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# Awareness of Obstructive Sleep Apnea, Including its Orofacial and Systemic Complications among Dental Patients Attending a Tertiary Hospital in Lagos, Nigeria

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## Abstract

Obstructive sleep apnea (OSA) is the most common globally prevalent sleep disordered breathing. It is associated with various orofacial malformations and systemic morbidities. The limited level of awareness has left most cases undiagnosed. This study assessed the level of awareness of OSA and its orofacial and systemic complications among dental patients at the Lagos State University teaching hospital (LASUTH), Lagos, Nigeria. It was cross-sectional, involving 120 consenting subjects. Sample selection was by convenient sampling. Data collection was conducted using a self-administered questionnaire to obtain the biodata and the participants' awareness of OSA using the Likert scale. Data analysis was carried out using SPSS version 24 to assess the descriptive variables and OSA awareness of the subjects. Ordinal logistic regression was used to determine the relationship between the covariates and the participants' awareness of OSA. Statistical significance was determined at $p \leq 0.05$. The mean age of the participants was 45.7±16.2 years. A few, 23(19.2%), were fully aware of what OSA is. Twenty-six (21.7%) were fully aware that OSA can predispose to dental problems. Seventy-one (59.2%) were aware to a limited extent that some orofacial symptoms could identify people with OSA. Only 27(22.5%), 24 (20%), and 23 (19.2%) were fully aware that OSA is related to high blood pressure, obesity, and sudden death, respectively. In an ordinal regression, the age groups and occupational groups were the determinants of the participants' awareness about OSA ($p \leq 0.05$). Intensive education of the population is needed through several forums to increase their awareness of OSA and its complications.

**Keywords:** Obstructive sleep apnea, sleep disordered breathing, Orofacial complications, systemic complications.



## INTRODUCTION

Obstructive Sleep Apnea (OSA) is the most common type of sleep-disordered breathing (Khodadadi, N *et al*, 2022). It is a condition characterised by repeated interruptions in breathing during sleep, leading to episodic airway blockage, decreased oxygen saturation, and sleep fragmentation (Arango Jimenez, N *et al*, 2023) (Te´llez-Corral, A *et al*, 2022) (Kim, S. R *et al.,* 2023) (Mukherjee, S and Galgali, S. R, 2021). OSA is a serious public health challenge complicated by conditions such as hypertension, disordered cardiac rhythms and other cardiovascular conditions (Kim, S. R *et al.,* 2023) (Mukherjee, S and Galgali, S. R, 2021) (Mi, Z *et al*, 2023). It also results in concentration impairment and daytime drowsiness, which can potentiate domestic, road traffic and workplace accidents (Jaakkola, J *et al*, 2025). The snoring noise has led to serious marital and social problems, such that it requires immediate management (Cascais, C *et al,* 2023). Approximately 1 billion people globally are affected by OSA; only a small percentage of these cases are diagnosed, even though it is associated with several illnesses and, in some instances, sudden

death (Lastra, A. C *et al*, 2025). Addressing the global issue of undiagnosed OSA is a matter of great concern. Therefore, there is a need for effective population-level diagnostic and treatment strategies to address the challenges of identifying and managing OSA at every level to reduce the cost of management (Lastra, A. C *et al*,2025).

Obesity has been reported as the main predisposing factor for OSA (Ytzhaik, N *et al.,* 2023). It is also known to be prevalent in the aged, smokers and alcoholics, and can be inherited. Polysomnography (PSG) is the gold standard in the diagnosis of OSA, but it is expensive and time-consuming (Lastra, A. C *et al*, 2025). The diagnostic criterion for OSA is when at least five apnea or hypopnea events take place within one hour (Lastra, A. C *et al,*2025).

