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Research Article

Epidemiological Profile Of Arterial Hypertension Among Chronic Carriers Of Hepatitis B Virus At Laquintinie Hospital, Douala, Cameroon: A Hospital-Based Cross-Sectional Study.

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Abstract

Introduction: The growing burden of non-communicable diseases in sub-Saharan Africa increasingly overlaps with endemic infectious diseases such as chronic hepatitis B virus (HBV) infection. The coexistence of arterial hypertension (AH) and chronic HBV may increase morbidity and complicate clinical management.

Aim of Study: To determine the prevalence of hypertension and identify associated sociodemographic, behavioral, and clinical factors among chronic HBV carriers at the Laquintinie Hospital.

Materials and Methods: A hospital-based cross-sectional study was conducted in the Hepato-Gastroenterology Department of Laquintinie Hospital, Douala, from December 2022 to January 2024, among 401 participants. Sociodemographic, behavioral, and clinical data were collected using structured questionnaires and clinical measurements. Blood samples were collected for HBV screening using the sandwich ELISA method, and blood pressure was measured with a sphygmomanometer. Participants were categorized according to hypertension and HBV status. Logistic regression analyses were performed to assess factors associated with hypertension among chronic HBV carriers. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated, and statistical significance was set at $p < 0.05$.

Results: The overall prevalence of hypertension was 41.14% (165/401). Among the 188 chronic HBV carriers, 92 were hypertensive, corresponding to a prevalence of 48.93%. HBV infection was significantly associated with hypertension (OR = 1.83; 95% CI: 1.22–2.74; $p = 0.003$). Among HBV carriers, male sex (OR = 2.74; $p = 0.005$), younger adult age (21–30 years; OR = 6.65; $p = 0.04$), and primary education level (OR = 9.37; $p = 0.004$) were significantly associated with hypertension. Regular physical activity was protective (OR = 0.08; $p < 0.001$), whereas smoking (OR = 31.48; $p < 0.001$), overweight BMI (OR = 6.16; $p < 0.001$), abnormal pulse rates, and prior history of hypertension (OR = 3.19; $p = 0.006$) were significantly associated with increased odds of hypertension. Daily fruit and vegetable consumption was associated with reduced odds of hypertension (OR = 0.32; $p = 0.03$).

Conclusion: Hypertension is highly prevalent among chronic HBV carriers in Douala, Cameroon, and HBV infection is significantly associated with increased odds of hypertension. Both non-modifiable (sex, age, education) and modifiable (smoking, physical inactivity, overweight, poor diet) factors contribute to this comorbidity. Integrating routine blood pressure screening and lifestyle interventions into HBV care services may help reduce cardiovascular risk in this population.

Keywords: Hypertension, hepatitis B virus, prevalence, cardiovascular risk, Cameroon, cross-sectional study.

INTRODUCTION

Hypertension represents a major public health concern worldwide, being the leading risk factor for cardiovascular morbidity, stroke, and renal failure (1). Globally, about 1.4 billion adults aged 30–79 years suffer from hypertension in 2024, making it the most common reason for consultation in general medicine (2). Its prevalence in Africa is estimated at 27% compared to 18% in America (3), and in Cameroon, it was 28.8% in 2016 (4).

In parallel, chronic hepatitis B virus (HBV) infection constitutes a global health burden, affecting millions of people and exposing them, on the one hand, to an increased risk of severe hepatic complications, notably cirrhosis and hepatocellular carcinoma (5), and on the other hand, to serious extra-hepatic complications, which may be renal or cardiac (6). In Cameroon, the prevalence of HBV is estimated at around 11.2% (5), placing the country in the high endemicity zone.

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While the epidemiology of each of these conditions is well documented individually, data concerning their coexistence and interaction remain limited. Some studies, sometimes contradictory, suggest that extra-hepatic manifestations of HBV may present as hypertension, highlighting a possible pathophysiological link (7). Moreover, renal involvement, a possible complication of HBV, could also contribute to the development of hypertension (8,9). However, the precise epidemiological profile of hypertension within this specific population remains to be clarified. We believe that a better understanding of the prevalence of hypertension and the associated risk factors in this specific population may contribute to the implementation of relevant strategies for improved management.

