Assessment of risk of obstructive sleep apnoea syndrome among patients attending a medical outpatient clinic in a tertiary health facility in South-West Nigeria

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Background. Obstructive sleep apnoea syndrome (OSAS) is increasingly becoming a disease of public health importance in Nigeria and Africa with long-term negative effects. It is a chronic illness that results from partial or complete collapse of the airway during sleep, and loud snoring is a common complaint by the patients or their partners.[1,2] Some of the most common manifestations of OSAS include loud snoring, excessive daytime sleepiness (EDS) and breathing pauses during sleep. It is gradual in onset and the associated symptoms are mostly unrecognised by patients.[3] OSAS contributes to long-term clinical consequences such as hypertension, cardiovascular disease and abnormalities in glucose metabolism.[4-6]

The prevalence of snoring among adults varies in different parts of the world from 19.3% to 52.3%, while the risk of OSAS ranges from 16.8% to 33.3%.[7-14] The prevalence of clinically suspected OSAS in a study done in Abuja, Nigeria was low at 1%.[15] However, with increasing westernisation of diet, obesity, tendencies towards sedentary lifestyles and increasing prevalence of diabetes mellitus (DM) and hypertension, OSAS is becoming an increasing problem.

The laboratory overnight polysomnography (PSG) is the gold standard for diagnosis of OSAS but this is expensive and not commonly available. Resource constraints mean that many patients with a history of snoring or other symptoms of OSAS cannot easily be diagnosed in countries such as Nigeria.[10-14] The practical assessment of patients at high risk of developing sleep-disordered breathing and OSAS includes use of validated questionnaires such as the Epworth sleepiness scale (ESS), the STOPBANG questionnaire, the Cleveland Sleep Habits Questionnaire and the Berlin questionnaire. These assessments are widely used to estimate and evaluate the likelihood of sleep-disordered breathing. Identifying those who are at risk of OSAS will help to determine who may require subsequent evaluation with more comprehensive tests.[10,15-18]

Conclusion. In resource-poor settings in Africa, where there is an emphasis on screening and treating diseases of poverty, patients with medical conditions such as high BMI and hypertension should be screened for OSAS.

This study was aimed at determining the risk of OSAS among patients attending a medical outpatient clinic in a tertiary health facility using the Berlin questionnaire and the ESS.

**Methods**

**Study area**
Owo is an ancient city located in the Owo local government area of Ondo State, South-West Nigeria. Agriculture (including fishing) constitutes the main occupation of the people. It is located about 350 km from Lagos State and 50 km from Akure, the state capital. The Federal Medical Centre (FMC) in Owo was a general hospital taken over by the Federal Government of Nigeria in 1989 and redesignated FMC with the aim of providing tertiary services in Ondo State. It is a 250-bed hospital with a staff of 1 200, of which doctors and nurses constitute about 500. It is the only tertiary hospital in Ondo state and provides primary, secondary and tertiary levels of care.

**Study design**
This was a descriptive cross-sectional study of adults attending the medical outpatient clinic of FMC, Owo.

**Study population**
The population sampled for this study included patients with common conditions attending the medical outpatient clinic, which was largely made up of patients with hypertension, DM, asthma and tuberculosis.

**Sample size determination**
The required sample size for this study was calculated using standard formulae for calculating minimum sample size for descriptive cross-sectional study.

Minimum sample size = \( \frac{Z^2 \times p \times q}{d^2} \).

\( Z^2 \) is the standard normal deviate corresponding to level of significance (usually 5%). This was 1.96.

\( p \) is the prevalence of outcome of interest. A prevalence of high risk OSAS of 17.4% was used.15

\( q \) is \( 1 - p \).

\( d \) is the level of precision (0.05 was used).

This sample size was calculated to be 220. However, only 208 patients were seen during the study period.

**Sampling method**
Consecutive patients who were not previously diagnosed with OSAS or sleep-disordered breathing were eligible for recruitment. Since the estimated minimum sample size was 220 subjects, and the clinic recorded an average of 80 patients per month, the study lasted from January to March 2014.

A semi-structured self-administered questionnaire was used for data collection. Medical doctors attending to patients at the outpatient clinic participated in questionnaire administration. The questionnaire was categorised into three sections using the objectives of the study as criteria: section A – sociodemographic characteristics; section B – ESS; section C – Berlin questionnaire for sleep evaluation. ESS score <11 was categorised as normal, while a score \( \geq 11 \) suggested EDS. Berlin questionnaire scores ranged from 0 to 3, respondents with a score of 3 were categorised as having a high likelihood of sleep-disordered breathing (HSDB) while those scoring less were categorised as having a low likelihood of sleep-disordered breathing (LSDB). The patients’ bed partner, when available, was asked about the presence of snoring, and the patients themselves were asked when there was no one who accompanied them to the hospital, or when those who accompanied them did not have such information.

