Scientific Research Publishing

Open Journal of Epidemiology, 2025, 15(3), 542-552
https://www.scirp.org/journal/ojepi
ISSN Online: 2165-7467
ISSN Print: 2165-7459

Sleep Apnoea Syndrome (SAS): Clinical and Polygraphic Characteristics of 75 Patients in the Cardiology Department of the Ignace Deen National Hospital

Mamadou Bassirou Bah*, Elhadj Yaya Balde, Amadou Dioulde Doumbouya, Mamadou Tahirou Diallo, Alpha Kone, Thierno Siradio Balde, Mamadou Aliou Balde, Mamadou Dian Bah, Abdoulaye Bah, Abdoulaye Camara, Morlaye Soumaoro, Ibrahima Sory Barry, Mamadou Dadhi Balde

Cardiology Department, IGNACE University Hospital, Conakry, Guinea
Email: *djouldemamou91@gmail.com

How to cite this paper: Bah, M.B., Balde, E.Y., Doumbouya, A.D., Diallo, M.T., Kone, A., Balde, T.S., Balde, M.A., Bah, M.D., Bah, A., Camara, A., Soumaoro, M., Barry, I.S. and Balde, M.D (2025) Sleep Apnoea Syndrome (SAS): Clinical and Polygraphic Characteristics of 75 Patients in the Cardiology Department of the Ignace Deen National Hospital. *Open Journal of Epidemiology*, **15**, 542-552.
https://doi.org/10.4236/ojepi.2025.153034

Received: April 30, 2025
Accepted: August 2, 2025
Published: August 5, 2025

Abstract

Introduction: The aim of this study was to describe the clinical and polygraphic characteristics of SAS in patients consulting cardiology at the Ignace Deen National Hospital. **Patients and Methods:** We conducted a prospective descriptive study over a 12-month period (1st January 2024 to 31st December 2025) on patients aged 18 and over with symptoms of sleep apnoea syndrome who had undergone a ventilatory polygraphy. **Results:** In this study, we included 75 patients ranging in age from 22 to 77 years, with an average age of 52 years. Males accounted for 48% of cases. Gynoid obesity was present in 38% of patients, while android obesity accounted for 64%. Arterial hypertension was the main cardiovascular risk factor (88%), followed by a sedentary lifestyle (52%), diabetes (34.67%) and smoking (6.67%). Daytime OSA symptoms were dominated by headache (73.33%), sleepiness (66.66%) and fatigue (52%). Nocturnal symptoms mainly included snoring (93.33%), nocturia (46.66%) and startle awakenings (37.33%). On the basis of the apnoea-hypopnoea index (AHI), 30.67% of patients had severe OSA, 22.67% moderate OSA and 38.67% mild OSA. A further 8% had no OSA. The mean AHI was 22.66. Of the 75 patients, 53.33% had an indication for treatment with continuous positive airway pressure (CPAP), but only 3 patients (7.75%) were able to benefit from it. **Conclusion:** Obstructive sleep apnoea syndrome is a reality in Guinea. It is crucial to focus on detecting its symptoms in order to make an early diagnosis and rapidly guide treatment.

Keywords

Sleep Apnoea Syndrome, Ventilatory Polygraphy, Ignace Deen

1. Introduction

Sleep Apnoea Syndrome (SAS) is a sleep-related respiratory disorder characterised by hypopnoea and ventilatory apnoea. These respiratory disorders cause blood hypoxaemia, hypercapnia, fragmented sleep, recurrent nocturnal awakenings, increased respiratory effort and increased sympathetic nervous activity [1]. At least 4% and 2% of adult men and women in the general population are diagnosed with OSA and its characteristic symptoms [2]. OSA is also an independent risk factor for cardiovascular morbidity [3]-[5].

The impact of SAS on cardiovascular disease has been documented and is due to recurrent cardiometabolic disturbances experienced during repeated attempts to breathe against an obstructed airway, precipitating nocturnal episodes of hypoxia, sleep disturbances and sympathetic nervous system surges, leading to elevated blood pressure and heart rate, endothelial dysfunction, systemic inflammation and insulin resistance—all mechanisms implicated in the pathogenesis of cardiovascular disease [6].

