

## Quality of Life of Patients with Obstructive Sleep Apnea on CPAP Treatment in South West Nigeria: A Preliminary Report

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### ABSTRACT

**Background:** Obstructive sleep apnea (OSA) is rising in Africa. The treatment of the disease involves the use of continuous positive airway pressure (CPAP) machine. Information on the quality of life of patients with OSA on CPAP therapy in Nigeria is scarce. **Objectives:** This study assessed the quality of life of patients with OSA on CPAP treatment in Lagos. The study also evaluated the daytime wakefulness, perception of quality of night sleep as well as the physical and emotional activities of the patients. **Methodology:** This was a cross-sectional study using a semi-structured questionnaire done at Lagos State University Teaching Hospital from September 2021 to December 2021. All consenting patients with previous diagnosis of OSA with polysomnography who have been regular on CPAP therapy for at least three months were recruited. Patients were contacted via WhatsApp, telephone or physical interview. **Results:** A total of 23 patients were contacted, of which 19 patients consented. There were 13 males and 6 females with a mean age of 53.63±13.1 years. All the participants had improvement in their general state of health. Majority of the patients had improvement in their sleep quality, day-time sleepiness and snoring (n=17:89.5%, n=14:72% and n=12:63.2% respectively). Majority of the patients have no physical limitation on moderate activities (n=12:63.2%) while 47.4% of responders have no social activities interference. **Conclusion:** CPAP usage in patients with obstructive apnea is associated with improved snoring, sleep quality, day-time somnolence and general quality of life.

**Keywords:** CPAP, apnea, Obstructive sleep apnea, CPAP outcome, CPAP benefits.

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#### Article Metrics

Date Submitted: 30 July 2022

Date Accepted: 19 Sept 2022

Date Published: Jan-June 2023

#### Journal Metrics

e-ISSN: 1115-0521

Website: [www.orientjom.org.ng](http://www.orientjom.org.ng)

E-mail: [editorojm@gmail.com](mailto:editorojm@gmail.com)

#### Publisher

cPrint, Nig. Ltd

E-mail: [cprintpublisher@gmail.com](mailto:cprintpublisher@gmail.com)



#### Access to the article

Website: <http://www.orientjom.org.ng>

DOI: 10.5281/zenodo.7140881

#### How to cite this article

Ojo OT, Ajibare AO, Dada AO, Morokola A, Odeyemi A, Fapohunda T et al., Quality of Life of Patients with Obstructive Sleep Apnea on CPAP Treatment South West Nigeria: A Preliminary Report. *Orient J Med*, 2023;35(1-2):21-27. DOI:10.5281/zenodo.7140881

## INTRODUCTION

Obstructive sleep apnea is a respiratory sleep disorder characterized by intermittent upper-airway collapse during sleep.<sup>[1]</sup> The burden has doubled over the years in the developing countries including Nigeria where the prevalence is about 19-34% among a population of 200 million people.<sup>[2-4]</sup>

The major consequence of OSAS is excessive daytime sleepiness, low energy, impaired cognition and altered mood.<sup>[5]</sup> Patients are also prone to accidents while driving or working, and most of them report poor social functioning and reduced quality of life.<sup>[5,6]</sup> The long-term sequelae of OSA include increased risk of cardiovascular, cerebrovascular and metabolic syndrome disorders that may ultimately lead to premature death if untreated.<sup>[7]</sup>

The main treatment for obstructive sleep apnea (OSA) is the use of continuous positive airway pressure (CPAP). Conventional CPAP device is applied by means of a nasal or face mask and it generates nasal pressure that maintains a constant positive airway pressure to the patient during sleep.<sup>[8]</sup> This has been proven to improve outcomes including daytime sleepiness, cognitive performance, blood pressure, glucose control, cardiovascular status, quality of life and mortality.<sup>[9-11]</sup>

Information on quality of life of patients with OSA on CPAP therapy in Nigeria is scarce. The objective of this study was to assess the quality of life of patients with OSA on CPAP treatment in Lagos. The study also described the quality of night sleep and daytime wakefulness as well as physical and emotional activities of the patients.

## METHODOLOGY

### Study design

This was a cross-sectional descriptive study.