The relationship between obstructive sleep apnea (OSA) and oral health is emphasised by the interactions between OSA and some oral conditions, such as parafunctional habits (bruxism), dry mouth (xerostomia), periodontal disease, temporomandibular joint disorders, structural malformations of the palate and dental tissues, mandibular micrognathia, macroglossia enlargement of the palatine tonsils and uvula, and disorders of taste. There is a narrowing of the nasal cavity resulting from a highly arched, small palate, which potentiates the danger of airway resistance and collapse (Maniaci, A *et al*, 2024) There is also malocclusion, which changes the normal anatomic relationships inside the mouth and the position and form of the soft palate. The changes in tongue position during sleep caused by alterations in tooth structure further exacerbate airway blockage. Mouth breathing, which is usually a compensatory mechanism to nasal obstruction in people with OSA can cause dry mouth and predispose to dental caries due to reduced salivary flow (Cioboata, R *et al*, 2025). Temporomandibular joint disorders resulting from bruxism are also common in people with OSA (Cioboata, R *et al*, 2025).

Awareness of OSA and its oral complications is essential for early diagnosis and treatment ref. In a study involving a group of OSA patients referred to the Department of Orthodontics and Dental Sleep Medicine of the University of Bologna (Bartolucci, M.L *et al,* 2023). About 20% of them showed a poor awareness of their condition. This indicates that some patients diagnosed with OSA did not have a clear knowledge of their condition. They also demonstrated a poor knowledge of the complications, such as cardiovascular or metabolic comorbidities (Bartolucci, M.L *et al,* 2023). Most of the patients have just a superficial knowledge of the condition (Bartolucci, M. L *et al,* 2023). This suggests even poorer knowledge in the general patient population. Knowledge of OSA among dentists and physicians about collaborative and team approach in the management is not optimal (Kantaci, Y *et al*, 2023) (Alqahtani, N *et al*, 2020). This would ultimately affect their patients' level of awareness. Good quality of Sleep positively impacts health and well-being. In a Nigerian study, the majority of the patients were not aware that snoring (77.3%) and excessive daytime sleepiness (65.8%) constitute a medical problem in the population studied (Desalu, O *et al.,* 2016).

Considering the enormity of the size of the morbidities associated with OSA and the associated underdiagnosis, it is important to assess the level of awareness in the Nigerian population. Hence, this study aims to assess the awareness of dental patients attending dental centre at the Lagos State University Teaching Hospital, Lagos, Nigeria, about OSA and its oral / systemic complications.

## METHODOLOGY

The study location was the Oral Medicine and Oral Diagnosis clinic at the Lagos State University Teaching Hospital (LASUTH), Ikeja, Lagos, Nigeria. LASUTH is a training institution and a tertiary referral hospital in Lagos, a metropolitan city in southwest Nigeria it which borders three other states and the Atlantic Ocean. The Department receives more than 50 patients weekly with several dental conditions.

This study was cross-sectional, involving 120 first-time patients, 55 of whom were males and 65 were females. Sample selection was by convenient sampling. The inclusion criteria included subjects aged 15 years and above. Participants who were health workers or students and those undergoing or who had undergone treatment for OSA were excluded from the study.

Data collection was conducted using a self-administered questionnaire, which comprised both open-ended and closed-ended questions. This was used to obtain the biodata such as age, sex, occupation, marital status, and educational status. The participants' awareness of OSA and its relationship with oral/dental and medical morbidity and mortality was assessed on the questionnaire using the Likert scale (fully aware = 4, aware = 3, neither aware nor unaware = 2, not aware 1, not aware at all = 0). The mean score was recorded for each item used to assess awareness on the questionnaire. A score of 0.10 – 1.00 was considered 'not aware', 1.10 - 2.00 was 'low level awareness', 2.10 – 3.00 was 'moderate level awareness', and 3.10 - 4.00 was 'high level awareness'. Written informed consent was obtained from the subjects before they participated in the study. Ethical approval for this research was obtained from the Health Research and Ethics Committee of Lagos State University Teaching Hospital (LASUTH).