In France, a study by Sylla *et al.* [7] revealed a prevalence of SAS of 63.9% among cardiology patients consulting a peripheral hospital. Research into the prevalence of SAS in sub-Saharan Africa is still limited. However, a few studies have been carried out in certain countries in the region.

In Cameroon in 2022, Massongo M *et al.* [8] reported a prevalence of SAS of 55% in their cohort of patients.

In Senegal, a study of patients aged between 20 and 70, using both the Berlin Questionnaire and the Epworth Sleepiness Scale, showed that 24.47% of participants were at high risk of SAS [9].

In Côte d'Ivoire, a study by Kouassi BA *et al.* [10] based on the results of 52 polygraphs showed a particularly high prevalence of SAS, reaching 73%.

In Guinea, to our knowledge, there is only one study in the scientific literature on obstructive sleep apnoea syndrome (OSA), by Baldé *et al.* [11], which concerned a clinical case in a hypertensive patient.

Given this lack of epidemiological data, our study aims to fill this scientific void by providing local information on SAS in Guinea. Its aim is to analyse the clinical and polygraphic characteristics of patients undergoing cardiology consultations at the Ignace Deen National Hospital.

2. Patients and Methods

2.1. Scope of the Study

This study was carried out in the Republic of Guinea, a West African country, in its capital Conakry. The cardiology department of the Ignace Deen National Hospital provided the setting for the study. It is one of the country's leading centres for general cardiology.

To collect our data, we will use:

- Two (2) Miniscreen ventilatory polygraphs.
- A survey form and standardised questionnaires such as Epworth and Berlin.

2.2. Type and Duration of Study

This was a descriptive study with prospective recruitment that took place over a 12-month period from 1 January 2024 to 31 December 2025.

2.3. Selection Criteria

2.3.1. Inclusion Criteria

In the present study, we included all patients aged 18 and over with symptoms of sleep apnoea syndrome who had undergone a ventilatory polygraphy.

2.3.2. Non-Inclusion Criteria

Patients under the age of 18, or with a clinical suspicion but who had not undergone ventilatory polygraphy, were not included.

2.4. Study Variables

Our study variables were qualitative and quantitative and covered sociodemographic, anthropometric, clinical, paraclinical and therapeutic data.

2.4.1. Epidemiological Variables

Concern age, gender.

2.4.2. Anthropometric Variables

Weight, height, neck circumference, waist circumference and body mass index.

2.4.3. Clinical Variables

Each patient included in the study was interviewed and clinically examined for medical history (arterial hypertension, type 2 diabetes, stroke, heart failure, pulmonary pathology, pregnancy, smoking), daytime clinical data (nocturnal snoring, pauses in breathing, restless sleep, startle awakening, reduced libido, nycturia) and daytime data (morning headaches, daytime fatigue, reduced memory, irritability). We used the Berlin questionnaires and the Epworth Score to reinforce the suspicion of diagnosis, as they are non-invasive clinical screening tools with an excellent negative predictive value.

2.4.4. Paraclinical Variables

All patients included underwent a ventilatory polygraph. We used two (2) ventilatory polygraphs. The Apnoea-Hypopnoea Index (AHI), *i.e.*, the number of apnoeas and hypopnoeas per hour, enabled us to classify the patients into 4 categories:

- Patients without sleep apnoea syndrome: AHI < 5 events per hour

- Patients with mild sleep apnoea syndrome: AHI ≥ 5 and ≤14/h
- Patients with moderate sleep apnoea syndrome: AHI ≥ 15 and ≤29/h
- Patients with severe sleep apnoea syndrome: IAH ≥ 30/h

2.5. Conduct of the Study

After collecting anamnestic data, patients with suspected sleep apnoea syndrome were reprogrammed for diagnostic confirmation. Each patient was called in individually to have the measuring device fitted, and then had to return the next day to return the device. Diagnostic confirmation was based on recording by nocturnal ventilatory polygraphy, performed by cardiology interns trained in this technique. The equipment used was two Miniscreen ventilatory polygraphs, comprising several sensors: a nasal flow sensor, a sound sensor to detect snoring, position sensors to monitor postural changes, and an oximeter to record variations in oxygen saturation. The recordings were analysed by a cardiologist with expertise in the management of SAS.