### Study site

The study was carried out in Lagos State University Teaching Hospital (LASUTH) Ikeja, which is one of

the three tertiary centers that receive referrals from all parts of the Lagos metropolis and its environs. Participants were recruited from the respiratory clinic of the hospital where an average of 70-100 patients are seen per week including about one case of obstructed sleep apnea.

### Inclusion criteria

Participants aged > 18 years with moderate to severe obstructive sleep apnea diagnosed with polysomnography with an apnea-hypopnea index(AHI) >15 on CPAP machine therapy for at least 3 months and compliant were recruited for the study. Moderate OSA is defined by AHI between 15 and 29.9 events/h, while severe OSA is defined by AHI as greater than 30 events/hour.<sup>[12]</sup>

### Exclusion criteria

Individuals with kyphoscoliosis or neuromuscular disorders, acute illness, chronic alcoholics, those on mandibular devices or on treatment for weight loss or those receiving medications that could cause drowsiness were excluded.

### Sampling technique

Convenient sampling method was used in this study. All the eligible patients were recruited after taking their consent.

### Data collection

Each participant was assisted by the researcher or a trained research assistant to complete the interviewer-administered questionnaire adapted from previous studies which sought information about the socio-demographics, and perceptions about the outcomes of CPAP therapy including the sleep quality, snoring, daytime sleepiness assessed using Epworth sleepiness scale<sup>[13,14]</sup>, and general quality of life assessed with a short form health survey (SF-12).<sup>[13,14]</sup>

SF12 Questionnaire is a health related quality of life (HRQoL) questionnaire. It consists of twelve questions that measure eight health domains to assess

physical and mental health. The physical health-related domains include general health, physical functioning, physical and body pain. The mental health-related domains include vitality, social functioning, emotional and mental health.<sup>[15,16]</sup> This instrument has been validated across a number of chronic diseases and conditions. Each item was scored 1-5 and then recoded from 0 - 100 in reverse order. The total score was calculated.<sup>[16]</sup> A score of 50 and above has been recommended as a cut-off to determine good quality of life.<sup>[17]</sup>

Epworth sleepiness scale (ESS) is a subjective measure of a patient's sleepiness with 8 items. The test is a list of eight situations in which tendency to become sleepy is rated on a scale of 0, no chance of dozing, to 3, high chance of dozing. The values of all the responses were added up. The ESS score (the sum of 8 item scores, 0-3) can range from 0 to 24. The scale estimates whether the patient is experiencing excessive sleepiness. Patients were grouped into 4 categories depending on ESS score: 0-10 as normal, 11-14 as having mild sleepiness, 15-17 as having moderate sleepiness and 18-24 as having severe sleepiness.<sup>[4,18]</sup>

Epworth score of < 10 and SF 12 > 50 indicate good outcomes. Improved report on snoring and sleep quality also indicates good outcome.

### Data analysis

The data were analyzed using SPSS version 26. The numerical variables such as the age of the subjects, Epworth and SF-12 scores were summarized as mean and standard deviation. Categorical variables such as gender were summarized as frequencies and percentages.

### Ethical approval

Ethical approval was obtained from Lagos State University Teaching Hospital (LASUTH) Ethics and Research Committee.

## RESULTS

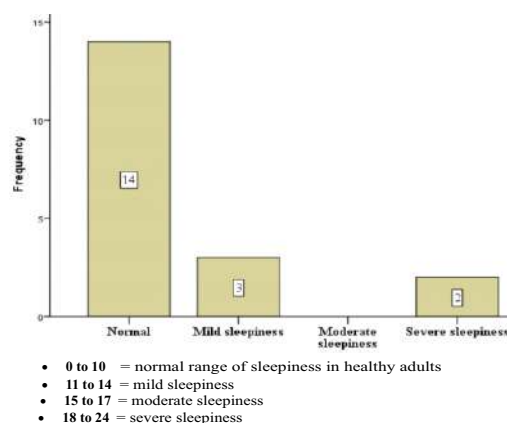
A total of 19 moderate to severe OSA patients on CPAP participated in the survey. There were 13 males and 6 females with a mean age of 53.63±13.1 years. The majority of the participants had tertiary education (n=17, 89.5%). Thirteen patients earned more than 200,000 naira (about \$500) per month. Seventeen participants had other co-morbidities. (Table 1).