Data analysis was carried out using SPSS version 24. For descriptive variables that are continuous, such as age, the mean, minimum, and maximum and measures of variability were determined. While simple frequency and percentages were determined for categorical variables such as age groups, sex, educational

status, occupation, and the awareness of the participants about OSA and the dental and medical morbidities. Multivariate analysis was done using ordinal logistic regression to assess the relationship of the demographics and other covariates, and the participants' awareness of OSA. Statistical significance was determined at $p \leq 0.05$.

The fitness of the model was ascertained using the pseudo $R^2$ by Cox and Snell and Nagelkerke.

## RESULTS

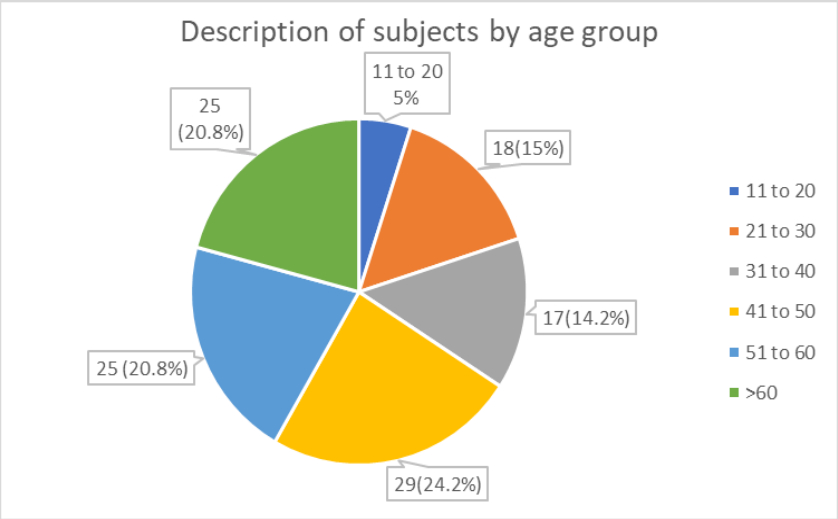


**Figure 1: Description of the Subjects by the Age Group**

A total of 120 subjects participated in this study, with a mean age of 45.7±16.2 years, ranging from 15 to 82 years. Most of the subjects were in the 41- to 50-year age group, followed by those in the 51- to 60-year age group and those above 60 years old; the least were those below 20 years old (Figure 1).

**Table 1: Socio-demographics of the Respondents**

| Variable | | Frequency | Percentage (%) |
|---|---|---|---|
| **Sex** | Male | 55 | 45.8 |
| | Female | 65 | 54.5 |
| **Occupation** | Unskilled | 12 | 10 |
| | Skilled | 29 | 24.2 |
| | Students | 15 | 12.5 |
| | Professional | 51 | 42.5 |
| | Retired | 13 | 10.8 |
| **Educational status** | Not formally educated | 2 | 1.7 |
| | Primary | 13 | 10.8 |
| | Secondary | 12 | 10 |
| | Tertiary | 93 | 77.5 |
| **Marital status** | Single | 38 | 31.7 |
| | Married | 68 | 56.7 |
| | Separated | 4 | 3.3 |
| | Divorced | 3 | 2.5 |
| | Widowed | 7 | 5.8 |

The male-to-female ratio was 1:1.18. The majority of the participants were professionals, 51(42.5%), followed by the skilled workers, 29 (24.2%), while the least were the unskilled workers, 12(10%). Ninety-three (77.5%) of the respondents had up to a tertiary level of education, while those without any formal education were 2(1.7%). Most of the respondents were married, 68(56.7%), followed by the singles, 38(31.7%), the least were the divorced and the separated, which were 3(2.5%) and 4(3.3%) respectively. (Table 1). Only 4 (3.3%) had frequently come across someone with OSA, while 30 (25.0%) had come across them occasionally, and 86 (71.7%) had never come across anyone with OSA. One hundred and eight (90.0%) of the respondents believed that OSA is not gender prevalent, while 12(10%) believed it is.

