



Master in Internal Medicine
Faculty of Medicine
Universiti Teknologi MARA (UiTM)

Title:

**Short Term Continuous Positive Airway Pressure (CPAP)
Compliance Among Obstructive Sleep Apnea (OSA) patients in
Respiratory Clinic UiTM and Its Associated Factors.**

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**Short Term Continuous Positive Airway Pressure (CPAP) Compliance
Among Obstructive Sleep Apnea (OSA) patients in Respiratory Clinic
UITM and Its Associated Factors.**

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Summary at a glance:

This cross-sectional study was done in a single tertiary center respiratory clinic, looking at CPAP-compliant data in OSA patients and the associated factors.

Conference presentation: nil

Abstract

Methods: This cross-sectional study of OSA patients treated with CPAP aged over 18 years in the Respiratory Outpatient Clinic UiTM was conducted from June 2022 to November 2022. Baseline demographic data, medical records data, and a questionnaire on compliance were collected.

Results: 80 OSA patients on CPAP treatment were recruited in this study. The mean age was 54 ± 1.4 years old, and the mean AHI at diagnosis was 44.77 ± 20.70 /hour. The prevalence of CPAP treatment adherence was 48.8% (n=39). Patients with MSS class III/IV had more than five times increased odds of compliance ($p=0.033$). Factors that were found to have reduced the odds of compliance were nasal pillow mask type (OR= 0.01, $p=0.015$), mask loose fit (OR=0.07, $p=0.042$), inability to breathe easily (OR=0.07, $p=0.032$) and presence of nasal blockage (OR= 0.03, $p=0.002$). Sociodemographic background, OSA severity, and types of machines were not associated with CPAP compliance.

Conclusions: CPAP adherence in our population remains poor, and factors such as identification of the severity of MSS, presence of nasal congestion, MRSEs (mask fit and ability to breathe while on CPAP), and the correct mask interface should be addressed to improve CPAP compliance in our patients.

Short title: CPAP compliance in OSA patients.

Keywords: Obstructive sleep apnea, continuous positive airway pressure machine, compliance, mask interface, nasal pillow, Malaysia

INTRODUCTION

Obstructive sleep apnea (OSA) is one of the most common respiratory diseases. It is estimated that 1 out of 7.3 billion of the world's population aged 30 to 69 years have been diagnosed with OSA.^{1,2} OSA can lead to worsening cardiovascular risk and cardiometabolic disorders such as hypertension, diabetes mellitus, and coronary artery disease.^{1,2} It can also cause symptoms such as daytime somnolence, fatigue, irritability, cognitive impairment, and depression.³ Additionally, OSA is associated with poor performance in driving simulators and a higher rate of traffic accidents (based on both accident data and self-report).²

Continuous positive airway pressure (CPAP) has been shown in several studies including randomized control trials with CPAP vs. oral placebo, to be very effective in treating sleep-disordered breathing, improving daytime sleepiness and daytime performance, and reducing mortality in patients with severe OSA.^{3,4,5} However, despite advances in CPAP technology, most patients still have difficulty tolerating the devices. A significant proportion of patients do not tolerate CPAP therapy and often seek alternative treatment options.⁴⁻⁶

Compliance with the device remains the major barrier in treatment with low CPAP adherence rates ranging from 38 to 72% in Asian countries.⁵⁻⁹ The American Academy of Sleep Medicine (AASM) defined optimal CPAP adherence or compliance as CPAP usage for an average of 4 hours each night for at least 70% of nights.⁴ However, most studies observe adherence over a relatively short duration. In a long-term study of patients prescribed with CPAP therapy for at least 4 years, compliance was noted to be only 54%.¹⁰ Predictors for better compliance vary across multiple studies, including sociodemographic data such as gender, age, race, OSA severity such as higher AHI, ODI, ESS, device-related, and interface related. Data on CPAP compliance in Asian populations are scarce, and to date and to the best of our knowledge, there is no published data in the Malaysian population. Thus, this study aims to determine the prevalence and factors associated with CPAP compliance in OSA patients.