**Data analysis**
The data obtained were analysed using the Statistical Package for Social Sciences (SPSS) for Windows evaluation version 21 (International Business Machines Corporation, USA). Data were presented using tables. Association between variables was assessed with \( \chi^2 \) test. Bivariate logistic regression analysis was used to determine predictors of high likelihood of sleep-disordered breathing. Level of significance was set at \( p=0.05 \).

**Consent**
Permission to conduct the study was sought from each respondent before conducting the interview and a high level of privacy was ensured. Respondents were adequately informed that they had the right to decline participation or to withdraw from the study at any point in time. In addition, respondents were informed that refusal to participate in the study or withdrawal from it would not result in any penalty.

**Results**
There were 208 respondents, mean age (standard deviation (SD)) was 53.8 (16.3) years, 98 (47.1%) males and 110 (52.9%) were females. The most common diagnosis was hypertension in 66 (38.2%). The sociodemographic characteristics and primary diagnoses of the respondents are summarised in Table 1. The Berlin questionnaire showed that 152 (73.1%) had HSDB. Only 39 (18.8%) had EDS using the ESS as shown in Table 2. Twenty-seven of the respondents (13%) were obese and 54 (26%) were overweight.

Among respondents aged <44 years, more than half (36 (62.1%)) had a LSDB compared with 22 (37.9%) who had HSDB \((p<0.001)\). Increasing body mass index (BMI) was associated with an increasing HSDB; respondents who were obese (26 (96.3%))

### Table 1. Sociodemographic characteristics and primary diagnosis of respondents

<table>
<thead>
<tr>
<th>Variables</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
</tr>
<tr>
<td>&lt;44</td>
<td>58 (27.9)</td>
</tr>
<tr>
<td>44 - 64</td>
<td>87 (41.8)</td>
</tr>
<tr>
<td>( \geq 65 )</td>
<td>63 (30.3)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>98 (47.1)</td>
</tr>
<tr>
<td>Female</td>
<td>110 (52.9)</td>
</tr>
<tr>
<td>Primary diagnosis (N=173)</td>
<td></td>
</tr>
<tr>
<td>Pulmonary tuberculosis</td>
<td>41 (23.7)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>66 (38.2)</td>
</tr>
<tr>
<td>DM</td>
<td>16 (9.2)</td>
</tr>
<tr>
<td>Hypertension and DM</td>
<td>34 (19.7)</td>
</tr>
<tr>
<td>Asthma</td>
<td>16 (9.2)</td>
</tr>
</tbody>
</table>

### Table 2. Sleep evaluation of respondents using Berlin questionnaire and the Epworth sleepiness scale

<table>
<thead>
<tr>
<th>Tool used</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin sleep evaluation</td>
<td></td>
</tr>
<tr>
<td>LSDB</td>
<td>56 (26.9)</td>
</tr>
<tr>
<td>HSDB</td>
<td>152 (73.1)</td>
</tr>
<tr>
<td>ESS</td>
<td></td>
</tr>
<tr>
<td>Normal &lt;11</td>
<td>169 (81.3)</td>
</tr>
<tr>
<td>EDS ( \geq 11 )</td>
<td>39 (18.8)</td>
</tr>
</tbody>
</table>

LSDB = low likelihood of sleep-disordered breathing; HSDB = high likelihood of sleep-disordered breathing; EDS = excessive daytime sleepiness.
had HSDB compared with the underweight respondents (7 (29.2%), \( p < 0.001 \)). Table 3 shows the association between sociodemographic characteristics of the respondents and sleep-disordered breathing.

Table 4 shows the association between primary diagnosis and sleep-disordered breathing in respondents. Among respondents with multiple primary morbidity, 33 (97.1%) had HSDB compared with 103 (74.1%) of respondents with single morbidity (\( p = 0.003 \)). Of the hypertensive respondents, 63 (95.5%) had HSDB while only 3 (4.5%) had LSDB (\( p < 0.001 \)).

The predictors of HSDB are shown in Table 5. Respondents aged 44 - 64 years were about 6 times more likely to have HSDB compared with those <44 years (odds ratio (OR) 5.6, 95% confidence interval (CI) 1.5 - 20.7, \( p = 0.009 \)).

