

# Epidemiological and Clinical Profile of Hypertensive Patients with Obstructive Sleep Apnea at CHU-B

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## Abstract

**Objectives:** To detect obstructive sleep apnea syndrome (OSAS) in a population of hypertensive patients, using the Berlin questionnaire and to establish the epidemiological and clinical profile of patients. **Patients and Method:** This was a cross-sectional and analytical study, carried out from March to August 2019 at the CHU Brazzaville. Included are hypertensive patients followed as outpatients. The diagnosis of the OSAS was based on the answers to the Berlin questionnaire. **Results:** A total of 315 patients were included, including 210 women (64.9%). Prevalence of OSAS was 75.8% (n = 239). The average age of patients with sleep apnea was  $58.5 \pm 12.4$  years with female predominance (64.9%). In the mixed analysis, the factors associated with (OSAS) were: occupation OR (2.56) 95% CI (1.15 - 5.69), obesity OR 7.50 (1.60 - 35.1) and abdominal obesity OR 2.36 CI 95% (1.36 - 4.08). Living standards were high in 59 cases (18.7 per cent). The medical history of previous hospitalization was present in 209 cases (66.3%), diabetes 95 (30.2%), and heart failure 57 cases (18.1%). Lifestyle patterns were: sedentary (n = 181; 57.5%) alcohol consumption (n = 97; 30.8%). On physical examination, overweight was noted in 96 cases (30.5%) and obesity in 91 cases (28.8%). The anomalies in the Berlin questionnaire were: snoring (n = 197; 62.5%), waking fatigue (n = 127; 40.3%), fatigue during the day (n = 97; 30.8%). **Conclusion:** The prevalence of obstructive sleep apnea syndrome is high during arterial hypertension in our setting. Hence the need for sleep exploration through polysomnography, and prevention through the fight against the associated risk factors.

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## Keywords

Hypertension, Obstructive Sleep Apnea Syndrome, Brazzaville

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## 1. Introduction

Obstructive sleep apnea syndrome (OSAS) is a common disease that affects middle aged adults and elderly adults. It is characterized by episodes of complete collapse of the airway or partial collapse with an associated decrease in oxygen saturation or arousal from sleep [1]. Other symptoms are daytime drowsiness, cognitive impairment, loud snoring. Obstructive sleep apnea (OSA) has significant implications in decreasing quality of life; driving safety and development of cardiovascular disease. In fact cohort studies have shown that in apneic untreated patients the risk of stroke is three time higher. That risk is multiplied by three for development of hypertension [2]. Traditionally polysomnography (PSG) in a sleep laboratory has been used as a reference standard for the diagnosis of OSA. PSG measures several sleep variables, one of which is the apnea-hypopnea index (AHI) or respiratory disturbance index (RDI). Generally an AHI of more than five events per hour of sleep is considered abnormal and the patient is considered to have a sleep disorder. An abnormal AHI accompanied by excessive daytime sleepiness is the hallmark for OSA diagnosis. Thus because of the lack of sleep laboratory in Africa and particularly in Congo, OSA is still underdiagnosed and a little described. However in this context the diagnosis is based on the presence of a light number of established criteria such as the Epworth questionnaire and the Berlin questionnaire [3] [4]. In Congo, this is a first study among hypertensive patients despite the absence of sleep laboratories.

## 2. Patients and Method

A descriptive and analytical prospective study was carried out in the cardiology and internal medicine department (outpatient consultations) of the University Hospital Center of Brazzaville (CHU-B), from March 2019 to August 2019 (6 months).

Were included to this study patients which were managed for hypertension. Informed consent was taken from each participant.

The sample size was estimated using Schwartz equation:

$$N = t^2 \times p \times (1 - p) / m^2$$

$N$ : sample size,  $t$ : level of confidence (the value of a confidence level of 95% is 1.96),  $p$ : expected prevalence,  $m$ : precision (5%).