AIM OF STUDY

To determine the prevalence of hypertension and identify associated sociodemographic, behavioral, and clinical factors among chronic HBV carriers at the Laquintinie Hospital, in order to better understand this comorbidity and optimize the overall management of these patients.

MATERIALS AND METHODS

Study type, population, and sample size

A hospital-based cross-sectional study on voluntary participants was carried out in the Department of Hepato-Gastroenterology and the Serology Laboratory of Laquintinie Hospital, Douala, from December 2022 to January 2024. The study protocol was approved by the Institutional Ethics Committee for Human Health Research of the University of Douala, Cameroon (Ref: 3449 CEI-UDo/10/2022/T), along with authorization from Laquintinie Hospital. Participants were voluntary subjects who came for consultation at Laquintinie Hospital in Douala. The participants were healthy individuals and those suffering from hepatitis B virus (HBV) infection and hypertension (HTN). Male and female participants with no age restriction were selected for the study. Those included in the study were participants with or no symptoms of the disease, having signed the informed consent form and assent for those under 21. For non-inclusion criteria, the targets were those with a history of liver, kidney, and heart diseases, pregnant women, positive serology for other viral hepatitis (C, D) or HIV co-infections, malaria; diabetes, cancers, or any disease that may be associated with hypertension. The sample size was calculated using Schwartz's formula with a prevalence of 23.5% (9): n = t2 [p(1-p)/m2].

n: required sample size; t: confidence level at 95% (standard value 1.96); p: prevalence of hypertension among people living with HBV, 23.5% (9); m: margin of error at 5% (standard value 0.05). Numerical application: (1.962 [0.235(1 - 0.235) / 0.052 = 227).

According to this formula, the minimum sample size was 227 participants. A total of 412 participants were eligible for the study. Among them, subjects with hemolyzed blood serum and who did not provide complete information (n = 11) were excluded from the analysis. Finally, 401 participants were retained for the study. Data were collected using a survey form including risk factors, sociodemographic, clinical and paraclinical variables. Blood was collected from participants who agreed to give their informed consent to participate in the study. Detection of AgHBS antigen and measurement of blood pressure, were used to stratify participants into sick and healthy and subdivided into 4 groups: 92 hypertensive patients with HBV infection (AH+ / HBV+), 73 hypertensive patients without HBV (AH+ / HBV-), 96 normotensive HBV-infected patients (AH- / HBV+), and 140 healthy controls (AH- / HBV).

Sampling and preparation of specimens

Blood samples were collected from the antecubital veins. Ten milliliters (10 ml) of blood was drawn from each patient by a trained laboratory technician, following strict aseptic procedures. The blood was collected in a dry tube, centrifuged at 3000 rpm for 10 minutes to obtain serum. The serum samples were then transferred to the serology laboratory for analysis.

Diagnosis of hepatitis B

This was performed by detecting HBsAg using the ELISA method with a commercial kit (Fortress HBsAg, Fortress diagnostics, United Kingdom). The sandwich ELISA method traps an antigen between two antibodies: a "capture" antibody fixed to the plate and a "detection" antibody labeled with an enzyme, allowing detection of the presence and concentration of the antigen in a complex sample. The method includes steps of capture antibody fixation, sample addition, addition of enzyme-labeled detection antibody, and finally a substrate to reveal the signal.

Measurement of systolic and diastolic blood pressure

Blood pressure was measured using a sphygmomanometer. Patients were placed at rest for 15 minutes in a seated position before measurement. Blood pressure was measured three times at 5-minute intervals, and the mean was calculated. This measure was repeated for 3 days and the diagnosis is confirmed over 3 months. Values were recorded, compared to reference ranges, and patients classified according to the National Committee on Prevention, Detection, and Treatment of High Blood Pressure (10). Reference values considered were: normal blood pressure: < 120 / 80 mmHg; pre-hypertension: 120 – 139 / 80–89 mmHg; stage 1 hypertension: 140 – 159 / 90 – 99 mmHg; stage 2 hypertension: 160 – 179 / 100–109 mmHg and stage 3 hypertension: ≥ 180 / 110 mmHg (10). Calculation of body mass index (BMI): Weight and height of

each participant were measured, and BMI was calculated using the following formula: [BMI = Body weight (kg) / Height2 (m)2]

Statistical data analysis

The collected data were entered and coded in an Excel database and analyzed using SPSS version 26.0. After cleaning the database and graphically checking the normality of distributions of all studied variables, quantitative variables were summarized as means with standard deviations. The Chi-square test was used to compare frequencies of risk factors across groups to infer relationships between these risk factors and participants' pathological status. Logistic regression analysis was used to identify independent factors associated with hypertension and / or HBV. The relationship between hypertension grade and risk factors in HBV carriers was also examined. A p-value less than 0.05 was considered statistically significant.