**Table 2: Assessment of the Awareness of Osa Among the Respondents**

| Awareness | Fully aware | Aware | Neither aware nor not aware | Not aware | Not aware at all | Score |
|---|---|---|---|---|---|---|
| Are you aware of what obstructive sleep apnea is? | 23(19.2) | 58(48.3) | 5(4.2) | 16(13.3) | 18(15) | 2.43 |
| Are you aware that OSA patients suffer from severe snoring? | 21(17.5) | 63(52.5) | 7(5.8 | 20(16.7) | 9(7.5) | 2.56 |
| Are you aware that OSA can cause dental problems? | 26(21.7) | 76(63.3) | 7(5.8) | 8(6.7) | 3(2.5) | 2.95 |
| Are you aware that some orofacial symptoms and characteristics identify people with OSA? | 26(21.7) | 71(59.2) | 15(12.5) | 6(5) | 2(1.7 | 2.94 |
| Are you aware that OSA can cause | | | | | | |
| Poor teeth arrangement | 28(23.3) | 64(53.3) | 9(7.5) | 14(11.7) | 5(4.2) | 2.80 |
| Gum disease | 31(25.8) | 53(44.2) | 12(10) | 20(16.7) | 4(3.3) | 2.63 |
| Dry mouth | 27(22.5) | 60(50) | 9(7.5) | 22(18.3) | 2(1.7) | 2.73 |
| Throat infection | 20(16.7) | 56(46.7) | 9(7.5) | 26(21.7) | 9(7.5) | 2.43 |
| Orofacial pain | 31(25.8) | 67(55.8) | 9(7.5) | 12(10) | 1(8) | 2.96 |
| Mouth odour | 30(25) | 58(48.3) | 5(4.2) | 18(15) | 9(7.5) | 2.68 |
| Grinding of teeth | 29(24.2) | 56(46.7) | 6(5) | 22(18.3) | 7(5.8) | 2.65 |
| Dental caries | 18(15) | 58(48.3) | 8(6.7) | 27(22.5) | 9(7.5) | 2.41 |
| Are you aware that OSA is related to high blood pressure? | 27(22.5) | 71(59.2) | 9(7.5) | 10(8.3) | 3(2.5) | 2.91 |
| Are you aware that OSA is related to obesity? | 24(20) | 67(55.8) | 6(5) | 13(10.8) | 10(8.3) | 2.68 |
| Are you aware that OSA is related to sudden death? | 23(19.2) | 59(49.2) | 11(9.2) | 18(15) | 9(7.5) | 2.58 |

A sizeable proportion, 58(48.3%) of the participants had a level of awareness of what OSA is, while 23(19.2%) were fully aware, and 34(28.3%) were not aware, with a score of 2.43. (Table 2). Sixty-three (52.5%) of the respondents were aware that severe snoring is very common amongst patients of OSA, while 21(17.5%) were fully aware of this, and 29(24.2%) were not aware, the score was 2.56. Twenty-six (21.7%) were fully aware, and 76(63.3%) were aware to an extent that OSA can predispose to dental problems, while 11(9.2%) were not aware; the score was 2.95.A large proportion, 77(64.2%) of the participants, did not believe that dentists have a significant role in identifying patients at high risk of OSA in the clinic, while 43(35.8%) believed so. Seventy-one (59.2%) (space between table and write up)

were aware to a limited extent that some orofacial symptoms could identify people with OSA, whereas 26(21.7%) were fully aware, and 2(1.7%) were not aware at all. The score was 2.94.