2.6. Data Management, Analysis and Ethical Considerations

This study did not involve any intervention or experimentation on human beings, and participation was obtained with the patients' consent. Anonymity was guaranteed and maintained. Data analysis and processing were carried out using EPI Info software version 7.2.3 and Microsoft 365 for data entry and the design of tables and figures. References were managed using Mendeley reference manager.

3. Results

In this study, we included 75 patients.

Table 1 presents the main characteristics of the study population. The patients included ranged in age from 22 to 77 years, with an average age of 52 years. The majority of participants lived in the capital, Conakry (84%). Males accounted for 48% of cases.

Table 1. Presentation of patients according to epidemiological data.

Variables	Workforce	Percentage
Age		
42 - 61	40	74.67
62 - 77	19	25.33
Average age	52.70 ± 12.59	Extreme 22 and 77 years
Sex		
Male	48	64.00
Female	27	36.00

Gynoid obesity was present in 38% of patients, while android obesity affected 64%. Neck circumference ranged from 32 to 49 cm, with an average of 41 cm.

High neck circumference was observed in 53.33% of participants. These data are shown in Table 2.

Table 3 details the patient's history and risk factors. Hypertension was the main cardiovascular risk factor (88%), followed by a sedentary lifestyle (52%), diabetes (34.67%) and smoking (6.67%). Three cases of heart failure were also identified.

All the patients included had a clinical suspicion of obstructive sleep apnoea syndrome (Table 4). Daytime symptoms were dominated by headache (73.33%), somnolence (66.66%) and fatigue (52%). Nocturnal symptoms mainly included snoring (93.33%), nocturia (46.66%) and startle awakenings (37.33%).

Concerning the sleep apnoea syndrome screening scores presented in Table 5, for the EPWORTH score only 30% had normal sleepiness, while the others the rest (70%) had moderate to severe sleepiness. According to the score, 64% of patients were at high risk of developing SAS.

Table 2. Patient presentation based on anthropometric data.

Variables	Workforce	Percentage
Body mass index		
Obesity	38	50.67
Overweight	27	36.00
Average body mass index	30.64 ± 6.93	Extreme 18 and 56
Waist circumference		
Android obesity	48	64.00
Normal	27	36.00
Average waist size	99.98 ± 13.13	Extreme 70 and 10 cm
Cervical perimeter		
high	40	53.33
Normal	35	46.67
Average	41.39 ± 4.46	Extreme 32 and 49 cm

Table 3. Presentation of patients according to history and cardiovascular risk factors.

Variables	Workforce	Percentage
Cardiovascular risk factors		
High blood pressure	66	88.00
Diabetes	26	34.67
Sedentary lifestyle	39	52.00
Tobacco	5	6.67
History		
Heart failure	3	4.00
Cerebrovascular accident	2	2.00

Table 4. Frequencies of functional signs of sleep apnea syndrome.

Variables	Workforce	Percentage
Daytime symptoms		
Morning headaches	55	73.33
Somnolence	50	66.66
Daytime fatigue	39	52.00
Irritability	6	8.00
Memory impairment	4	5.33
Nocturnal symptoms		
Snoring	70	9.33
Nocturia	35	46.66
Waking up with a start	28	37.33
Decreased libido	22	29.33
Breathing pauses	21	28.00
Restless sleep	4	5.33

Table 5. Presentation of patients according to screening scores.