OBSERVATIONS AND RESULTS

General characteristics of the study population

Table 1. Distribution of the study population according to sociodemographic parameters and status.

Sociodemographic Parameters	AH+/ HBV+ n (%) N = 92	AH-/ HBV+ n (%) N = 96	AH-/ HBV+ n (%) N = 140	Chi-square (p-value)
Sex				
Male	59 (64.10)	61 (63.50)	53 (37.90)	21.724 (0.000)
Female	33 (35.90)	35 (36.50)	87 (62.10)	
Age group (years)				
≤ 20	1 (1.10)	4 (4.20)	10 (7.10)	73.925 (0.000)
21 – 30	11 (12)	46 (47.90)	42 (30)	
31 – 40	21 (22.80)	24 (25)	41 (29.30)	
41 – 50	18 (19.60)	14 (14.60)	27 (19.30)	
51 – 60	21 (22.80)	8 (8.30)	15 (10.70)	
61 – 70	19 (20.70)	0 (0.00)	3 (2.10)	
> 70	1 (1.10)	0 (0.00)	2 (1.40)	
Marital status				
Single	30 (32.60)	57 (59.40)	81 (57.9)	29.879 (0.000)
Married	47 (51.10)	38 (39.60)	52 (37.10)	
Widowed	12 (13)	1 (1)	4 (2.90)	
Separated	3 (3.30)	0 (0.00)	3 (2.10)	
Occupation				
Civil servant	20 (21.70)	14 (14.60)	24 (17.10)	35.532 (0.000)
Student	0 (0.00)	15 (15.60)	31 (22.10)	
Farmer	2 (2.20)	6 (6.30)	1 (0.70)	
Housewife	9 (9.80)	10 (10.40)	23 (16.40)	
Informal sector	61 (66.30)	51 (53.10)	61 (43.60)	
Education level				
Illiterate	0 (0.00)	0 (0.00)	1 (0.70)	33.527 (0.000)
Primary	23 (25)	9 (9.40)	6 (4.30)	
Secondary	53 (57.60)	50 (52.10)	74 (52.90)	
Higher	16 (17.40)	37 (38.50)	59 (42.10)	
Region of origin				

Far North	1 (1.10)	1 (1)	2 (1.40)	17.962 (0.590)
North	4 (4.30)	3 (3.10)	2 (1.40)	
Adamawa	2 (2.20)	4 (4.20)	1 (0.70)	
East	4 (4.30)	5 (5.20)	5 (3.60)	
North-West	10 (10.90)	9 (9.40)	9 (6.40)	
West	41 (44.60)	37 (38.50)	65 (46.40)	
Centre	13 (14.10)	10 (10.40)	14 (10)	
Littoral	13 (14.10)	21 (21.90)	37 (26.40)	
South-West	2 (2.20)	5 (5.20)	3 (2.10)	
South	2 (2.20)	0 (0.00)	1 (0.70)	
Expatriate	0 (0.00)	1 (1)	1 (0.70)	
Monthly income				
None	0 (0.00)	3 (3.10)	4 (2.90)	9.096 (0.168)
Low	18 (19.60)	30 (31.30)	46 (32.90)	
Medium	35 (38)	32 (33.30)	42 (30)	
Good	39 (42.40)	31 (32.30)	48 (34.30)	

AH+/ HBV+: Hypertension positive / Hepatitis B positive; AH-/ HBV++: Hypertension negative / Hepatitis B positive; AH-/ HBV-: Hypertension negative / Hepatitis B negative; N: number of subjects per group

Table 1 summarizes the distribution of the study population by sociodemographic factors and disease status. Significant differences were observed across groups for sex, age, marital status, occupation, and education level ($p < 0.01$), with older age, male sex, and lower education more prevalent in the AH+ / HBV+ group. In contrast, region of origin and monthly income showed no significant differences between groups ($p > 0.05$). These results indicate that certain sociodemographic characteristics, particularly age, sex, marital status, occupation, and education, are associated with the co-occurrence of hypertension and chronic hepatitis B virus (HBV) infection in this population.