**Table 1: Socio-demographic and CPAP-related characteristics of patients**

| Variables                                   | Frequency (n=19) | Percentage |
|---|------------------|------------|
| <b>Age group (years)</b>                    |                  |            |
| ≤45   | 7                | 36.8       |
| 46-65                                       | 8                | 42.1       |
| >65   | 4                | 21.1       |
| <b>Gender</b>                               |                  |            |
| Male  | 13               | 68.4       |
| Female                                      | 6                | 31.6       |
| <b>Educational status</b>                   |                  |            |
| None  | 1                | 5.3        |
| Primary                                     | 0                | 0          |
| Secondary                                   | 1                | 5.3        |
| Tertiary                                    | 17               | 89.5       |
| <b>Average income per month (Naira)</b>     |                  |            |
| <100,000                                    | 3                | 15.8       |
| 100-200,000                                 | 3                | 15.8       |
| >200,000                                    | 13               | 84.2       |
| <b>Presence of other medical conditions</b> |                  |            |
| Yes   | 17               | 89.5       |
| No  | 2                | 10.5       |

The mean Epworth sleepiness questionnaire score was 7.95 ±3.6. Improvement in daytime sleepiness from Epworth sleepiness scale score of less than 10 was recorded in 14 (72%) of the participants in Figure 1.

**Fig 1: Grade of sleepiness using Eppworth Sleepiness Scale**



Significant improvement in snoring was reported by 12(63.2%) and improvement in sleep quality was reported by 17 (89.5%) subjects. (Figure 2).

The mean SF-12 was 83.87 +/- 11.56. All the patients have good general state of health. Majority of the patients have no physical limitation on moderate activities (12:63.2%). About a third (n=7, 36.8%) of the patient had no pain limitation, while others have varying degree of pain. Majority of the patients have a lot of energy most of the time (n=13, 68.4%). More than a third (n=9, 47.4%) have not felt downhearted and had no social activities interference. (Table 2)

Figure ii: Overall quality of life

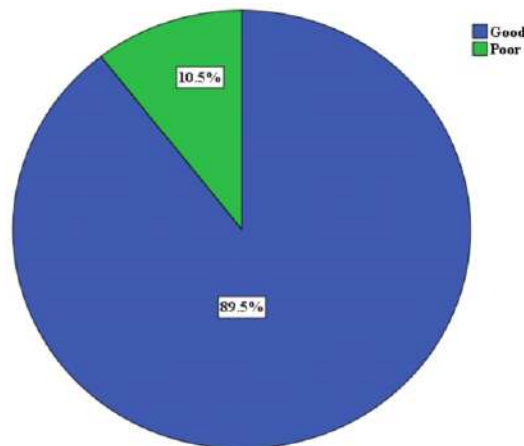


Table 2: Short Form Health Survey of the participants (SF12)

| Variables  | Frequency (n=19) | Percentage |
|--|------------------|------------|
| <b>In general, state of health</b>   |                  |            |
| Excellent  | 4                | 21.1       |
| Very good  | 11               | 57.8       |
| Good   | 4                | 21.1       |
| <b>Does health limit you in moderate activities</b>                                    |                  |            |
| Yes limited a little   | 7                | 36.8       |
| No, not limited at all   | 12               | 63.2       |
| <b>Does health limit you in climbing several flight of stairs</b>                      |                  |            |
| Yes limited a lot  |                  |            |
| Yes limited a little   | 3                | 15.8       |
| No, not limited at all   | 8                | 42.1       |
| <b>Accomplished less than you would due to physical health</b>                         |                  |            |
| Yes  | 8                | 42.1       |
| No   | 5                | 26.3       |
|  | 14               | 73.7       |
| <b>Were limited in the kind of work or other activities due to physical health</b>     |                  |            |
| Yes  | 6                | 31.6       |
| No   | 13               | 68.4       |
| <b>Accomplished less than you would like due to emotional problems</b>                 |                  |            |
| Yes  | 5                | 26.3       |
| No   | 14               | 73.7       |
| <b>Didn't do work or other activities as carefully as usual due emotional problems</b> |                  |            |
| Yes  | 3                | 15.8       |
| No   | 16               | 84.2       |
| <b>How much did pain interfere with your normal work</b>                               |                  |            |
| Not at all   | 7                | 36.8       |
| A little bit   | 6                | 31.6       |

