

Original Research Article

CPAP compliance in patients with moderate to severe obstructive sleep apnea from three centers in South India

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ABSTRACT

Background: Obstructive sleep apnea syndrome (OSAS) is a common sleep related breathing disorder, characterised by frequent interruptions of breathing during sleep resulting in arousals and a sympathetic overdrive. The most effective treatment for patients with significant sleep apnea has been a device which delivers positive pressure on the upper airway to act as a physiological splint thus preventing collapse of the upper airway (CPAP) to be used while sleeping. However patient compliance with CPAP use has always been a problem area. Many studies published show a compliance rate between 30% to 80% from different parts of the globe. We wanted to assess compliance with CPAP in our patient population.

Methods: A retrospective telephonic interview of patients who had been diagnosed with moderate to severe OSAS from 3 centers in Kerala.

Results: In present study we found a net compliance rate of only 14.7% and the primary reason for this high rate of non-compliance was the relatively high cost of the CPAP.

Conclusions: The compliance with CPAP in our study was very low and the most cited reason was the cost of the device. In patients who brought the device the compliance rate was similar to studies from western countries. To increase compliance with CPAP in patients with OSAS may require innovative thinking to reduce the upfront cost of the device (e.g. renting or leasing devices, providing options for paying in instalments and also more importantly focussing on low cost devices (CPAP).

Keywords: CPAP compliance, Cost factor of CPAP, OSAS

INTRODUCTION

Obstructive sleep apnea and obstructive sleep apnea syndrome are the most common subsets of sleep related breathing disorders characterised by >5 respiratory events (obstructive apneas, hypopneas or respiratory effort related arousal) per hour of sleep with symptoms or comorbidities or >15 episodes per hour without symptoms or comorbidities. In patients with OSA there is repetitive collapse of the upper airway occurs that leads to snoring, frequent episodes of sleep interruption, hypoxemia, hypercapnia, swings in intrathoracic pressure

and increased sympathetic activity. OSAS is defined as presence of OSA with daytime symptoms mostly daytime somnolence OSAS is a frequently under diagnosed problem with very low awareness among the general public and medical practitioners. Several community based epidemiological studies from India have estimated the prevalence of OSAS to be 2.4% to 4.96% in men and 1-2% in women.¹⁻⁴

Objective of present study was to assess compliance with CPAP therapy in patients with moderate to severe OSAS and reasons for non compliance.

METHODS

Retrospective telephone interview of subjects with moderate to severe OSAS was taken. Patients with moderate to severe OSAS diagnosed in 3 Centers in kerala (AHI>15) who were recommended nocturnal CPAP therapy after successful auto titration.

Patients who were diagnosed with moderate to severe OSAS (AHI>15) were all given a free 3 day trial with an auto titrating CPAP machine and an appropriate size full face mask. This protocol was followed by all the three centers which participated in the study. After this free trial the data from the auto CPAP machine was analysed and patients were recommended to buy an appropriate CPAP machine for regular use.

Only those patients with moderate to severe OSAS and had successfully undergone the auto CPAP trial were contacted.

We conducted telephonic interviews of patients who had been diagnosed with moderate to severe OSA from the 3 centers during the period from Jan 2015 to July 2016.

The telephonic interviews were conducted from October to November 2016.

RESULTS

Out of the 70 people who underwent a successful auto CPAP trial and titration who were called we were able to connect to 68 people. Of these 68 people 14 had brought CPAP (20.5%). Out of the 14 people 10 were using the CPAP regularly for more than 4 hrs /day (71.4%). 2 people were using it intermittently <4 hrs/day and 2 people were not using it (14.3% each) (Table 1).

Table 1: Pathhern of CPAP use.

CPAP use	No. of patients	%
Using more than 4 hrs/day	10	71.4
Using less than 4 hrs/day	2	14.3
Not using	2	14.3
Total number	14	100

Of the 54 (79.5%) people who did not buy CPAP, 30 (55.5%) reported financial causes as the main reason with discomfort during the trial as another reason.

Table 2: Reasons for non adherence.