Table 2. Distribution of the study population according to behavioral / clinical factors and status.

Behavioral / Clinical Factors	**AH+/ HBV+ n (%) N=92**	**AH-/ HBV+ n (%) N=96**	**AH-/ HBV- n (%) N=140**	**Chi-square (p-value)**
Regular physical activity				
Yes	19 (20.70)	73 (76)	100 (71.40)	76.109 (0.000)
No	73 (79.30)	23 (24)	40 (28.60)	
Smoking status				
Yes	51 (55.40)	26 (27.10)	10 (7.10)	66.455 (0.000)
No	41 (44.60)	70 (72.90)	130 (92.90)	
Regular alcohol consumption				
Yes	79 (85.90)	73 (76)	94 (67.10)	10.462 (0.005)
No	13 (14.10)	23 (24)	46 (32.90)	
Regular meat consumption				
Yes	86 (93.50)	79 (82.30)	122 (87.10)	5.403 (0.067)
No	6 (6.50)	17 (17.70)	18 (12.90)	
Regular fish consumption				
Yes	92 (100)	92 (95.80)	132 (94.30)	5.594 (0.061)
No	0 (0.0)	4 (4.20)	8 (5.70)	
Regular fruit and vegetable consumption				
Daily	7 (7.60)	14 (14.60)	46 (32.90)	26.504 (0.000)
Weekly	40 (43.50)	34 (35.40)	48 (34.30)	
Monthly	32 (34.80)	33 (34.40)	34 (24.30)	
Occasionally	13 (14.10)	15 (15.60)	12 (8.60)	
History of hypertension (AH)				

Yes	62 (67.40)	43 (44.80)	61 (43.60)	14.440 (0.001)
No	30 (32.60)	53 (55.20)	79 (56.40)	
BMI (kg/m²)				
Underweight (<18.5):	1 (1.10)	3 (3.10)	0 (0.0)	48.605 (0.000)
Normal (18.5–24.9):	27 (29.30)	68 (70.80)	89 (63.60)	
Overweight (25–29.9):	63 (68.50)	25 (26)	47 (33.60)	
Obesity (≥30):	1 (1.10)	0 (0.00)	4 (2.90)	
Pulse (bpm)				
Low (<60): 3	3 (3.30)	2 (2.10)	1 (0.70)	44.762 (0.000)
Normal (60–100):	68 (73.90)	92 (95.80)	137 (97.90)	
High (>100):	21 (22.80)	2 (2.10)	2 (1.40)	

Bpm: beats per minute; AH+/HBV+: Hypertension positive / Hepatitis B positive; AH-/HBV+: Hypertension negative / Hepatitis B positive; AH-/HBV-: Hypertension negative / Hepatitis B negative; N: number of subjects per group; BMI: Body Mass Index.

Table 2 shows the distribution of behavioral and clinical factors across the study groups. Significant differences were observed for physical activity, smoking, alcohol consumption, fruit and vegetable intake, history of hypertension, BMI, and pulse rate ($p < 0.01$), with AH+ / HBV+ participants exhibiting higher rates of smoking, alcohol use, overweight/obesity, elevated pulse, and lower frequency of daily fruit and vegetable consumption. No significant differences were found for regular meat or fish consumption ($p > 0.05$). These findings suggest that lifestyle and clinical factors, including physical inactivity, poor diet, and higher body mass index (BMI), are associated with the coexistence of hypertension and chronic HBV infection.

Prevalence of hypertension (AH) among chronic hepatitis B virus (HBV) carriers at Laquintinie hospital in Douala

Out of 401 participants, 165 were hypertensive, representing a hypertension prevalence of 41.14%. Among the 188 patients with chronic hepatitis B, 92 were hypertensive, corresponding to a prevalence of 48.93%. HBV infection was strongly and positively associated with hypertension (OR = 1.83; p = 0.003; CI: 1.22 – 2.74).

Sociodemographic factors associated with hypertension (AH) among chronic hepatitis B virus (HBV) carriers at Laquintinie hospital in Douala.

Table 3. Sociodemographic factors associated with hypertension (AH) among chronic hepatitis B virus (HBV) carriers.