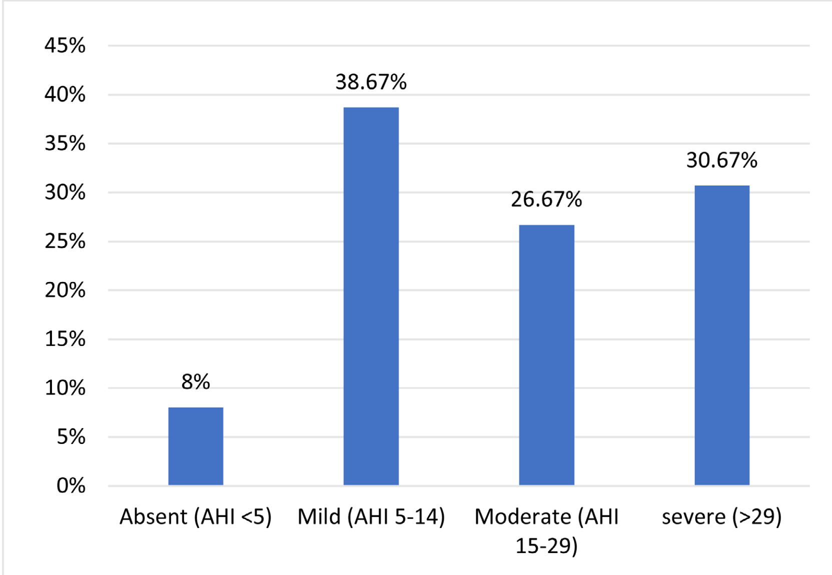
Variables	Workforce	Percentage
EPWORTH Score		
Normal sleepiness	30	40.00
Moderate drowsiness	28	37.33
Excessive sleepiness	17	22.67
TOTAL	75	100
Berlin Questionnaire		
High SAS risk	61	64.00
Low risk	14	36.00

On the basis of the apnoea-hypopnoea index (AHI), 30.67% of patients had severe SAS, 22.67% moderate SAS and 38.67% mild SAS. In addition, 8% of participants had no SAS. The mean AHI was 22.66%. The results of the polygraph are shown in Figure 1.

Of the 75 patients, 53.33% had an indication for treatment with continuous positive airway pressure (CPAP), but only 3 patients (7.75%) were able to benefit from it.

4. Discussion

This study is particularly important as it represents the very first to be carried out in Guinea. Nevertheless, certain limitations should be noted: the monocentric nature of the study, the size of our sample and the absence of polysomnography.



Average: 22.66 ± 19.

Figure 1. Patient presentation: the Apnoea Hypopnoea Index.

In this study, we used ventilatory polygraphy to confirm the diagnosis of SAS. However, it is important to emphasise that polysomnography performed in a sleep laboratory remains the reference examination for diagnosing SAS.

The average age of the patients included in this study was 52. This is in line with several international studies which show that obstructive sleep apnoea syndrome is more common in middle-aged and older adults [1]. In Africa, a study carried out in Cameroon by Massongo *et al.* [8] reported a similar mean age of 50 years in OSAS patients. Similarly, a study in Côte d'Ivoire by Kouassi BA *et al.* [10] found a similar mean age in patients diagnosed by polysomnography.

Males accounted for 48% of cases, a slightly lower proportion than in the literature, which generally shows a male predominance in SAS. In fact, several studies have shown that men are at greater risk of developing severe SAS due to anatomical and hormonal differences that influence the collapsibility of the upper airways [10]. However, in certain African populations, the differences between the sexes are less marked due to similar rates of obesity between men and women, which could explain our results [12].

