

Serological Status of Viral Hepatitis B and Associated Factors Among Sex Workers in Douala (Littoral-Cameroon)

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To cite this article:

Dikosso Claire Astrid, Voundi-Voundi Esther, Well a Well a Koul Pascal Blaise, Moubitang Matomba Christine, Ntchimou Tochie Juliana Vinciane, Mbiandjeu Tchoumke Marius, Romaric De Manfouo Tuono, Fotsing Kwetche Pierre Rene. Serological Status of Viral Hepatitis B and Associated Factors Among Sex Workers in Douala (Littoral-Cameroon). *Biomedical Sciences*. Vol. 9, No. 2, 2023, pp. 47-52.

doi: 10.11648/j.bs.20230902.13

Received: April 17, 2023; **Accepted:** April 28, 2023; **Published:** May 17, 2023

Abstract: *Introduction:* Viral Hepatitis B (VHB) is a real concern for international organisations in general and the Cameroonian authorities in particular; our work aimed to determine the serological status of VHB as well as the associated factors among female sex workers (FSWs) in the city of Douala. *Method:* We conducted a descriptive cross-sectional study over a period of two months from 01 August to 02 October 2022. For the detection of serological markers, we used immuno-chromatographic tests [HBV 5-in-1 Hepatitis B Virus markers Rapid Test Panel (batch number; China, 2022)] and enzyme-linked immunosorbent assays [Hepatitis B Virus surface Antigen (HBsAg) ELISA Test Kit, batch number: HBSG37310B, China, 2022], both of HIGHTOP brand. The markers investigated by the immuno-chromatographic tests were HBsAg, HBsAb, HBeAg, HBeAb, and cHbAb. Logistic regression analysis was performed to determine the degree of association with HBsAg carriage at the 5% significance level. Results: A total of 87 participants were included in the present work, with a mean age of 29.66 ± 6.24 years, ranging from 18 to 43 years; furthermore, the serological profiles obtained in these TS were distributed as follows: 1% (1/87) of the participants were infected with the presence of viral activity; 7% (6/87) were infected with the absence of viral activity; 19% (17/87) had received a vaccine; 13% (11/87) had been in contact with the virus; 7% (6/87) had been in contact with the virus in the past and were cured; and 53% (46/87) were not infected; However, univariate regression analyses showed that primary education (OR= 0.042; 95% CI = 0.002-0.973; P=0.048); secondary education (OR= 0.034; 95% CI = 0.003-0.459; P=0.011); barmaid activity (OR= 0.030; 95% CI = 0.002-0.495; P=0.014) and shopkeeper activity (OR= 0.056; 95% CI = 0.003-0.923; P=0.044) were significantly associated with HBsAg carriage *Conclusion:* The present study shows that a variety of serological profiles of HBV were found among SWs in the city of Douala; however, the implementation of large-scale sensitization campaigns (via the media, social networks, and within schools) and expanded vaccination programmes against HBV throughout the country would help reduce its prevalence.

Keywords: Hepatitis B, Sex Workers, Cameroon

1. Introduction

Viral Hepatitis B (VHB) is a real concern for international organisations in general and the Cameroonian authorities in particular [1]. It is a potentially fatal hepatic infection caused

by the hepatitis B virus (HBV), contagious with humans as the only reservoir [2]. The virus is classified as a *Hepadnaviridae*, with a circular, partially double-stranded, small DNA [3]. Transmission of the disease occurs mainly through unprotected sex or contact with infected biological

materials [2, 3]. According to the World Health Organisation (WHO), 296 million people worldwide are estimated to be living with chronic HBV, and the annual number of HBV-related deaths is estimated to be more than 780,000 due to cirrhosis or liver cancer [4]. In 2019, it is estimated to have caused almost 290,000 deaths worldwide [4, 5]. Furthermore, sub-Saharan Africa is an area of high HBV prevalence with a chronic carriage rate of over 8%, compared to less than 1% in Western Europe and North America [6]. In Cameroon, the prevalence is 11.2%, making it one of the highest in Africa [7]. However, in many countries, female sex workers (FSWs) are considered a high risk group for sexually transmitted infections. Studies by Zoumana *et al.*, in Mali, and Ouedraogo *et al.*, in Burkina Faso, on HBV carriage among FSWs found prevalences of 2.7% and 12.8% respectively [2, 7]. Furthermore, studies on HBV among SWs have not yet been conducted in the Cameroonian context, hence our objective to determine the serological status of HBV and associated factors among SWs in the city of Douala.

