119 provided data (questionnaire and blood samples), six participants being unable to provide blood samples.

Table 1
Sociodemographic Characteristic of study participants, Buea Regional, Hospital South-Western Cameroon, 2021 (N = 119).

Variables	Categories	Frequency (n)	Percent
Gender	Male	58	48.7
	Female	61	51.3
	Total	119	100.0
Age	13–19	21	17.6
	20–29	40	33.6
	30–39	26	21.8
	40–49	19	16.0
	50–59	8	6.7
	60+	5	4.2
Marital status	Married	32	26.9
	Single	78	65.5
	Cohabiting	3	2.5
	Divorced	2	1.7
	Widow/widower	4	3.4
	Total	119	100.0
Religion	Christian	117	98.3
	Muslim	1	0.8
	Others	1	0.8
	Total	119	100.0
Level of education	None	4	3.4
	Primary	10	8.4
	Secondary	18	15.1
	High	13	10.9
	University	74	62.2
	Total	119	100.0

3.1. Sociodemographic data

A slightly higher proportion 64 (51.3%) of the participants were females. Six one (33.6%), of the participants were in the age group 20–29 years, of which 78 (65.5%) were single 117 (98.3%) of Christians, with the majority 74 (62.2%) had attended the university level of education, as shown in [Table 1](#) below.

3.2. Prevalence of hepatitis B infection

The prevalence of Hepatitis B infection was 8.4%, which is 10 positive cases out of 119 participants.

The results on the level of knowledge of Hepatitis B infection is presented in [Tables 2a](#) and [2b](#). Up to 64 (53.8%) of the participants had adequate knowledge of Hepatitis B infection as they answered at least six out of the twelve questions. Most of the participants had heard about the disease, 81 (68.1%) were aware that it is a deadly disease and 47 (39.5%) knew that it was caused by a virus. They were also aware of some of the preventive measures, including the vaccine. However, a slightly higher proportion of the participant was not aware that the infection had no defined cure.

3.3. Factors associated with hepatitis B infection

3.3.1. Sociodemographic factors associated with hepatitis B infection

The highest number of HBV positive cases, (three) were observed in the participants aged 30–39 and 40–49 years of age respectively. However, age was not significantly associated with Hepatitis B positive status. Only sex and education were significantly associated with Hepatitis B infection. All other demographic factors were not found to be significantly associated with being positive for HBV ([Table 3](#)).

3.3.2. Other factors associated with HBV infection

Having more than one sexual partner in the last six months was significantly associated with HBV infection ($p \leq 0.05$). Having visited a dentist also had a significant associated with the infection ($p \leq 0.05$) ([Table 4](#)).

3.3.3. Significant predictors

In the multivariable analysis, being a male was found to be a significant predictor of being positive for hepatitis. Males were 13.17 times more likely to be positive for Hepatitis B than females ([Table 5](#)).

4. Discussion

The prevalence of Hepatitis B infection in the Buea Regional Hospital was found to be 8.4% ([Fig. 1](#)). This is lower than the prevalence of a study carried out by [9] in the Buea health district among pregnant women which reported a prevalence of 9.7%. This confirms the declining trends of HBV infection in the world in general in Asian and African countries in particular. This is a consequence of the integration of hepatitis B vaccination in developing countries, where higher levels of immunisation are observed among young people. The level of Hepatitis B immunisation coverage varies between 79% in 2005 and 89% in 2013 [10,11]. This could also be due to a greater proportion of the population 64 (53.8%) having adequate knowledge about the infection and practicing preventive

Table 2a
Knowledge of Hepatitis B infection, Buea Regional Hospital, southwestern Cameroon, 2021 (N = 119).

Variables	Categories	Frequency (n)	Percent
Knowledge	Inadequate knowledge	55	46.2
	Adequate knowledge	64	53.8
Total		119	100.0
Knowledge Questions			
Heard of Hepatitis B	No/I don't know	13	10.9
	Yes	106	89.1
Know that Hepatitis B is a Deadly Disease	No/I don't know	38	31.9
	Yes	81	68.1
Know that Hepatitis B Is a Viral Infection	No/I don't know	47	39.5
	Yes	72	60.5
Hepatitis B can Be Tested for in The Lab	No/I don't know	50	42.9
	Yes	69	57.1
Hepatitis B can Be Transmitted from Person To Person	No/I don't know	46	37.8
	Yes	73	62.2
Hepatitis B can Be Transmitted Through Contact with Infected Body Fluid	No/I don't know	56	46.2
	Yes	63	53.8
Hepatitis B Is an STI	No/I don't know	64	52.9
	Yes	55	47.1
Hepatitis B Affects the Liver	No/I don't know	62	52.1
	Yes	57	47.9

Table 2b

Knowledge of Hepatitis B infection, Buea Regional Hospital, southwestern Cameroon, 2021 (N = 119).