The expected prevalence was based on Konin *et al.* study [5] on presumption of obstructive sleep apnea among a population of black African hypertensive patients at Abidjan heart Institute. The calculated sample size was 380 people.

Demographic variables such as gender, age, marital status, educational level; medical history; clinical examination and antihypertensive drugs were docu-

mented in a survey sheet. The survey sheet was translated in different local languages to facilitate the filling of the informations.

The Berlin questionnaire was used to identify patients with obstructive sleep apnea. It has been documented to be clinically sensitive and correlates significantly with the presence of OSA among various populations. The questionnaire consists of 3 categories related to the risk of having sleep apnea. Patients can be classified into High Risk or Low Risk based on their responses to the individual items and their overall scores in the symptom categories (Appendix).

### 3. Conduct of the Study and Statistical Analysis

Patients meeting the inclusion criteria, after giving their written informed consent, filled the survey sheet and answered to the Berlin questionnaire. A clinical examination with measurement of the anthropomorphic parameters (weight, height, BMI, abdominal perimeter) and patients blood pressure was carried out. The data were processed by Epi info vR (CDC Atlanta USA). For the comparison of the percentages, the KHI square test was used. The Student t test was used for the averages. A calculation of the odds ratio (OR) and their confidence interval (CI) was made to look for the factors associated with the SAOS. For comparisons, the significance thresholds were  $p < 0.05$ .

### 4. Results

#### Epidemiological data

A total of 315 patients were included in the study. Women accounted for 66 per cent of cases, and the sex ratio was 1.6 in favor of women. The medium age of the patients was of  $59 \pm 13.3$  years (extremes: 25 - 88 years) more than the half of the studied population was less than 60 years old.

**Table 1** shows the repartition according to socio-demographics characteristics and gender.

In our sample, the majority of individuals were employed. Regarding the standard of living, we had 63.8% for the average standard of living; 19% for elevated living standards; 17.1 per cent for the low standard of living. 76 (31.8%) patients had been hypertensive for more than ten years.

Medical history and lifestyle habits of the studies population are resumed in **Table 2**.

We found a familiar history of high blood pressure in 215 (68.3%) patients, snoring in 200 patients (63.5%), diabetes in 116 (36.8%) patients. Associated cardiovascular risk factors were sedentary (57.7%), alcohol consumption (36%), diabetes (31%), known dyslipidemia (18.4%) and active smoking (2.1%). The anomalies of the Berlin questionnaire were: snoring ( $n = 197$ ; 62.5%), waking fatigue ( $n = 127$ ; 40.3%), fatigue during the day ( $n = 97$ ; 30.8%), asleep at the wheel ( $n = 22$ ; 27.5%).

In the univariate analysis, the factors associated with SAOS were: occupation OR (2.56) IC 95% (1.15 - 5.69), obesity by weight OR7.50 (1.60 - 35.1) and abdominal obesity OR 2.36 IC 95 % (1.36 - 4.08) (**Table 3**).

**Table 1.** Socio-demographic characteristics by gender.

	Femmes n (%)	Hommes n (%)	Total n (%)
<b>Age (years)</b>			
25 - 39.9	15 (7.2)	4 (3.8)	19 (6.1)
40 - 64.9	125 (59.5)	56 (53.3)	181 (57.5)
65 - 79.9	62 (29.5)	41 (39)	103 (32.7)
>79.9	8 (3.8)	4 (3.8)	12 (3.8)
<b>Profession</b>			
Government employee	47 (22.4)	56 (53.3)	103 (32.7)
Informal worker	117 (55.7)	45 (42.9)	162 (51.4)
Unemployed	46 (21.9)	4 (3.8)	50 (15.9)
<b>Instruction level</b>			
Supérieur	26 (12.4)	27 (25.7)	53 (16.8)
Secondary	113 (53.8)	61 (58.1)	174 (55.2)
Primary	48 (22.9)	17 (16.2)	65 (20.6)
No instruction	23 (11)	-	23 (7.3)
<b>Standard of living</b>			
High	40 (19)	19 (18.1)	59 (18.7)
Average	134 (63.8)	67 (63.8)	201 (63.8)
Low	36 (17.1)	19 (18.1)	55 (17.5)