2. Method

Type of study and study population: We conducted a descriptive cross-sectional study among consenting sex workers living in the city of Douala. The study was carried out over a period of two months, from 1 August to 2 October 2022, in five districts of the city of Douala, namely: Douala 1^{er}, Douala 2^{ème}, Douala 3^{ème}, Douala 4^{ème} and Douala 5^{ème}. The recruitment of the latter was done consecutively.

Data collection tools and procedure: Data collection was carried out in prostitution venues (street and brothels) by direct interview using a questionnaire which collected socio-demographic data (age, sex, level of education, marital status), medical history (history of sexually transmitted diseases, use of antivirals) and data related to the profession of sex worker (years of experience, frequency of work, number of clients per day, use of contraceptives, history of STDs, use of sharp objects).

Selection criteria for the study population: The study population included HCV patients living in the city of Douala who gave free and informed consent. Participants on antivirals were excluded from the study.

Collection and laboratory analysis of blood samples: The conditions for proper collection were observed throughout the study. To obtain serum, we used collection tubes without anticoagulant (dry tubes). Each tube was coded and the collected specimens were centrifuged at room temperature at 3000 rpm for 03 minutes. The serum obtained was transferred to cryotubes previously labelled with the same starting code, then stored at a temperature between 2°C and 8°C pending further analysis.

Serological tests: For the detection of serological markers, we used the immuno-chromatographic test, HBV 5-in-1 Hepatitis B Virus markers Rapid Test Panel serum/plasma (batch number; China; 2022) and the enzyme-linked immunosorbent test, Hepatitis B Virus surface Antigen (HBsAg) ELISA Test Kit (batch number: HBSG37310B,

China, 2022), both from HIGHTOP. The markers tested were HBsAg, HBsAb, HBeAg, HBeAb, and cHbAb and the serological profiles obtained were: Vaccinated (HBsAg negative, HBsAb positive, HBcAb negative); Infected (HBsAg positive, HBsAb negative, HBcAb positive); Immune uninfected (HBsAg negative, HBsAb positive, HBcAb positive); Virus contact/potentially infected (HBsAg negative, HBsAb negative, HBcAb positive). To maintain the quality of the laboratory results, the test kit manufacturers' standard operating procedures were strictly followed.

Data analysis: Data were entered into CPRO version 18.0 and exported to IBM SPSS statistics version 26 for analysis. Logistic regression analysis was performed to determine the degree of association of HBsAg carriage, with a significance level of 5%.

Ethical considerations: an ethical clearance was issued to us by the Institutional Ethics Committee of the University of the Mountains (CIE-UdM), under the reference N°2022/187/UDM/PR/CEAQ; then we also obtained an administrative research authorization issued by the Regional Delegate of Public Health of the Littoral Region under the N° 0347/AAR/MIINSANTE/DRSPL/BCASS; and finally we received a research authorisation under reference N° 2022/0888/L/HGOPED/DG/DRFI from the Director of the Gynaecological-Obstetric and Paediatric Hospital of Douala for the analysis of our specimens in the microbiology laboratory of his structure.

3. Results

3.1. General Characteristics of the Study Population

A total of 87 participants were included in the present work, with a mean age of 29.66 ± 6.24 years, ranging from 18 to 43 years.

Table 1. General characteristics of the population according to HBsAg carriage.

Features	Numbers (%)	AgHbs	
		Negative (%)	Positive (%)
Age			
Adolescents	6 (43)	6 (100)	0 (0)
Adults	81 (57)	74 (91)	7 (9)
Level of education			
Primary	13 (15)	12 (63)	1 (37)
Secondary	71 (82)	67 (94)	4 (6)
Primary	3 (3)	1 (33)	2 (67)
Marital status			
Single	79 (91)	72 (91)	7 (9)
Married	8 (9)	8 (100)	0 (0)
Landmark location			
Douala 1 ^{ER}	6 (7)	6 (100)	0 (0)
Douala 2 ^{ème}	6 (7)	5 (83)	1 (17)
Douala 3 ^{ème}	10 (11)	8 (80)	2 (20)
Douala 4 ^{ème}	11 (13)	10 (91)	1 (9)
Douala 5 ^{ème}	54 (62)	51 (94)	3 (6)

Adolescent: 15 to 19 years; adult: 20 years and over

Table 1 shows that HBsAg carriage was found exclusively in adults (57% [81/87]); participants with secondary

education (82% [71/67]) were predominantly HBsAg carriers (6% [4/71]); and 91% (79/87) of them were single and exclusively carrying the HBsAg (9% [7/79]); moreover, the Douala 5 district^{ème} was the place where the most HBsAg carriers were found (6% [3/54]).