## DISCUSSION

The aim of the study was to investigate the different outcomes of CPAP therapy including quality of life in patients with obstructive sleep apnea. The significant improvement in snoring and sleep quality recorded in this study is similar to the findings of Beninati *et al* who measured the effect of treatment of OSA on their

partners. He reported that elimination of snoring and OSA in these patients were associated with an improvement in the quality of their bed partners' sleep.<sup>[19]</sup> Similarly, Loredo *et al* investigated the short-term effectiveness of continuous positive airway

pressure (CPAP) in improvement of sleep quality in patients with obstructive sleep apnea (OSA) and found an association between CPAP and an improvement in sleep quality.<sup>[20]</sup> Mcardle *et al* also determined the impact of CPAP treatment of OSA patients on their partners and reported only subjective sleep quality benefits from the treatment.<sup>[21]</sup> Ancoli-Israel *et al* in another study investigated the effectiveness of CPAP therapy in improvement of sleep quality in patients with OSA and confirmed the effectiveness of CPAP in lowering the number of arousals, and raising the oxygen saturation of these patients during the night.<sup>[22]</sup>

Our findings on improvement in daytime somnolence in majority of patients are comparable to findings of Heater *et al* who investigated the benefits from CPAP in OSA patients and found significant improvement in Epworth sleepiness scales score, road traffic accident and CPAP use.<sup>[23]</sup> Likewise, Habukawa *et al* studied the relationship between (OSA), depressive symptoms, and the effect of CPAP therapy and found significant correlations among the improvement rates in sleep score and night respiratory events with CPAP treatment.<sup>[24]</sup> He noted that these findings may result in a significant improvement of residual depressive symptoms due to the improvement of daytime sleepiness in these patients.<sup>[24]</sup> Sforza *et al* performed modified maintenance of wakefulness test in 58 patients with obstructive sleep apnea (OSA) syndrome before treatment and after long-term ( $554 \pm 28$  days) home therapy with nasal continuous positive airway pressure (CPAP) and found significant improvement in daytime alertness which correlated with the reduction in sleep fragmentation after CPAP treatment.<sup>[25]</sup> However, Bhat *et al* found no predictive relationship between improvements in daytime sleepiness, fatigue and CPAP use in patients with OSA. This may be due to measurements of daytime sleepiness after just one month of CPAP use.<sup>[26]</sup> However, this study gives evidence that first time CPAP application for titration can lead to a general

increase in perceived well-being.

The findings of this study show improvement in all the domains of SF12 in majority of our patients and this is similar to the report of Lo *et al* who studied the effectiveness of CPAP treatment on perceived HRQoL in patients with OSA and demonstrated that participants with greater adherence to therapy reported a higher quality of life improvement.<sup>[27]</sup> Similarly, Campos *et al* investigated the effect of CPAP on QoL in women with moderate to severe OSA and reported improved QoL, mood state, anxiety and depressive symptoms, and daytime sleepiness after 3 months of CPAP therapy.<sup>[28]</sup> On the contrary, Bjornsdottir *et al* compared the quality of life between the general population and untreated patients with obstructive sleep apnea and changes of quality of life among patients with obstructive sleep apnea after 2 years of positive airway pressure treatment and did not find significant overall differences between full and non-users of positive airway pressure in improvement of quality of life from baseline to follow-up.<sup>[29]</sup> However, there was a trend towards more improvement in physical quality of life for positive airway pressure-adherent patients, and the most obese subjects improved their physical quality of life more.<sup>[29]</sup> The results suggests that co-morbidities of obstructive sleep apnea, such as obesity, insomnia and daytime sleepiness, have a great effect on life qualities and need to be taken into account and addressed with additional interventions.

There are certain limitations to our study. The sample size was small because of limited number of patients on treatment for obstructive sleep apnea in Lagos. Hence, the test of associations via a vis compliance, co-morbidities and socio-demographics could not be done at this time. Secondly, this is a questionnaire-based study which may be subject to recall bias.

## CONCLUSION

Continuous positive airway pressure (CPAP) usage in patients with obstructive apnea in Lagos is associated



with improved snoring, sleep quality, daytime somnolence and general quality of life. There is a need for future study with a larger sample size, probably multicenter, for objective assessment of quality of life and its determinants for obstructive sleep apnea patients on CPAP machine.

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