The majority of the participants had some awareness of oral conditions associated with OSA, including poor teeth arrangement 64(53.3%), dry mouth 53(44.2%), throat infection 60(50%), orofacial pain 56(46.7%), mouth odour 67(55.8%), teeth grinding 56(46.7%), and dental caries

**Table 2: Assessment of the Awareness of Osa Among the Respondents**

58(48.3%). Seventy-one (59.2%) were aware that OSA is related to high blood pressure, 27(22.5) were fully aware, while 13 (10.8%) were not aware, with a score of 2.91. Twenty-four (20%) were fully aware that there is a relationship between obesity and OSA, 67 (55.8%) were aware to an extent, while 23 (19.1%) were not aware; the score was 2.68. Twenty-three (19.2%) were fully aware that OSA is related to sudden death, 59(49.2%) had a limited awareness, while 27(22.5%) were not aware; the score was 2.58.

When the confounders were controlled for (Table 3) in an ordinal regression, the age groups and occupational groups (skilled and students) were related determinants of the participants' knowledge about OSA. The pseudo $R^2$ of 0.99 (Cox and Snell and 0.99 (Nagelkerke) explain a good fit of the regression model.

**Table 3: Ordinal Logistic Regression to Assess the Determinants of Awareness of Osa Among the Respondents**

| Pseudo R-Square | |
|---|---|
| Cox and Snell | .999 |
| Nagelkerke | .999 |
| McFadden | .907 |

| Variable | Estimate | Standard error | Wald | df | Sig | 95%confidence interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower bound | Upper bound |
| [age group=1.00] | -37.302 | 5.082 | 53.874 | 1 | .000* | -47.263 | -27.341 |
| [age group=2.00] | -29.920 | 3.640 | 67.555 | 1 | .000* | -37.055 | -22.785 |
| [age group=3.00] | -23.779 | 3.205 | 55.056 | 1 | .000* | -30.061 | -17.498 |
| [age group=4.00] | -16.150 | 2.615 | 38.134 | 1 | .000* | -21.276 | -11.024 |
| [age group=5.00] | -8.275 | 2.043 | 16.399 | 1 | .000* | -12.280 | -4.270 |
| [age group=6.00] | 0[a] | . | . | 0 | . | . | . |
| [sex=1.00] | .182 | .360 | .255 | 1 | .613 | -.524 | .888 |
| [sex=2.00] | 0[a] | . | . | 0 | . | . | . |
| [occupation=1.00] | -1.548 | .976 | 2.518 | 1 | .113 | -3.460 | .364 |
| [occupation=2.00] | -1.810 | .867 | 4.363 | 1 | .037* | -3.509 | -.112 |
| [occupation=3.00] | -4.662 | 1.233 | 14.301 | 1 | .000* | -7.078 | -2.246 |
| [occupation=4.00] | -1.515 | .832 | 3.311 | 1 | .069 | -3.146 | .117 |
| [occupation=5.00] | 0[a] | . | . | 0 | . | . | . |
| [marital status=1.00] | .315 | 1.220 | .067 | 1 | .796 | -2.076 | 2.707 |
| [marital status=2.00] | .063 | 1.083 | .003 | 1 | .954 | -2.061 | 2.186 |
| [marital status=3.00] | 1.135 | 1.518 | .560 | 1 | .454 | -1.839 | 4.110 |
| [marital status=4.00] | .937 | 1.341 | .489 | 1 | .484 | -1.690 | 3.565 |
| [marital status=5.00] | 0[a] | . | . | 0 | . | . | . |
| [education level=1.00] | 1.758 | 1.866 | .887 | 1 | .346 | -1.899 | 5.415 |
| [education level=2.00] | -.394 | .698 | .318 | 1 | .573 | -1.762 | .974 |
| [education level=3.00] | -1.066 | .685 | 2.426 | 1 | .119 | -2.408 | .275 |
| [education level=4.00] | 0[a] | . | . | 0 | . | . | . |

## DISCUSSION

The participants in this study were predominantly middle-aged and above, with a mean age of 45.7±16.2 years, with only very few below 20 years old. There was almost an equal number of males and females in this study. Professionals and skilled workers were more than the other occupational cadres amongst the participants. This can be explained by the higher healthcare-seeking behaviours associated with higher socioeconomic classes, as revealed in a study in Ibadan, Nigeria, and also due to the requirement of an annual health check-up by employers. Similarly, the participants who attained up to the tertiary level in education were the majority; higher level of education is also associated with higher healthcare seeking (Latunji, O. O and Akinyemi, O. O 2018); there were only a very few who had no formal education whatsoever. The majority of the respondents were married, followed by about one-third who were singles.