3.2. Prevalence of Serological Markers of HBV

Analysis of our data revealed a prevalence of serological markers of 80.45% (70/87), of which 10% (7/87) were HBsAg positive; 1% (1/87) were HBsAg positive; 33% (23/87) were HBsAg positive; 23% (16/87) were HBsAg positive and 33% (23/87) were HBcAg positive.

Furthermore, the serological profiles obtained from the present work were distributed as follows: 1% (1/87) of the participants were infected with the presence of viral activity (AgHbs+; AcHbc+; AcHbs-; AgHbe+; AcHbe-); 7% (6/87) were infected with the absence of viral activity (AgHbs+; AcHbc+; AcHbs-; AgHbe-; AcHbe+); 19% (17/87) had been vaccinated (AgHbs-; AcHbc-; AcHbs+; AcHbe-; AcHbe-) 13% (11/87) had been in contact with the virus (AgHbs-; AcHbc+; AcHbs-; AgHbe-; AcHbe-); 7% (6/87) had been in contact with the virus in the past and were cured (AgHbs-; AcHbc+; AcHbs+; AgHbe-; AcHbe-) and 53% (46/87) were uninfected (AgHbs-; AcHbc-; AcHbs-; AgHbe-; AcHbe-) (Figure 1).

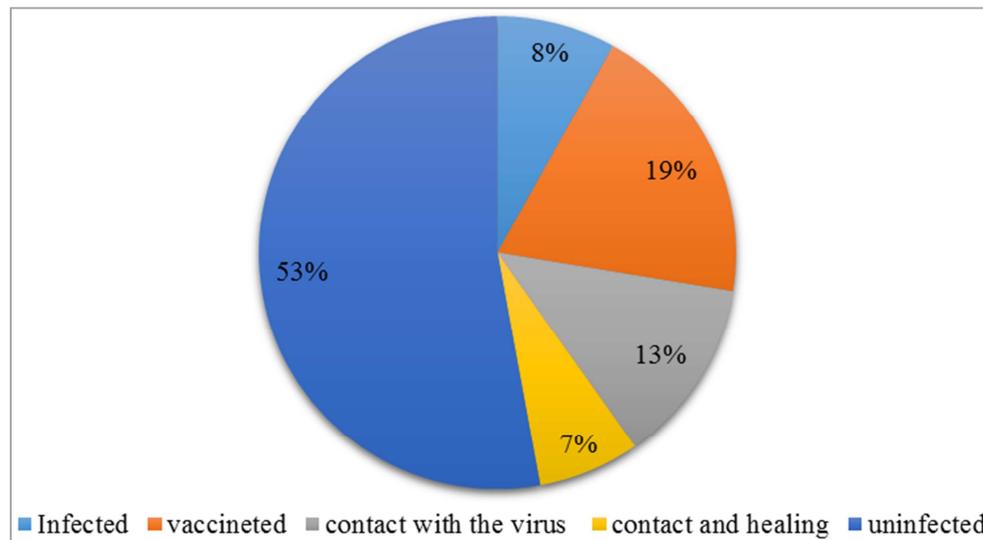


Figure 1. Serological profiles of viral hepatitis B.

3.3. Factors Associated with HBsAg Carriage

The univariate regression analysis presented in Table 2 shows that the primary (OR= 0.042; 95% CI = 0.002-0.973; p=0.048) and secondary (OR= 0.034; 95% CI = 0.003-0.459; P=0.011) education level of the participants was significantly

associated with HBsAg carriage; In addition, the activities performed by sex workers, namely bartending (OR= 0.030; 95% CI = 0.002-0.495; P=0.014) and trading (OR= 0.056; 95% CI = 0.003-0.923; P=0.044) were significantly associated with HBsAg carriage (Table 3).