Sociodemographic factors	**Variations**	**AH+ / HBV+ (n = 92)**		**AH- / HBV+ (n = 96)**	
		OR (CI)	**p-value**	**OR (CI)**	**p-value**
Marital status	Single	0.63 (0.29 – 1.36)	0.24	0.58 (0.27 – 1.22)	0.15
	Widowed	0.85 (0.11 – 6.45)	0.87	1.85 (0.07 – 43.45)	0.70
	Separated	1 (0.11 – 8.88)	0.99	4.36 (0 – 100000)	0.99
	Married	0	–	0	–
Occupation	Student	2.98 (0 – 2980)	1	0.26 (0.05 – 1.20)	0.08
	Pupil	1.01 (0.04 – 23)	0.00	5.71 (0.34 – 94.98)	0.22
	Housewife	0.16 (0.03 – 0.79)	0.02	0.66 (0.14 – 3)	0.59
	Informal sector	0.57 (0.19 – 1.72)	0.32	1.32 (0.45 – 3.88)	0.61
	Civil servant	0	–	0	–
Education level	Illiterate	0.66 (0.66 – 0.66)	1	3.56 (0 – 35)	1
	Primary	9.37 (2.03 – 43.23)	0.004	2.59 (0.56 – 11.96)	0.22
	Secondary	1.68 (0.57 – 4.93)	0.33	0.69 (0.26 – 1.80)	0.45
	Higher	0	–	0	–
Monthly income	None	1.9 (0 – 193)	1	3.37 (0.36 – 31.60)	0.28
	Low	1.35 (0.41 – 4.41)	0.61	1.61 (0.51 – 5.12)	0.41
	Medium	1.44 (0.66 – 3.12)	0.35	1.12 (0.51 – 2.44)	0.77
	High	0	–	0	–

Region of origin	Far North	63.80 (0 – 6380)	0.99	0.54 (0.01 – 29.77)	0.76
	North	16.47 (0 – 1647)	0.99	1.20 (0.02 – 52.01)	0.92
	Adamawa	5.21 (0 – 52.13)	0.99	4.56 (0.08 – 233.62)	0.45
	East	21.32 (0 – 2132)	0.99	0.66 (0.02 – 19.17)	0.81
	North-West	2.67 (0 – 26.78)	0.99	0.66 (0.02 – 16.46)	0.80
	West	1.41 (0 – 14.19)	0.99	0.31 (0.01 – 6.92)	0.46
	Centre	18.43 (0 – 184.30)	0.99	0.37 (0.01 – 9.24)	0.54
	Littoral	8.20 (0 – 82.02)	0.99	0.41 (0.01 – 9.31)	0.58
	South-West	9.51 (0 – 95.10)	0.99	0.96 (0.02 – 32)	0.98
	South	2.65 (0 – 26.53)	0.99	6.52 (0 – 10000)	1
	Expatriate	0	–	0	–
Age group (years)	21 – 30	1.81 (0.09 – 34.76)	0.69	6.65 (1.0 – 43.44)	0.04
	31 – 40	1.05 (0.05 – 20.30)	0.97	1.66 (0.22 – 11.83)	0.63
	41 – 50	1.59 (0.07 – 32.35)	0.76	1.35 (0.17 – 10.64)	0.77
	51 – 60	2.41 (0.11 – 49.67)	0.56	1.17 (0.13 – 10.28)	0.88
	61 – 70	6.65 (1.0 - 43.44)	0.00	4.36 (0 – 4.367)	1
	> 70	1.07 (0.01 – 61.53)	0.97	2.64 (0 – 2.642)	1
	≤ 20	0	–	0	–
Sex	Male	2.74 (1.34 – 5.58)	0.005	2.97 (1.55 – 5.68)	0.001
	Female	0	–	0	–

AH+/HBV+: Hypertension positive / Hepatitis B positive; AH-/HBV+: Hypertension negative / Hepatitis B positive; n: number of subjects per group; CI: confidence interval; OR: odds ratio.