**Table 2.** Distribution according to patient medical history and lifestyle habits.

	n	%
<b>Family history</b>		
Snoring	200	63.5
Family Obésity	152	48.3
Hypertension	215	68.3
Diabetes	116	36.8
Stroke	93	29.5
<b>Personal medical history</b>		
Current anti-hypertensive therapy:		
Bitherapy	132	41.9
Monotherapy	126	40
Quadritherapy	3	1
Trithérapie	54	17.1
Diabetes	95	30.2
Hospitalization	209	66.3
Dyslipidémie	54	17.1
Heart failure	57	18.1
<b>Lifestyle habits</b>		
Sédentarité	181	57.5
alcohol consumption	97	30.8
Smoking	7	2.2

**Table 3.** OSA's determining factor.

	Apnea		OR [IC 95%]	p-value
	yes	no		
	n (%)	n (%)		
<b>sBP</b>				
<140	59 (24.7)	27 (35.5)	Ref	-
140 - 159	89 (37.2)	22 (28.9)	1.85 [0.96 - 3.55]	0.066
160 - 179	52 (21.8)	16 (21.1)	1.49 [0.72 - 3.06]	0.288
≥180	39 (16.3)	11 (14.5)	1.62 [0.72 - 3.64]	0.247
<b>dbP</b>				
<90	95 (39.7)	43 (56.6)	Ref	-
90 - 99	60 (25.1)	16 (21.1)	1.70 [0.88 - 3.28]	0.115
100 - 109	48 (20.1)	11 (14.5)	1.98 [0.94 - 4.17]	0.071
>110	36 (15.1)	6 (8)	2.72 [1.06 - 6.93]	0.029
<b>HR</b>				
Tachycardie	2 (0.8)	2 (2.6)	0.31 [0.04 - 2.26]	0.291
<b>BMI</b>				
[18.5 - 25[	68 (28.5)	43 (56.6)	Ref	-
[30 - 35[	51 (21.3)	9 (11.8)	6.38 [1.95 - 20.9]	0.003
[35 - 40[	20 (8.3)	3 (4)	7.50 [1.60 - 35.1]	0.01
≥40	8 (3.3)	-	-	0.012
<b>Abdominal Obesity</b>	185 (77.4)	45 (59.2)	2.36 [1.36 - 4.08]	0.002

## 5. Discussion

### 5.1. Prevalency

A correlation between obstructive sleep apnea syndrome and high blood pressure has been found in the literature. In our study, 239 patients were highly suspicious of SAOS, a prevalence of 75.8%. These results are consistent with those of S. Duong Qyu *et al.* 84%, Patri G *et al.* 35% - 83%, Logan AG *et al.* 75%. In Côte d'Ivoire, Morocco and the West, however, frequencies are lower, respectively 45%, 13.2% and 30%. This difference in frequency could be explained by sample size and type of patient recruitment.

### 5.2. Epidemiological Aspects

The average age of our series was 59 years old, more than half were under 60 years old, which is similar to Meslier *et al.* [6], who found that the percentage of subjects with a high probability of OSA increased with age and increased three times between 33 and 64 years old. In the same idea order the study accomplished by G. Cadelis and al [7] highlighted a statistically significant difference between subjects at high risk and at weak risk of developing OSA concerning the age. There was an increase in the risk of Obstructive Sleep Apnea Syndrome for patients older than 51 years. In Onen CH *et al.* [4] as well as in Konin C *et al.* [5] studies, age was not a significant factor in the occurrence of SAOS. Because age