More than 70% of the participants in this study reported that they had never encountered anyone with OSA. One quarter of them reported that they occasionally come across them. This does not agree with available literature because most OSA sufferers are usually identified and alerted by their spouses and relatives, as they may not know themselves (Thurnheer, R 2000), since it occurs during sleep. Ninety per cent of the respondents believed that OSA is not gender prevalent. Studies have shown that OSA is more prevalent and more severe in males; it occurs in females later in life, usually post-menopausal, with varied symptoms (Lin C. M 2008) (Castelnuovo, A 2005). A larger proportion of the participants had a level of awareness of OSA, which is inadequate, as only about 20% were fully aware, with a score of 2.43, which signifies a moderate level of awareness (2.10-3.00). This is similar to a study in Bologna, Italy, (Bartolucci, M.L *et al,* 2023). This is the same pattern for all the responses to the questions about their awareness of OSA (Bartolucci, M.L *et al,* 2023) (Castelnuovo, A 2005). For instance, the respondents were aware to an extent that severe snoring is very common amongst patients of OSA; less than 20% were fully aware of this, the score was 2.56, which also shows a moderate level of awareness. They also demonstrated a moderate level of awareness with their response to the question on whether OSA can predispose to dental problems; only about 20% were fully aware, while more than 60% were aware to an extent.

A large percentage of participants did not believe that dentists play a significant role in the diagnosis of OSA by identifying patients at high risk of it in the clinic; about 36% believed so. This reflects the cumulative effect of a low level of awareness about

dental care in Nigeria; many do not even know the full extent of care that a dentist can carry out, including the medical doctors and the nurses (Elijah Olufemi Oyetola *et al.,* 2016) (Ikpefan, D.O 2020). They also had a moderate level of awareness that some orofacial symptoms could identify people with OSA, which confirms the poor awareness in identifying OSA among the people. as more than 60% were aware to some extent, and 20% reported full awareness. This pattern was also exhibited when their awareness of OSA and its relationship with oral/dental abnormalities, including poor teeth arrangement, dry mouth, throat infection, orofacial pain, mouth odour, teeth grinding, and dental caries, was assessed. The scores indicated a moderate level of awareness, 13 and 20.

The participants also showed a moderate level of awareness of the relationship of OSA and some systemic conditions, with about 60% of them showing a limited level of awareness that OSA is related to high blood pressure, 56% to obesity, and 49% to sudden death. This is similar to a study among hospital medical staff in Cyprus, where many staff members have some knowledge of the symptoms and risks associated with OSA. Their knowledge is inadequate about the complications (Gelener, P and Yıldız, F 2023), a study in Saudi Arabia reported a low level of awareness (Aldhahir, A. M *et al.,* 2025). The age groups, skilled and student occupational groups, were the related determinants of the participants' awareness about OSA when confounders were controlled for.

## CONCLUSION

It is evident from this study that the population studied have a limited awareness of OSA and its orofacial and systemic complications, thus explaining the large population of undiagnosed cases of OSA in Nigeria, as it is elsewhere. It also makes a case for many of the cases of hypertension and other morbidities that remain defiant to conventional treatment. All age groups showed some awareness, as well as the skilled workers and students, which showed that in-depth and further health education through conferences, workshops, classroom lectures and public health forums about OSA and the associated sequela should be enhanced by authorities, and this should be backed by a policy document to be strictly adhered to by all strata of Government. It is also very important to design education programs aimed at increasing OSA awareness among primary healthcare officers and other health personnel, to enhance their day-to-day patient experience.

**Conflict of interest -** Nil

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