Android obesity, present in 64% of patients, is a major risk factor for SAS, unlike gynoid obesity, which was less common (38%). Central obesity is well documented as a factor contributing to upper airway collapsibility and increased airway resistance [13]. A study carried out in South Africa showed that abdominal obesity is strongly associated with the severity of SAS, confirming our results [14]. With regard to cardiovascular risk factors, hypertension was present in 88% of patients, a result in line with the literature indicating a high prevalence of hypertension in SAS patients [15]. A meta-analysis has confirmed that SAS is an independent risk factor for resistant hypertension, underlining the importance of screening in this population [16]. Other co-morbidities such as a sedentary lifestyle (52%), diabetes (34.67%) and smoking (6.67%) were also identified. These factors are well documented as aggravating SAS, particularly because of the influence of metabolic syndrome on respiratory function [17]. In Africa, sedentary lifestyles are on the increase, which could explain the growing prevalence of SAS in certain urban populations [18]. Finally, three cases of heart failure were identified, reinforcing the links between SAS and cardiovascular pathologies. Studies have shown that sleep apnoea is an aggravating factor in heart failure, and that treatment with continuous positive airway pressure (CPAP) can improve cardiac function in these patients [19].

Snoring, the most frequently reported symptom in our study (93.33%), is a key marker of SAS. A recent meta-analysis confirmed that the presence of loud, recurrent snoring is highly suggestive of a sleep-disordered breathing disorder, particularly in patients with associated risk factors such as obesity and hypertension [20]. Excessive daytime sleepiness, present in 66.66% of patients in our cohort, is a major warning symptom, assessed mainly using the Epworth scale. Several studies, notably that of Peppard *et al.*, have demonstrated a direct association between excessive sleepiness and an increased risk of road accidents, cognitive impairment and reduced work performance [21]. Nocturia (46.66%) and startle awakenings (37.33%) are also symptoms frequently observed in SAS. The prevalence of nocturia is well documented in the literature, with studies showing that it results from an increase in nocturnal urine production due to fluctuations in intrathoracic pressure induced by apnoeic episodes [22].

Based on the apnoea-hypopnoea index (AHI), 30.67% of patients had severe SAS. These results are similar to those reported in the African and international literature [14] [15]. A study conducted in Nigeria found a comparable prevalence of severe SAS in patients at cardiovascular risk [23]. These data confirm that ASD is a major public health problem in Africa, requiring early diagnosis and management.

Of the 75 patients, 53.33% had an indication for continuous positive airway pressure (CPAP) treatment, but only 3 patients (7.75%) were able to benefit from it. This low rate of CPAP use could be explained by financial constraints and a lack of equipment availability. A similar situation has been reported in other African studies, highlighting the need for better access to devices for the treatment of SAS [24]. Polysomnography is recommended when ventilatory polygraphy does not allow a conclusion to be drawn about the diagnosis of SAS, particularly in the event of discordance between the clinic and the results obtained, or in the presence of comorbidities likely to influence the analysis of respiratory data [16]. A study by Redline *et al.* highlighted the need for polysomnography in complex cases, because of its ability to differentiate between associated sleep disorders [25].

These results highlight the need to raise awareness of SAS among healthcare professionals and to improve access to diagnostic tools such as ventilatory polygraphy and polysomnography. Building local capacity in terms of management and treatment, particularly the use of continuous positive airway pressure (CPAP), is essential to improving the quality of life of patients suffering from this condition. Management policies adapted to the socio-economic context of Africa should be put in place to reduce the impact of this disease.

5. Conclusion

Obstructive sleep apnoea syndrome is a common but largely under-diagnosed condition. In this Guinean cohort, the majority had cardiovascular comorbidities, in particular arterial hypertension and obesity, mainly of the android type. Clinical suspicion was based on SAS screening scores (Berlin and Epworth). The diagnosis of SAS was made by polygraphy, with one third having a severe form. The indication for treatment with CPAP was obvious, but less than 8% actually had access to it. These results underline the need to strengthen local capacity for screening (polygraphy, polysomnography) and access to treatment, with priority given to patients with identified comorbidities.