is a risk factor independently of presence of OSAS, these differences demonstrate that OSAS and HT are pathologies of adults. Our study found an OSAS greater frequency in women (64.9%). The predominance of the gender varies according to the series: women in Abidjan [5], men in Vietnam [8] and in France [9]. The absence of a link between sex and OSAS during HT seems to confirm that it is a pathology that affects both women and men. In our study as in others [7] [10] the majority of individuals were employed. However, C. Konin *et al.* [5] found no significant link between the profession and the occurrence of the OSAS. Alcoholism was significant in the occurrence of OSAS in our study. In the literature it is clearly established that taking alcohol aggravates the symptoms of severe OSAS. M.F Scalan *et al.* report an increase in night events, including the number and duration of apnea and hypopnea when alcohol is taken in the evening before bedtime [11]. Although many studies [3] [12] show that smoking is a determinant of OSAS, we have not found a link between OSA and smoking. This is due to the low consumption of tobacco by patients in our sample, but also to the limited size of our sample.

### 5.3. Clinical Aspect

The presence of abdominal obesity was significant. These results are similar with the literature. Young T *et al.* [13] in 2002 showed that the risk of moderate to severe OSAS was independently associated with the abdominal perimeter. The main symptom of OSAS found in our study was snoring; in more than half of the cases. Other studies have reported this prevalence [6] [8] [14] [15]. The majority of apneic patients in our sample (60%) had antihypertensive multi-therapy. These results are identical to those of C. Konin *et al.* [5] Cote d'Ivoire, which reported 82.3%. This explains the resistance of HTA in OSAS [16] [17] and the fact that HTA in OSAS is difficult to control pharmacologically [18]. In our study the strong suspicion of OSAS was significantly associated with snoring ( $p < 0.001$ ), daytime drowsiness (wake fatigue  $p < 0.001$ ; fatigue in the day  $p < 0.001$ ).

These results support the criteria of the Berlin questionnaire. This confirms the interest of exploring sleep with polysomnography or ventilatory polygraphy in any patient complaining of snoring, excessive daytime fatigue, excessive daytime drowsiness

In the mixed analysis, the factors associated with (OSAS) were: occupation OR (2.56) 95% CI (1.15 - 5.69), obesity weight OR 7.50 (1.60 - 35.1) and abdominal OR 2.36 CI 95% (1.36 - 4.08)

### 5.4. Study Limit

The absence of polysomnography was a limitation of our study. So we used the Berlin questionnaire. To minimize the bias linked to the use of a questionnaire, it was translated into local languages and only one interviewer conducted the study.

## 6. Conclusion

The prevalence of obstructive sleep apnea syndrome is high during high blood pressure in our context. Hence the need to explore sleep through polysomnography, and the prevention that goes through the fight associated risk factors.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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## Appendix

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### Berlin Questionnaire

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#### CATEGORY ONE:

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**1) Do you snore?**

**2) How loud is your snoring?**

As loud as breathing

As loud as talking

Louder than talking

Loud enough to be heard in the next room

**3) How often do you snore?**

Nearly every day

3 - 4 × /week

1 - 2 × /week

1 - 2 × /month

Hardly ever

**4) Has your snoring ever bothered other people?**

**5) Has anyone noticed you stop breathing when you are asleep?**

Nearly every day

3 - 4 × /week

1 - 2 × /week

1 - 2 × /month

Hardly ever

**Category I is positive if any of the above is present.**

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#### CATEGORY TWO

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**1) After sleep, are you fatigued?**

3 - 4 × /week

1 - 2 × /week

1 - 2 × /month

Hardly ever

**2) While awake, are you fatigued?**

3 - 4 × /week

1 - 2 × /week

1 - 2 × /month

Hardly ever

**3) Have you ever fallen asleep while driving a vehicle?**

Nearly every day

3 - 4 × /week

1 - 2 × /week

1 - 2 × /month

Hardly ever

**Category II is positive if any of the above is present.**

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**Continued**

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**CATEGORY THREE:**

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**1) Do you have hypertension?**

**2) Is your BMI > 30?**

**Category III is positive if any of the above is present**

**You are at high risk for sleep disorder if two or more categories are positive**

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