Table 3 presents sociodemographic factors associated with hypertension among chronic HBV carriers. Male sex was significantly associated with higher odds of hypertension in both AH+ / HBV+ and AH- / HBV+ groups (OR = 2.74, p = 0.005; OR = 2.97, p = 0.001). Age was also a significant predictor, with participants aged 21–30 showing increased odds in the AH- / HBV+ group (OR = 6.65, p = 0.04). Additionally, lower education level (primary) was associated with higher odds of hypertension in the AH+ / HBV+ group (OR = 9.37, p = 0.004), while occupation (housewife) showed a protective effect (OR = 0.16, p = 0.02). Other factors, including marital status, monthly income, and region of origin, were not significantly associated with hypertension (p > 0.05). These results indicate that male sex, younger adult age, and lower education level are key sociodemographic predictors of hypertension among HBV carriers.

Behavioral and clinical factors associated with hypertension (AH) in chronic hepatitis B virus (HBV) carriers at Laquintinie hospital in Douala.

Table 4. Behavioral and clinical factors associated with hypertension in chronic hepatitis B virus (HBV) carriers.

Behavioral and clinical factors	Variations	AH+ / HBV+ N = 92		AH- / HBV+ n = 96	
		OR (CI)	p-value	OR (CI)	p-value
Regular sports practice	Yes	0.08 (0.03 - 0.19)	0.00	1.43 (0.73 - 2.82)	0.29
	No	0	_	0	_
Smoking status	Yes	31.48 (10.47 - 94.60)	0.00	3.62 (1.58 - 8.57)	0.002
	No	0	_	0	_
Regular alcohol consumption	Yes	1.01 (0.37 - 2.71)	0.98	1.05 (0.54 - 2.05)	0.86
	No	0	_	0	_
Regular meat consumption	Yes	2.42 (0.65 - 8.98)	0.18	0.57 (0.26 - 1.26)	0.17
	No	0	_	0	_
Regular fish consumption	Yes	62.08 (6.20 – 620.87)	1	2.48 (0.48 - 12.45)	2.27
	No	0	_	0	_

Fruit and vegetable consumption	Daily	1.06 (0.19 - 5.82)	0.94	0.32 (0.11 - 0.92)	0.03
	Weekly	1.93 (0.43 - 8.55)	0.38	0.57 (0.22 - 1.48)	0.25
	Monthly	1.38 (0.30 - 6.31)	0.67	0.77 (0.29 - 2.04)	0.60
	Occasionally	0	_	0	_
History of hypertension	Yes	3.19 (1.40 - 7.25)	0.006	1.02 (0.57 - 1.83)	0.93
	No	0	_	0	_
BMI (kg/m²)	Underweight (< 18.5)	6.12 (0 – 612.75)	1	15 (0 – 158.61)	1
	Overweight (25 - 29.9)	6.16 (2.53 - 14.99)	0.00	0.85 (0.45 - 1.60)	0.63
	Obesity (> 30)	0.68 (0.03 - 12.02)	0.79	1.63 (0 – 16.37)	1
	Normal (18.5 - 24.9)	0	_	0	_
Pulse (bpm)	Hypo (< 60)	36.50 (2.11 - 630.54)	0.01	3.74 (0.20 - 68.48)	3.37
	Hyper (> 100)	9.56 (1.47 - 62.01)	0.01	0.69 (0.07 - 6.11)	0.74
	Normal (60 - 100)	0	_	0	_

OR: Odds ratio; CI: Confidence interval; AH+/HBV+: Hypertension positive / Hepatitis B positive; AH-/HBV+: Hypertension negative / Hepatitis B positive; n: number of subjects per group; bpm: beats per minute; BMI: Body Mass Index; kg/m²: kilogram per square meter.

Table 4 shows behavioral and clinical factors associated with hypertension in chronic HBV carriers. Among HTN+/HBV+ patients, regular physical activity was strongly protective (OR = 0.08, p < 0.001), whereas smoking (OR = 31.48, p < 0.001), elevated BMI in the overweight range (OR = 6.16, p < 0.001), abnormal pulse rates both hypo- (OR = 36.50, p = 0.01) and hyper-tachycardia (OR = 9.56, p = 0.01), and a prior history of hypertension (OR = 3.19, p = 0.006) were significantly associated with higher odds of hypertension. In the HTN-/HBV+ group, daily fruit and vegetable consumption was associated with lower odds of hypertension (OR = 0.32, p = 0.03), while other factors showed no significant associations (p > 0.05). These findings highlight modifiable lifestyle factors, particularly smoking, physical activity, and diet, as important correlates of hypertension among chronic HBV carriers.