METHODS

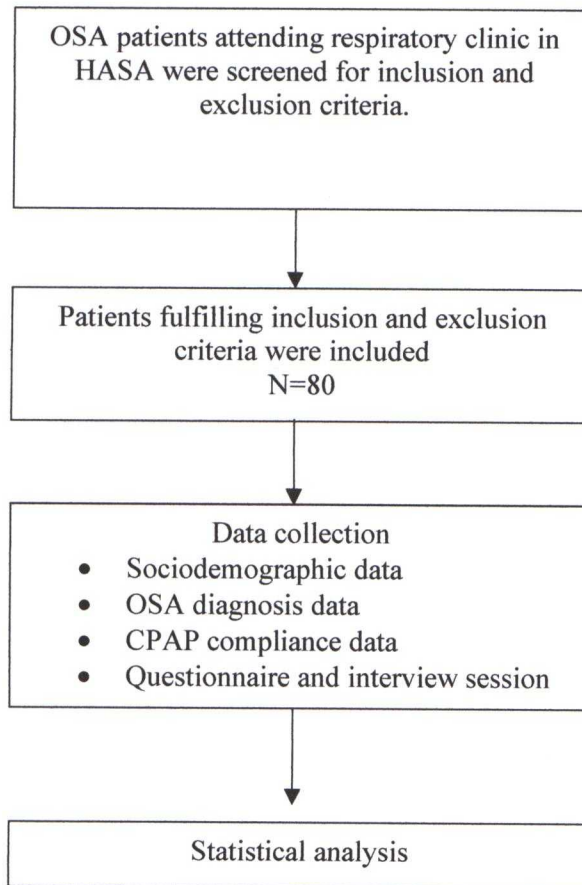
This was a cross-sectional study among OSA patients treated with CPAP in the respiratory outpatient clinic at Hospital Al-Sultan Abdullah (HASA) from June 2022 to November 2022. Patients over 18 years of age with a confirmed diagnosis of OSA by polysomnography, who had received CPAP treatment for at least 3 months and were able to read and converse in Malay or English language were included in the study. Exclusion criteria include patients who were unable to give consent, had mixed or central sleep apnea, refused or were unable to afford CPAP treatment, or were contraindicated for CPAP treatment.

Ethics approval was obtained from the Ethics Committee of Universiti Teknologi MARA (UITM) (100-FPR (PT.9/19((FRC-12-2021-01))). Written informed consent was obtained from all patients. Demographic data, medical history, symptoms at diagnosis, polysomnography data, and CPAP compliance reports for the past three months were obtained from CPAP devices. Patients were interviewed, and data were recorded in the clinical research forms (CRF).

The sample size was calculated using single proportion formula on OpenEpi sample size calculator (version 3). The prevalence of CPAP-compliant OSA patients used to calculate the sample size was 52.6%⁶ with a confidence interval of 95% and power of 80%. The calculated sample size was 74 patients, but to account for a 10% drop-out rate, the sample size was set at 80 subjects.

Data were analyzed using Statistical Package for Social Science (SPSS) version 26.0 (IBM). A frequency descriptive study was used to calculate the prevalence of CPAP compliance. Univariate logistic regression was used to identify potential factors associated with CPAP compliance. Crude odds ratios (ORs) and their 95% confidence intervals (95% CI) were calculated, maintaining the significance of variables at a p-value of ≤ 0.25 for inclusion in a multivariate logistic model. Multivariate analysis was conducted through a backward elimination with corresponding adjusting OR and 95% CI was calculated. Only variables with a significant p-value of <0.05 were included in the final model.

Study Flowchart



RESULTS

A total of 80 patients who met the inclusion and exclusion criteria were enrolled in the study. The sociodemographic and clinical characteristics of the participants are described in Table 1. There was an equal distribution of gender (n=40, 50%). The population's mean age was 54.18 ± 12 years. Majority of the patients were of Malay race (n=65, 81.30%), followed by Indian (n=9, 11.30%) and Chinese (n=6, 7.50%). Most of the patients had primary & secondary education (n=43, 53.80%), and the majority had an income of less than RM4850 (n=48, 60%) and are categorized as Malaysia's below 40% (B40) income group.¹¹

The mean STOPBANG score at diagnosis was 5.65 ± 1.25 with a mean ESS of 12.01 ± 4.99 , BMI at diagnosis of $36.89 \text{ kg/m}^2 (\pm 9.39)$, and pre-treatment AHI of 44.76 ± 20.69 events per hour. Most patients had severe OSA (n=57, 71.30%), followed by moderate OSA (n=17, 21.30%) and mild OSA (n=6, 7.50%). Most patients used Resmed Air Sense (n=36,