The likelihood of having HSDB increased with increasing BMI (OR 4.9, 95% CI 1.1 - 21.9, \( p = 0.037 \)) in those with normal BMI (OR 13.3, 95% CI 2.2 - 81.0, \( p = 0.005 \)) in overweight and markedly increased in obese respondents (OR 17.56, 95% CI 1.4 - 215.5, \( p = 0.025 \)) compared with those with underweight BMI. The respondents with multiple primary morbidities were about 24 times more likely to have HSDB compared with respondents having single morbidity (OR 23.7, 95% CI 2.2 - 255.73, \( p = 0.009 \)). The probability of having HSDB was much greater in respondents with hypertension compared with those with asthma (OR 15.6, CI 2.95 - 82.8, \( p = 0.001 \)).

The major finding of this study was that a significant number of patients who were being managed for chronic medical diseases in our tertiary hospital were at high risk of having OSAS. It was observed that most clinicians did not ask questions regarding snoring or EDS while attending to patients in the Medical Outpatients Department.[20]

In agreement with our findings, a study carried out at the university of Benin Teaching Hospital, Nigeria, showed that among a total of 102 medical outpatients with a mean age (SD) of 55.1 (13.6) years, the prevalence of OSAS risk among the respondents who were positive according to the Berlin questionnaire was 67 (65.7%). The study also observed a statistically significant association between age group in years (\( p = 0.01 \)), BMI (\( p < 0.001 \)), type of primary diagnosis (\( p < 0.001 \)), and Berlin risk of OSAS.[10] Our study showed a potentially high prevalence of OSAS among patients with chronic medical diseases as depicted by HSDB in the middle-aged and elderly groups using the Berlin questionnaire. However, the prevalence was low with the ESS. This may underscore the fact that the Berlin questionnaire has been documented to be clinically more sensitive and correlates significantly with the presence of OSAS among various populations.[10] The ESS has been documented to be more specific even though it is less sensitive than the Berlin questionnaire.[10]

**Discussion**

OSAS is diagnosed using the standard laboratory overnight PSG, which is not commonly available, and is expensive and time and personnel intensive. This has led to OSAS being underdiagnosed, making accurate quantification of the health burden of untreated OSAS difficult, thus contributing to the occurrence of complications of OSAS, especially cardiovascular morbidities.[10-13]

The provision of validated questionnaires such as the Berlin questionnaire and the ESS thus serve as surrogates to identify patients with HSDB.[10,16-18]

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using the STOPBANG questionnaire in a tertiary facility in Lagos, Nigeria, showed that 36.3% of the respondents had a high risk of OSAS while 24.4% had EDS using the ESS.\textsuperscript{[22]} The seemingly lower value that was observed in the Lagos study compared with ours may be explained by the heterogeneity of the patients used for their study, since recruitment was done from both medical and surgical departments while ours focused strictly on those with medical conditions.

There appeared to be a significant increased risk of OSAS among middle-aged respondents when compared with those who were elderly. Increasing BMI was associated with higher risk of OSAS while ours focused strictly on those with increased BMI. Hypertension and DM combined constituted the highest risk, possibly resulting from the synergistic effect of these two conditions and their associations with obesity in the so-called metabolic syndrome. Asthma constituted the lowest risk as observed in this study. However, the percentage of those who were asthmatic among the respondents was small and may account for the low risk identified.

Several studies have described the increase in statistical significance of EDS and the risk of OSAS.\textsuperscript{[23,24]} Although there was a positive association between EDS (as measured by the ESS) and the risk of sleep apnoea (as assessed by the Berlin questionnaire), it was not significant in our study. This may result from the limitations of the instruments used in this study and the subjective nature of the responses obtained. An objective assessment of overnight pulse oximetry or PSG, which could be more informative, was not done in this study due to lack of availability and the huge cost implications.

Our study has shown a considerable risk of OSAS among patients attending the Medical Outpatients Department and its association with other health-related factors.

In conclusion, the risk of OSAS increased with increased BMI. Hypertension and the presence of multiple comorbid conditions also increased the risk of OSAS.

It is important that healthcare providers make efforts to screen all patients for OSAS using the available screening questionnaires designed for this purpose, and to ensure the prompt and comprehensive treatment of comorbidities. Increased awareness should be created among the healthcare workers with a view to asking questions regarding snoring and a tendency to fall asleep during the day. Attention should also be paid to preventive strategies, including lifestyle modifications.

Like other descriptive cross-sectional studies, recall bias of snoring while asleep or during daytime, especially when the respondent is not staying in the same room with the spouse, is a possible limitation. This limitation is minimised by the short recall period in the assessment tools. There is also the possibility of the respondents denying sleeping, either at work or while driving, for fear of losing their jobs.

We conclude that there is an urgent need for sleep laboratories in Nigeria so that patients with a high risk of OSAS can easily be referred for further evaluation.

References

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