Reason for not using CPAP	No. of patients	%
Financial	30	55.5
Discomfort	20	37
Did not attribute to any cause	4	7.5
Total	54	100

20 (37%) people said that they did not buy as they were not comfortable during the trial. 4 people did not attribute any cause (Table 2). Overall only 10 patients (14.7%) with moderate to severe OSAS in our study were compliant with CPAP therapy. However almost 72% of our patients with a CPAP machine were adherent to use by using it for more than 4 hours per day and this matches with compliance rates from various other studies.

DISCUSSION

An obstructive sleep apnea syndrome has multiple effects on the patient. Uniformly it affects the quality of life in most patients with various symptoms like tiredness, anxiety, difficulty in concentration, daytime somnolence and sometimes even depression. Apart from these effects OSAS has more serious consequences over the long term if not being treated which include the following.

Mortality

Severe OSAS has 3.8 fold greater risk of all cause mortality and 5.8 fold greater risk of cardiovascular mortality than those without OSA.⁵

Hypertension:

OSAS is an independent risk factor for hypertension. An increase in one additional apnoeic event per hour enhances the odds of developing hypertension by 1%. With increasing severity of OSA the chance of developing hypertension also increases even after adjusting for confounding factors.⁶

Coronary artery disease

Factors like intermittent hypoxemia, sympathetic over-activation along with simultaneous changes in intrathoracic and cardiac pressures during sleep, implicates OSA as a potential trigger for cardiac ischemia. Studies have shown a graded increase in the risk of acute myocardial infarction with increasing AHI.^{7,8}

Stroke

OSA is associated with increased risk of stroke.⁹ In fact, OSA may increase the risk of death in patients with stroke. Patients with recurrent strokes had a higher percentage of OSA (AHI >10) than initial strokes (74% compared to 57% p = 0.013). A meta-analysis of 17 prospective cohort studies on cardiovascular deaths concluded that moderate to severe OSA significantly increases the risk of stroke.¹⁰⁻¹²

Diabetes mellitus

Studies have shown that the prevalence of OSA in diabetic (78%) and pre-diabetic (67%) obese patients is

higher than those with normal glucose tolerance (33%).¹⁰ Moreover, the risk of developing type 2 DM increases with the severity of OSA. A recent study also supports the fact that PAP therapy in combination with weight loss, reduces the insulin resistance than PAP therapy.¹¹

Dyslipidemia

It has been observed that OSA is independently associated with increased total cholesterol and LDL cholesterol levels, and carotid intima-media thickness irrespective of the cardiovascular co morbidity.¹²

Daytime sleepiness and motor vehicle accidents

OSA has been found to be an important cause of insomnia due to sleep fragmentation at night and excessive daytime sleepiness. In the landmark Wisconsin Sleep Cohort Study, patients with OSA were found to have a higher prevalence of EDS and tiredness. Excessive daytime sleepiness in OSA has been associated with increased risk of motor vehicle accidents.¹³

Hence appropriate management of patients with moderate to severe OSAS is imperative and many studies have shown that CPAP treatment to be beneficial.

CPAP therapy

The principle of continuous positive airway pressure (CPAP) is based on providing air under positive pressure through an interface (nasal mask, face mask or nasal pillows) thus creating a pneumatic splint in the upper airway to prevent its collapse during sleep. One of the most dramatic immediate effects of any medical treatment is the ability of continuous positive airway pressure (CPAP) treatment to reverse the repetitive upper airway obstruction of sleep apnea and associated daytime sleepiness. CPAP, the primary treatment for obstructive sleep apnea (OSA), has been shown to normalize sleep architecture, reduce daytime sleepiness, enhance daily function, elevate mood, reduce automobile accidents, and decrease blood pressure and other cardiovascular events. Despite the efficacy of CPAP in reversing sleep apnea, of those studies using the cut point of at least 4 hours per night to define adherence, 29 to 83% of patients were non-adherent.¹⁴⁻¹⁶ CPAP has been shown to be the most effective treatment or patients with moderate to severe OSA (respiratory events >15 per hour of sleep) and is almost universally recommended as the 1st line of treatment for these patients.

Compliance

The treatment of OSAS with CPAP therapy has inherent problems with initial acceptance and long term adherence together called compliance. Studies have shown that the health benefits of CPAP therapy accrue only if the patient is being compliant with CPAP treatment at least for 4 hours per day

Acceptance

Defined as a patient's readiness after the diagnosis of OSAS to have a CPAP titration done followed by use of a CPAP device at home.