Table 2. Socio-demographic factors associated with HBsAg carriage.

Variables	Numbers (%)	AgHBS		Univariate analysis		
		Negative (%)	Positive (%)	Odds ratio	95% CI	p-value
Age (years)						
[18-24]	20 (23)	19 (24)	1 (14)	0,526	(0,055-5,035)	0,577
[25-29]	23 (26)	21 (26)	2 (29)	0,952	(0,161-5,634)	0,957
[30 and over]	44 (51)	40 (50)	4 (57)	0,750	(0,158-3,568)	0,718
Level of education						
Primary	13 (15)	12 (63)	1 (37)	0,042	(0,002-0,973)	0,048
Secondary	71 (82)	67 (94)	4 (6)	0,034	(0,003-0,459)	0,011
Superior	3 (3)	1 (33)	2 (67)	0	-	0,999
Marital status						
Single	79 (91)	72 (91)	7 (9)	0	-	0,999
Married	8 (9)	8 (100)	0 (0)	157060060	-	0,999
Landmark location						
Douala 1 ^{er}	6 (7)	6 (100)	0 (0)	0	-	0,999
Douala 2 ^{ème}	6 (7)	5 (83)	1 (17)	3,400	(0,296-39,104)	0,326
Douala 3 ^{ème}	10 (11)	8 (80)	2 (20)	4,250	(0,612-29,522)	0,143
Douala 4 ^{ème}	11 (13)	10 (91)	1 (9)	1,700	(0,160-18,050)	0,660
Douala 5 ^{ème}	54 (62)	51 (94)	3 (6)	2,345	(0,490-11,212)	0,286

Table 3. Occupational characteristics of sex workers associated with HBsAg carriage.

Variables	Numbers (%)	HBsAg		Univariate analysis		
		Negative (%)	Positive (%)	Odds ratio	95% CI	p-value
Other activities						
Barmaid	1 (2)	1 (2)	0 (0)	0,030	(0,002-0,495)	0,014
Cashier	1 (2)	1 (2)	0 (0)	0	-	1
Hairdresser	19 (36)	18 (39)	1 (17)	0	-	1
Trader	16 (30)	14 (30)	2 (33)	0,056	(0,003-0,923)	0,044
Seamstress	8 (15)	8 (17)	0 (0)	0,143	(0,012-1,667)	0,121
Cooker	2 (4)	2 (4)	0 (0)	0	-	0,999
Hotels	1 (2)	1 (2)	0 (0)	0	-	0,999
Nurse	1 (2)	0 (0)	1 (17)	0	-	1
Housekeeper	4 (7)	2 (4)	2 (33)	1615474843	-	1
Length of time in sex work						
< 1 year	30 (34)	29 (39)	14 (70)	Ref	/	/
1-2 years	22 (25)	18 (23)	4 (20)	6,444	(0,667-62,307)	0,107
3-5 years	25 (29)	24 (30)	1 (5)	1,208	(0,072-20,355)	0,896
6 years and older	10 (12)	9 (11)	1 (5)	3,222	(0,183-56,883)	0,424
Frequency of work per week						
2-3 times	4 (5)	4 (5)	0 (0)	0	-	0,999
3-4 times	13 (15)	12 (15)	1 (14)	0,896	(0,091-8,783)	0,925
4-5 times	23 (26)	21 (26)	2 (29)	1,024	(0,173-6,045)	0,979
6-7 times	47 (54)	43 (54)	4 (57)	Ref	/	/
Contraceptive use						
Yes	85 (98)	78 (97)	7 (100)	Ref	/	/
No	2 (2)	2 (3)	0 (0)	0	-	0,999
History of STDs						
Yes	32 (37)	30 (37)	2 (29)	Ref	/	/
No	55 (63)	50 (63)	5 (71)	1,500	(0,274-8,220)	0,640
Use of sharps						
Yes	1 (1)	1 (1)	0 (0)	Ref	/	/
No	86 (99)	79 (99)	7 (100)	143143327,3	-	1

4. Discussion

The HBsAg was found exclusively in adult and unmarried participants, but was also present in the majority of sex workers with secondary school education who were based in the Douala 5 district^{ème}; in fact, the length of time in the profession, the high number of adult sex workers, and the lack of condom use could explain the exclusive presence of HBsAg in adult and unmarried participants. In addition, insufficient information and low general knowledge about viral hepatitis B could explain the presence of HBsAg in sex workers who had secondary school education [8].