Conflicts of Interest

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

References

[1] Lavie, L. (2015) Oxidative Stress in Obstructive Sleep Apnea and Intermittent Hypoxia-Revisited—The Bad Ugly and Good: Implications to the Heart and Brain. *Sleep Medicine Reviews*, **20**, 27-45. https://doi.org/10.1016/j.smrv.2014.07.003

[2] Leger, D., Bayon, V., Laaban, J.P. and Philip, P. (2012) Impact of Sleep Apnea on Economics. *Sleep Medicine Reviews*, **16**, 455-462. https://doi.org/10.1016/j.smrv.2011.10.001

[3] Hybertson, B.M., Gao, B., Bose, S.K. and McCord, J.M. (2011) Oxidative Stress in Health and Disease: The Therapeutic Potential of Nrf2 Activation. *Molecular Aspects of Medicine*, **32**, 234-246. https://doi.org/10.1016/j.mam.2011.10.006

[4] Valko, M., Rhodes, C.J., Moncol, J., Izakovic, M. and Mazur, M. (2006) Free Radicals, Metals and Antioxidants in Oxidative Stress-Induced Cancer. *Chemico-Biological Interactions*, **160**, 1-40. https://doi.org/10.1016/j.cbi.2005.12.009

[5] Reuter, S., Gupta, S.C., Chaturvedi, M.M. and Aggarwal, B.B. (2010) Oxidative Stress, Inflammation, and Cancer: How Are They Linked? *Free Radical Biology and Medicine*, **49**, 1603-1616. https://doi.org/10.1016/j.freeradbiomed.2010.09.006

[6] Dempsey, J.A., Veasey, S.C., Morgan, B.J. and O'Donnell, C.P. (2010) Pathophysiology of Sleep Apnea. *Physiological Reviews*, **90**, 47-112. https://doi.org/10.1152/physrev.00043.2008

[7] Sylla, I.S., Balde, M.D., Djita, N., Barry, A., Sylla, D., Balde, E.Y., *et al.* (2021) Fréquence du syndrome d'apnées obstructives du sommeil en consultation externe du centre hospitalier intercommunal alençon-mamers frequency of obstructive sleep apnea syndrome in outpatients at intercommunal alençon-mamers hospital. *Annals of African Medicine*, **14**.

[8] Massongo, M., Ngarka, L., Balkissou, D.A., Poka-Mayap, V., Sonwa, S.V., Tatah, G.Y., *et al.* (2022) Sleep Apnea Syndrome: Prevalence and Comorbidity with Other Non-Communicable Diseases and HIV Infection, among Hospitalized Patients in Yaoundé, Cameroon. *Sleep Disorders*, **2022**, Article ID: 4359294.

https://doi.org/10.1155/2022/4359294

[9] Ba, F., Thiam, S.A., Ba, E.H.M. and Sar, F.B. (2020) Prévalence du risque du syndrome d'apnées obstructives du sommeil à saint-louis. *Médecine du Sommeil*, **17**, 130-136. https://doi.org/10.1016/j.msom.2020.04.001

[10] Kouassi, B.A., Koffi, M.O., Kone, A., Sourabie, A., Lolo, S., Gode, C., *et al.* (2017) Résultats de polygraphie ventilatoire en Côte d'Ivoire: À propos de 52 enregistrements. *Revue des Maladies Respiratoires*, **34**, A287-A288. https://doi.org/10.1016/j.rmr.2016.10.709

[11] Baldé, E.Y., Bah, M.B., Doumbouya, A.D., Baldé, A.T., Guissé, M.C., Barry, I.S., *et al.* (2021) A Very Severe Obstructive Sleep Apnea Syndrome: In a Cause of Resistant Hypertension with One Sample Case. *World Journal of Cardiovascular Diseases*, **11**, 223-229.

[12] Adeboye, B., Bermano, G. and Rolland, C. (2012) Obesity and Its Health Impact in Africa: A Systematic Review: Review Article. *Cardiovascular Journal of Africa*, **23**, 512-521. https://doi.org/10.5830/cvja-2012-040

[13] Peppard, P.E., Young, T., Palta, M., Dempsey, J. and Skatrud, J. (2000) Longitudinal Study of Moderate Weight Change and Sleep-Disordered Breathing. *JAMA*, **284**, 3015-3021. https://doi.org/10.1001/jama.284.23.3015