Variables	Categories	Frequency (N)	Percent
Hepatitis B can be Prevented by Safe Sexual Practices	No/I don't know	63	52.9
	Yes	52	47.1
The existence of Hepatitis B Vaccine	No/I don't know	45	37.8
	Yes	74	62.2
Preventive measures of Hepatitis B is vaccin	No/I don't know	57	47.9
	Yes	62	51.3
Curative of Hepatitis B	Yes	84	69.7
	No/I don't know	35	30.3

Table 3

Demographic factors associated with Hepatitis B infection, Buea Regional Hospital, Southwestern Cameroon, 2021 (N = 119).

Variables	Categories	Total N (%)	Negative n (%)	Positive n (%)	P value
Age	13–19	21 (17.6)	21 (17.6)	0 (0.0)	0.184
	20–29	40 (33.6)	38 (31.9)	2 (1.7)	
	30–39	26 (21.8)	23 (19.3)	3 (2.5)	
	40–49	19 (16.0)	16 (13.4)	3 (2.5)	
	50–59	8 (6.7)	6 (5.0)	2 (1.7)	
	60–69	5 (4.2)	5 (4.2)	0 (0.0)	
Total		119 (100.0)	109 (91.6)	10 (8.4)	
Sex	Male	58 (48.7)	53 (44.5)	5 (4.2)	0.004
	Female	61 (51.2)	56 (47.1)	5 (4.2)	
	Total	119 (100.0)	109 (91.6)	10 (8.4)	
Marital Status	Married	32 (26.9)	29 (24.4)	3 (2.5)	0.156
	Single	78 (65.5)	73 (61.3)	4 (4.2)	
	Cohabiting	3 (2.5)	3 (2.5)	0 (0.0)	
	Divorced	2 (1.7)	1 (0.8)	1 (0.8)	
	Widow/widower	4 (3.4)	3 (2.5)	1 (0.08)	
	Total		119 (100.0)	109 (91.6)	
Education	None	4 (3.4)	2 (1.7)	2 (1.7)	0.050
	Primary	10 (8.4)	9 (7.6)	1 (0.8)	
	Secondary	18 (15.1)	17 (14.3)	1 (0.8)	
	High	13 (10.9)	12 (10.1)	1 (0.8)	
	University	74 (62.2)	69 (58.0)	5 (4.2)	
	Total		119 (100.0)	109 (91.6)	

Table 4

Factors associated factors with HBV infection, buea regional hospital southwestern, Cameroon, 2021 (N = 119).

Variables	Categories	Total N (%)	Negative n (%)	Positive n (%)	P value
Living or working With Someone Infected With Hepatitis B	Yes	17 (14.3)	17 (14.3)	0 (0.0)	0.163
	No	69 (58.0)	64 (53.8)	5 (4.2)	
	Don't know	33 (27.7)	28 (23.5)	5 (4.2)	
	Total	119 (100.0)	109 (91.6)	10 (8.4)	
The use of Injectable Drugs	Yes	8 (6.7)	6 (5.0)	2 (1.7)	0.136
	No	111 (93.3)	103 (86.6)	8 (6.7)	
	Total	119 (100.0)	109 (91.6)	10 (8.4)	
Number of Sexual Partner in The Last Six Months	Yes	39 (32.8)	33 (27.7)	6 (5.0)	0.055
	No	80 (67.2)	76 (63.9)	4 (3.4)	
	Total	119 (100.0)	109 (91.6)	10 (8.4)	
Visiting the Dentist For a Dental Procedure	Yes	29 (24.4)	24 (20.2)	5 (4.2)	0.049
	No	90 (75.6)	85 (71.4)	5 (4.2)	
	Total	119 (100.0)	109 (91.6)	10 (8.4)	

measures. Moreso, a low prevalence of HBV infection among young people in Sub-Saharan Africa is increasingly observed.

The results also shows that a higher proportion (64, 53.8%), of participants had adequate knowledge about the infection including its cause, treatment, and prevention. Therefore, they were higher compared to the knowledge of participants in a study carried out by Ref. [9], where only 16% of the participants were reported. This could be because more than half of the participants (74, 62.2%), had attained tertiary education and heard of the disease. The associated demographic factors, sex and level of education, were factors associated with the HBV positive status. Males were 13.17 times more likely to be positive for Hepatitis B infection than females. This is similar to a study carried out by Ref. [12], indicating the difference in the males and females lifestyles could be responsible. The relationship between male sex and viral hepatitis B is not certainly known. In addition to lifestyle risk factors, there are genetic factors

Table 5
Significant predictors of Hepatitis B infection, Buea Regional Hospital Southwestern, Cameroon, 2021 (N = 119).