DISCUSSION

The cross-sectional study conducted at the Laquintinie Hospital provides important insights into the epidemiological profile of arterial hypertension (AH) among chronic carriers of hepatitis B virus (HBV) in Douala, Cameroon. The findings reveal a high prevalence of hypertension, particularly among individuals living with chronic HBV infection, and identify key sociodemographic, behavioral, and clinical determinants associated with this comorbidity.

The overall prevalence of hypertension in the study population was 41.14%, while it reached 48.93% among chronic HBV carriers. This prevalence is higher than several reported estimates for the general population in sub-Saharan Africa, where pooled prevalence ranges between 30% and 35% among adults (11). The high burden observed among HBV carriers suggests an important overlap between infectious and non-communicable diseases in this context. The significant association between HBV infection and hypertension (OR = 1.83; p = 0.003) indicates that chronic HBV carriers may represent a particularly vulnerable group. Although causality cannot be established due to the cross-sectional design, chronic HBV infection is characterized by persistent inflammation and immune activation, which may contribute to endothelial dysfunction and arterial stiffness, key mechanisms in the pathogenesis of hypertension (12). In addition, chronic liver disease has been associated with metabolic disturbances that may increase cardiovascular risk (13). Male sex was strongly associated with hypertension among HBV carriers. This finding aligns with global evidence indicating higher hypertension prevalence among men, partly explained by behavioral risk factors and sex-related biological differences (1). Age also emerged as a significant predictor. Although hypertension generally increases with advancing age, the elevated odds ratio observed among younger adults in HBV-positive group is concerning. Early vascular changes associated with cardiometabolic risk exposure may explain this pattern (2). This finding underscores the relevance of early cardiovascular screening among HBV carriers, including younger adults. Lower educational level was significantly associated with hypertension. Education is widely recognized as a social determinant of health, influencing health literacy, preventive behaviors, and healthcare access (14). Individuals with limited education may be less aware of hypertension risk factors and less likely to engage in preventive practices.

Our findings highlight several modifiable behavioral and clinical factors associated with hypertension among chronic HBV carriers. Smoking showed a particularly strong association with hypertension. Tobacco use is a well-established risk factor for cardiovascular disease, contributing to endothelial dysfunction, oxidative stress, and increased sympathetic tone (15). Regular physical activity was strongly protective, consistent with evidence demonstrating that exercise reduces systolic and diastolic blood pressure and improves vascular health (16). Similarly, daily consumption of fruits and vegetables was associated with lower odds of hypertension.

Diets rich in fruits and vegetables, such as the DASH (Dietary Approaches to Stop Hypertension) dietary pattern, are known to reduce blood pressure and cardiovascular risk (17). Elevated BMI was significantly associated with hypertension. This is in agreement with global data identifying overweight and obesity as major contributors to hypertension through mechanisms such as insulin resistance, increased sympathetic activity, and renal sodium retention (18). Abnormal pulse rates and prior history of hypertension further reflect the chronic and multifactorial nature of blood pressure dysregulation.

The coexistence of hypertension and chronic HBV infection represents a dual burden in Cameroon and other low- and middle-income countries. Sub-Saharan Africa faces both a high prevalence of chronic HBV infection (19) and a rapidly increasing burden of non-communicable diseases (2). Integrated care models that incorporate routine blood pressure monitoring into HBV follow-up services could improve early detection and management. Interventions targeting smoking cessation, physical activity promotion, healthy dietary habits, and weight management are particularly relevant. Public health strategies should also address social determinants of health, including education and health literacy, to effectively reduce cardiovascular risk in this population.

CONCLUSION

Hypertension is highly prevalent among chronic HBV carriers at Laquintinie Hospital in Douala, with HBV infection significantly associated with increased odds of hypertension. Male sex, lower education level, smoking, physical inactivity, elevated BMI, and suboptimal dietary patterns were key associated factors of hypertension among chronic HBV carriers. These findings support the integration of cardiovascular risk assessment and lifestyle interventions into routine care for individuals living with chronic HBV infection in Cameroon.

Limitations of Study

This study has some limitations. Selection bias may have occurred due to hospital-based recruitment, limiting generalizability. Furthermore, residual confounding cannot be excluded.

Conflicts of Interest

The authors have no conflicts of interest to declare and no funding was taken from any source to conduct this research.

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