Analysis of our data revealed an HBsAg prevalence of 10% (7/87), which is higher than the prevalence obtained by Doumbia *et al* in 2021 among female sex workers (2.7%) in the Kenieba mining area of Mali; and lower than that obtained by Ouedraogo *et al* in 2019, who obtained a crude prevalence of 12.8% among female sex workers in three cities of Burkina Faso [2, 7]. These fluctuations in prevalence could be explained by the different sample sizes in each study. In addition, as viral hepatitis B is a sexually transmitted infection, the presence of HBsAg in these sex workers could be associated with lack of condom use.

The prevalence of HBeAg in the present study is estimated at 1% (1/87), a result that is at odds with those obtained by Doumbia *et al* [2], whose HBeAg test was negative in female sex workers; however, Katilé *et al* [9] recorded a prevalence of 7.4% of HBeAg-positive persons in a study carried out in

the regional hospital of Kayes. HBeAg positivity would increase the risk of virus spread within the population, this risk has been estimated at more than 90% if HBeAg is detected in serum [10, 11]. However, even in the absence of HBeAg, the risk of HBV transmission exists and the interpretation of the absence of HBeAg must take into account the possibility of viral replication in asymptomatic carriers and in the case of viral mutation of the C gene, in which case high levels of viremia are possible [12, 13].

The prevalence of AcHbs, AcHbe and AcHbc in the present work was 33%; 23% and 33% respectively. These rates are high compared to those obtained by Zayet *et al* [14] who worked on 229 health workers with a positivity rate of 15.3%; 7.34%; 22.94% for AcHbs, AcHbe and AcHbc respectively. This difference could be explained by the lack of knowledge and awareness among sex workers about viral hepatitis B and preventive measures such as vaccination and condom use.

Univariate logistic regression analysis showed that the primary (OR= 0.042; 95% CI = 0.002-0.973; P=0.048) and secondary (OR= 0.034; 95% CI = 0.003-0.459; P=0.011) education level of participants was significantly associated with HBsAg carriage. This could be explained on the one hand by an insufficient level of information and on the other hand by the lack of implementation of the national plan to combat viral hepatitis B following the example of the national plan to combat HIV/AIDS and COVID-19. Emphasis should be placed on different sources of information such as the media and social networks, followed by awareness-raising in schools

and at prostitution sites in this case. Establish vaccination coverage and free vaccines for adults.

Certain limitations were identified in the present work, namely, the small size of our sample linked to the reluctance of sex workers; the lack of use of more sensitive diagnostic tests such as Elisa or PCR (viral load) leading to an underestimation of the prevalence of HBsAg; and the quantitative cross-sectional nature of the present work did not allow for causal associations to be found as would be the case in a case control study. Indeed, the latter has a more thorough level of evidence of causality than cross-sectional studies.

5. Conclusion

The present work shows that a variety of serological profiles of viral hepatitis B were found among female sex workers in the city of Douala, namely: infected (7/87); vaccinated (17/87); contact with the virus (11/87); not infected (46/87), former infection (6/87). In addition, primary and secondary education, as well as barmaid and shopkeeper occupation were significantly associated with HBsAg carriage. The implementation of large-scale awareness campaigns (via the media, social networks, and within schools) and expanded vaccination programmes against HBV throughout the country would help to reduce its prevalence.

Conflict of Interest

The authors declare no conflict of interest.

Current State of Knowledge on the Subject

- 1) Viral hepatitis B (HBV) is caused by a virus called hepatitis B virus (HBV);
- 2) The prevalence of HBV in Cameroon is 8.3%.

Contribution of Our Study to the Knowledge

- 1) Prevalence of hepatitis B among female sex workers in the city of Douala;
- 2) Prevalence of serological markers of viral hepatitis B among female sex workers in the city of Douala;
- 3) Proportion of Hepatitis B serological profiles among female sex workers in the city of Douala.

Authors' Contributions

All authors contributed to the editing and financing of the manuscript.

Acknowledgements

The authors would like to thank the Regional Delegate for Public Health in the littoral region; the Director of the Douala

Gynaeco-Obstetric and Paediatric Hospital; all the participants who contributed to the realization of this work and the members of the Association for Education and Development (AED).

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