[14] Alenezi, M.A., Alabdulathim, S., Alhejaili, S.A.M., Al Sheif, Z.A.A., Aldossari, K.K., Bakhsh, J.I., *et al.* (2024) The Association between Obesity and the Development and Severity of Obstructive Sleep Apnea: A Systematic Review. *Cureus*, **16**, e69962. https://doi.org/10.7759/cureus.69962

[15] Marin, J.M., Carrizo, S.J., Vicente, E. and Agusti, A.G. (2005) Long-Term Cardiovascular Outcomes in Men with Obstructive Sleep Apnoea-Hypopnoea with or without Treatment with Continuous Positive Airway Pressure: An Observational Study. *The Lancet*, **365**, 1046-1053. https://doi.org/10.1016/s0140-6736(05)71141-7

[16] Javaheri, S., Barbe, F., Campos-Rodriguez, F., Dempsey, J.A., Khayat, R., Javaheri, S., *et al.* (2017) Sleep Apnea: Types, Mechanisms, and Clinical Cardiovascular Consequences. *Journal of the American College of Cardiology*, **69**, 841-858. https://doi.org/10.1016/j.jacc.2016.11.069

[17] Bonsignore, M.R., Baiamonte, P., Mazzuca, E., Castrogiovanni, A. and Marrone, O. (2019) Obstructive Sleep Apnea and Comorbidities: A Dangerous Liaison. *Multidisciplinary Respiratory Medicine*, **14**, Article No. 8.

[18] Adewole, O.O., Hakeem, A., Fola, A., Anteyi, E., Ajuwon, Z. and Erhabor, G. (2009) Obstructive Sleep Apnea among Adults in Nigeria. *Journal of the National Medical Association*, **101**, 720-725. https://doi.org/10.1016/s0027-9684(15)30983-4

[19] McEvoy, R.D., Antic, N.A., Heeley, E., Luo, Y., Ou, Q., Zhang, X., *et al.* (2016) CPAP for Prevention of Cardiovascular Events in Obstructive Sleep Apnea. *New England Journal of Medicine*, **375**, 919-931. https://doi.org/10.1056/nejmoa1606599

[20] Benjafield, A.V., Ayas, N.T., Eastwood, P.R., Heinzer, R., Ip, M.S.M., Morrell, M.J., *et al.* (2019) Estimation of the Global Prevalence and Burden of Obstructive Sleep Apnoea: A Literature-Based Analysis. *The Lancet Respiratory Medicine*, **7**, 687-698. https://doi.org/10.1016/s2213-2600(19)30198-5

[21] Peppard, P.E., Young, T., Barnet, J.H., Palta, M., Hagen, E.W. and Hla, K.M. (2013) Increased Prevalence of Sleep-Disordered Breathing in Adults. *American Journal of Epidemiology*, **177**, 1006-1014. https://doi.org/10.1093/aje/kws342

[22] Papworth, E., Dawson, S., Henderson, E.J., Eriksson, S.H., Selsick, H., Rees, J., *et al.* (2022) Association of Sleep Disorders with Nocturia: A Systematic Review and Nom-

inal Group Technique Consensus on Primary Care Assessment and Treatment. *European Urology Focus*, **8**, 42-51. https://doi.org/10.1016/j.euf.2021.12.011

[23] Adewoye Ifeoluwa, A., Adebiyi, A.A., Adeoye Abiodun, M. and Akinyemi, A. (2019) Right Ventricular Systolic Function in Nigerians with Heart Failure Secondary to Hypertensive Heart Disease. *African Health Sciences*, **19**, 2130-2139. https://doi.org/10.4314/ahs.v19i2.37

[24] Ogah, O.S., Adebiyi, A., Sliwa, K., Ogah, O.S., Adebiyi, A. and Sliwa, K. (2019) Heart Failure in Sub-Saharan Africa. Topics in Heart Failure Management. https://www.intechopen.com/chapters/66937

[25] Redline, S. and Tishler, P.V. (2000) The Genetics of Sleep Apnea. *Sleep Medicine Reviews*, **4**, 583-602. https://doi.org/10.1053/smrv.2000.0120