Adherence

Phase of long term use of the device

Rates of compliance

Various studies have shown different rates of compliance with CPAP. In a similar study from Pakistan initial acceptance was seen at 80% and long term compliance after 1 year was seen to be at 61.3%.¹⁷ In a Chinese study, 33% never commenced CPAP therapy.¹⁸ Even lower compliance rate (36%) was observed among bus drivers in Hong Kong despite significant improvement in subjective sleepiness and cognitive function with CPAP therapy.¹⁹ In a study from USA, CPAP adherence was low in black subjects.²⁰ Similarly Maori subjects had lower adherence to CPAP therapy than non Maori subjects that was thought to be related to lower educational levels and socioeconomic status.²¹ Thus, differences in compliance with CPAP therapy were multifactorial such as ethnicity, educational and socioeconomic status, and differences in treatment facilities and follow-up.

Differences in compliance may occur in patients being treated in private and public sectors. This aspect of CPAP therapy has not been studied in detail. In a study from Brazil patients in private sector had more greater severity of OSA than patients in public sector (AHI 31±25 vs. 25±24, $p < 0.001$) but CPAP acceptance was similar in both sectors (32 vs. 35%).²² In a study from UK, 77% were still using CPAP at three years and median use of CPAP those continuing therapy was 5.3 hours/night.²³ In another UK-based study of over 1000 OSA patients, 4.5% patients refused CPAP treatment (these were more often female and current smokers) and during follow-up 20% stopped treatment, primarily because of a perceived lack of benefit. Methods of survival analysis showed that 68% of patients continued treatment at 5 year.²⁴ The compliance was higher (86%) among those with severe OSA (AHI >30/hr) accompanied with daytime sleepiness. Among a cohort of 109 German patients treated with CPAP, only 46.6% met stringent criteria for long-term compliance, defined as a mean use of the CPAP machine for at least 4 hours per night.¹⁷ It is estimated that 29 to 83 percent of patients are non-adherent, when non-adherence is defined as a mean of ≤ 4 hours of use per night.^{25,14}

Causes of non compliance

A number of studies have shown that compliance to CPAP therapy is poor across the globe and the most common causes were nasal congestion, mask intolerance

in the western population. Discomfort with the apparatus or a sense of claustrophobia with the mask were other reasons given by patients. Additional reasons for CPAP discontinuation mentioned in the literature include anxiety, inconvenience, frequent nocturnal awakening and partner complaints. Nasal discomfort is specifically mentioned frequently by patients and is often the reason for abandoning CPAP therapy.²⁶ In India there have been limited studies looking at compliance rates and reasons for non compliance in our subset. Most data from western societies show that discomfort due the mask, claustrophobia and cosmetic appearance as the most common causes of non compliance, however cost may not be a issue in these populations as the CPAP machine is given by the health system or is substantially subsidised. However, in present study only 14.7% of patients were found to be compliant with CPAP and cost of the CPAP machine (55.5%) was cited as the main reason for non compliance followed by discomfort of the mask as the next most common cause. There are certain limitations of our study. First there is a small sample size and we have only valid contact of 68 out of 70 patients. Second, we used a telephone survey to assess the compliance of CPAP therapy and this may not correlate with actual CPAP usage however we assume that the information given by the patient is accurate.

CONCLUSION

Even though CPAP has been accepted as the treatment of choice for moderate to severe OSAS the compliance rates are very low in resource constrained settings. The most common reason for non compliance in present study was non acceptance of CPAP treatment. The cost of the CPAP machine which is to be borne by the patients is the reason cited by most of our patients as a reason for non acceptance.

The next most important reason cited was discomfort during the trial period. The patients who are non compliant due to discomfort of the CPAP machine would probably be more likely to be accepting of CPAP if they were given alternative CPAP interfaces like nasal masks or nasal pillows.

In present study all our patients underwent a CPAP trial with a full face mask which may have led to some of them not accepting CPAP treatment. Counselling and increasing awareness of the adverse effects of OSAS on the health of a person may also lead to increase in the acceptance of CPAP treatment. The cost benefit of using a CPAP has been shown to equivalent of using anti-hypertensives in patients with hypertension in some studies and similar studies bringing out the cost benefit for CPAP therapy would also help increasing compliance as the potential economic benefits would be easily understood.

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