Variables	OR	P-value	AOR	95% confidence interval	
				Lower	Upper
Sex	30.210	0.000	13.177	14.506	19.694
Male					
Female	0 ^b	–	–	–	–
Marital status	8.407	0.922	4.478	0.371	3.734
Married					
Not Married					
Education	–3.305	0.178	0.037	0.011	4.508
None					
Primary	–1.914	0.005	0.147	0.259	4.092
Secondary	–2.340	0.002	0.096	0.217	3.940
High	.013	0.993	1.013	0.062	16.650
University	0 ^b	–	–	–	–
Been with a patient	10.786	0.865	4.832	0.601	3.883
Yes					
No	1.233	0.226	3.430	0.466	25.235
Don't know	0 ^b	–	–	–	–
Used injection drugs	.895	0.998	2.448	0.000	5.462
Yes					
No	0 ^b	–	–	–	–
Previous operation	–1.656	0.200	0.191	0.015	2.400
Yes					
No	0 ^b	–	–	–	–
Dental procedure	–1.791	0.098	0.167	0.020	1.392
Yes					
No	0 ^b	–	–	–	–

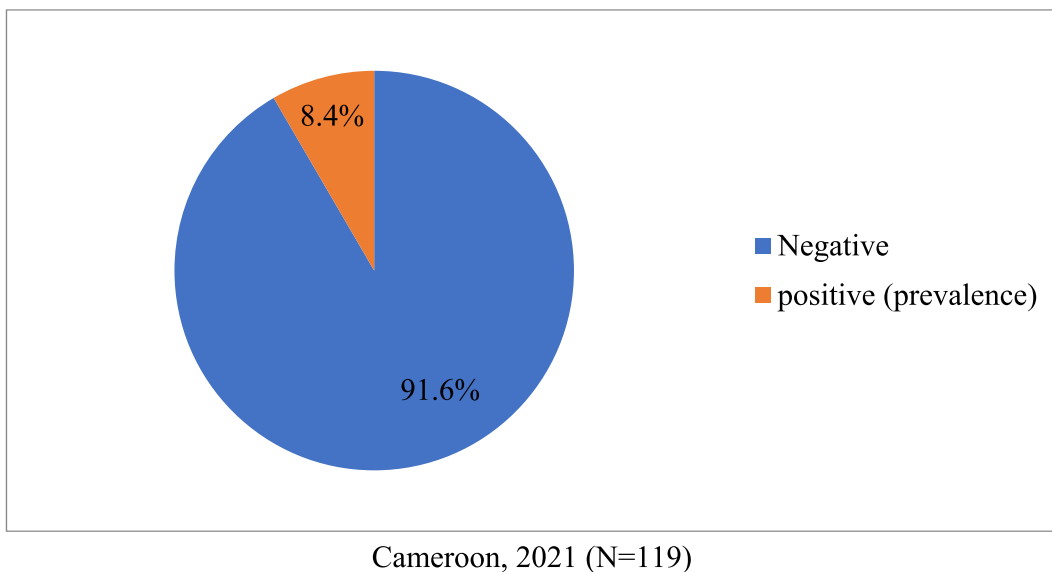


Fig. 1. Prevalence of Hepatitis B infection Buea Regional Hospital, Southwestern Cameroon, 2021 (N = 119).

and factors related to the virus. HBV X protein has been shown to enhance the transcriptional activity of Androgene Receptors (Ars) in an androgen concentration–dependent manner, which may amplify the sex difference in HBV-infected patients [13]. Having had more than one sexual partner in the last six months and having visited the dentist were the only two significant factors associated with HBV positive cases. This is similar to a study conducted by Refs. [14,15]. This similarity could be because sexual intercourse and dental procedures involve contact with bodily fluids, which is one of the main routes of HBV transmission.

5. Strengths and limitations

1. Strengths

- ✓ The site of the study was easily accessible.
- ✓ Most participants were curious about the infection so minimal convincing was needed.

✓ Specimen procession was facilitated as the study was carried out in the laboratory.

2. Limitations

Some participants especially the ward patients who gave their consent and filled the questionnaires were not able to provide adequate blood samples reducing our total number of participants.

6. Conclusion

The prevalence of Hepatitis B infection in the Buea Regional Hospital was found to be 10 (8.4%). Additionally, 64 (53.8%) of the participants involved in the study were found to have adequate knowledge about the infection. The participants who had visited a dentist and those with more than one sexual partner in the last six months were more prone to Hepatitis B infection. However, a well-designed epidemiological study is required to get a more comprehensive understanding about HBV infection in South western region, Cameroon.

Author contribution statement

Claudia Noubissie Nzechieu Evenge; Elisabeth Zeuko'o Menkem: Conceived and designed the experiments; Performed the experiments; Analysed and interpreted the data; Wrote the paper. Eleonore Ngounou; Djakissam Watching; Erastus Nembo Nembu; Woquan Sama Luma; Armel Jackson Seukep; Francis Desire Bomba Taksinkou; Fabrice Fekam Boyom: Contributed reagents, materials, analysis tools or data.

Data availability statement

Data associated with this study has been deposited at the library of the Faculty of Health Sciences, University of Buea.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

- [1] World Health Organisation, Hepatitis B, Department of Communicable Diseases Surveillance And Response, 2002. <http://www.who.int/emc>.
- [2] Thad Wilkins, Richard Sams, Mary Carpenter, Hepatitis B; Screening, Prevention, Diagnosis and Treatment vol. 99, Medical College of Georgia at Augusta University, 2019, pp. 314–323.
- [3] K.R. Mysore, D.H. Leung, Hepatitis B and C, Clin. Liver Dis. 22 (4) (2018 Nov) 703–722, <https://doi.org/10.1016/j.cld.2018.06.002>. Epub 2018 Aug 22. PMID: 30266158.
- [4] K. Singh, S. Bhat, S. Shastry, Trend in seroprevalence of Hepatitis B virus infection among blood donors of coastal Karnataka, India, J. Infect. Dev. Ctries 3 (5) (2009 Jun 1) 376–379.
- [5] T.J. Liang, Hepatitis B: the virus and disease, Hepatology 49 (5 Suppl) (2009) S13–S21, <https://doi.org/10.1002/hep.22881>. PMID: 19399811; PMCID: PMC2809016.
- [6] M.L. Bartholomew, M.J. Lee, Management of hepatitis B infection in pregnancy, Clin. Obstet. Gynecol. 61 (1) (2018) 137–145, <https://doi.org/10.1097/GRF.000000000000331>. PMID: 29252923.
- [7] D.M. Knipe, P.M. Howley, D.E. Griffin, M.A. Martin, R.A. Lamb, B. Roizman, et al. (Eds.), Fields Virology, vol. 4, Lippincott-Raven Publishers, Philadelphia, 2001.
- [8] J.J. Bigna, M.A. Amougou, S.L. Asangbeh, A.M. Kenne, S.R.N. Noumegni, E.T. Ngo-Malabo, J.J. Noubiap, Seroprevalence of hepatitis B virus infection in Cameroon: a systematic review and meta-analysis, BMJ Open 7 (6) (2017 Jun 30), e015298, <https://doi.org/10.1136/bmjopen-2016-015298>. PMID: 28667212; PMCID: PMC5734365.
- [9] A. Frambo, J. Atashili, P. Nde Fon, P. Ndumbe, Prevalence of HBsAg and knowledge about hepatitis B in pregnancy in the Buea health district, Cameroon: a cross-sectional study, BMC Res. Notes 7 (2014) 394.
- [10] <https://med.stanford.edu/content/dam/sm/liver/documents/research/GlobalHepatitisBVaccinationC-coverage/AFRO/Cameroon.pdf>.
- [11] Djeneba B. Fofana, Anou M. Somboro, Mamoudou Maiga, Mamadou I. Kampo, Brehima Diakité, Yacouba Cissoko, et al., Hepatitis B virus in west african children: systematic review and meta-analysis of HIV and other factors associated with hepatitis B Infection, Int J Environ Res Public Health 20 (5) (2023 Mar) 4142, <https://doi.org/10.3390/ijerph20054142>. Published online 2023 Feb 25.
- [12] Meffire Christine, L. Yann, D. Elisabeth, D. Frédéric, A. Denise, L. Jean-marie, L. Sandrine, G. Jean-pierre, G. René, D. Jean-claude, Prevalence of Hepatitis B and Hepatitis c virus infection in France, J. Med. Virol. 82 (4) (2010) 546–555.
- [13] Angela Chiunhsien Wang, Jiun-Hung Geng, Chih-Wen Wang, Da-Wei Wu, Ch Szu-Chia, Sex difference in the associations among risk factors with hepatitis B and C infections in a large Taiwanese population study, Front. Public Health 10 (2022 Nov 30), 1068078.
- [14] B. Warda, F. Abderrahim, D. Noureddine, P. Thierry, N. Nadia, B. Soumaya, E. Mustapha, E. Abdelouhad, M. Hassan, B. Abdelouahab, Prevalence and Risk factors of Hepatitis B and C virus infections among the general population and blood donors in Morocco, BMC Publ. Health 13 (1) (2013) 1–8.
- [15] W. Robinson, Hepatitis B Virus and Hepatitis D Virus. Principles and Practice of Infectious Diseases, 1995, pp. 1406–1439.