Introduction: Continuous positive airway pressure (CPAP) is an effective treatment for obstructive sleep apnea syndrome and is considered first-line management. The goal of the study was to determine if patient age, gender, or apnea-hypopnea index (AHI) value would predict patient adherence to continuous positive airway pressure (CPAP) treatment in patients with obstructive sleep apnea.

Methods: Patients with AHI values greater than 15 who received CPAP machines were selected and compliance was measured at 1 to 4 month intervals and at 1 year. Compliance was defined as usage greater or equal to 5 hours per night either by patient reporting or readings on CPAP machines. A retrospective chart review was performed. Groups were analyzed by two sample t-tests and by a logistic regression model.

Results: One hundred and six patients of 368 (29%) who received CPAP machines were noted to have documented compliance with CPAP use at 1 to 4 months. Forty-six patients (12%) were using their machines at one year, while 40 patients were not. There were no significant differences between the age or AHI values of these two groups when compared by t-tests alone. Patients who were compliant at one year were analyzed by a logistic regression model to determine predictors of compliance. There was no significance noted for females. For the male group at one year, the model demonstrated a significant AHI value (p-value = 0.023) as a predictor of compliance if greater than 27.3 and a significant two way interaction between age and AHI (p=0.023).

Conclusions: Older male patients with AHI readings greater than 27.3 are noted to be more adherent to CPAP use than younger males.

Materials and Methods

Following IRB approval through Henry Ford Medical Center, a retrospective chart review was performed to determine a list of patients that had a polysomnogram performed between January 2005 and December 2007. Parameters that were included in the data collection were patient age, sex, and AHI. Patients were included if they had HAP insurance in order to track insurance claims. This was done to eliminate individuals that were thought to be non-compliant but were unable to purchase CPAP because of financial limitations. Patients were selected for the study if they had an apnea-hypopnea index greater or equal to 15 on the polysomnogram. AHI was defined as the mean number of apnea and hypopnea events per hour of sleep. Apnea was defined as absence of airflow for 10 seconds and hypopnea was defined as a 50% reduction in airflow for a minimum of 10 seconds. Patients were seen at an otolaryngology or pulmonology sleep physician before their diagnostic study as well as following the polysomnogram. The patient would then be referred for a CPAP titration study. Patients would be provided with the CPAP machines following the titration. Of the patients that received CPAP, clinical notes were reviewed to determine if the patients were still compliant with CPAP at 1-4 months and at 1 year. Adequate CPAP usage was defined as an average of greater than 5 hours per night for the majority of nights of the week.

The patients were categorized based on documented usage. Those that subjectively reported greater than 5 hours per night of usage and those with objectively measured hours on the CPAP were considered adherent to therapy. The patients that discontinued their CPAP use or were using the machine less than the recommended optimal hours per night either by subjective or objective reporting were deemed non-adherent. Those that were lost to follow up or were subjectively using their machines without documentation of time usage were excluded from the analysis.

The results were analyzed by chi squared testing of nominal data and Student’s t-tests for comparing continuous variables between groups. Logistic regression models were also performed. P-values less than 0.05 were considered significant.

Evaluation of Adherence to Continuous Positive Airway Pressure in Treatment for Obstructive Sleep Apnea

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Discussion

Adherence to CPAP can be predicted as early as the third to seventh day of usage.7 Budhiraja et al demonstrated that 86% of their patients who used their machines for greater than 4 hours a night on day 3 were still using greater than 4 hours a night at day 30. Popescu et al looked at patients with adherence at 2 weeks and one year. Seventy three percent of the patients elected to continue their CPAP after a 2 week trial.8 Of those patients that continued to use the machine for a longer duration, 68.5% were still using them for greater than 5 hours per night at one year.9 Our study looked at the 1 to 4 month interval usage as being a predictor of long term usage. Only 26 of 106 patients (24%) were noted to remain adherent to CPAP at one year if they were adherent at one month which seems low compared to the other studies.

Socioeconomic class can contribute to patient adherence to CPAP. It has been shown that those of low socioeconomic class have less of a tendency to be compliant.10 By using patients with insurance, patients are more likely to utilize the machine when it is provided to them. Others have looked at increasing age as a predictor of adherence to the CPAP machines.11 Our study demonstrated the average age of the patients that were compliant to be 58 and those that were not to be 47 which is consistent with the reported literature. This is likely secondary to the associated stigma of CPAP machine usage in the younger generation.

Gender also appears to be a strong predictor of adherence; males had a higher tendency to adhere to CPAP usage. This finding is contrary to Budhiraja et al and Sin et al who did not find any gender predilection for adherence.

AHI was examined to determine if it was a predictor of compliance. The average AHI in the population that consistently used their machines was 44.9 and the AHI in the group that was less consistent or did not use the machines was 36.3. This is consistent with Yetkin et al who noted that of three groups of patients, divided on the basis of their AHI scores, those with severe sleep apnea (mean AHI 56.6 ±27.7) had a greater tendency to utilize CPAP regularly.

The study is limited as a retrospective chart review. Patients did not always follow up with the sleep center and documentation in primary care physicians’ notes regarding use of CPAP machines was not always present. If the patient did follow up, usage of CPAP was not always documented and even if usage was documented, hourly usage was not noted. Patients did not always bring in their machines to objectively document usage, and the subjective report of usage in the chart may not be accurate.

Conclusion

CPAP is the treatment of choice for obstructive sleep apnea if there is adequate patient compliance. However, as in other studies, compliance continues to be an issue. Patients are lost following their diagnostic polysomnogram even prior to CPAP titration and obtain CPAP for treatment. Once CPAP titration is complete and the patient receives the CPAP machine, older males with higher AHI values have a higher likelihood of continued usage. Interventions to improve CPAP interventions need to be targeted at young males and females to help improve adherence. Length of time from initial visit for complaints of sleep apnea and initiation of therapy is quite long. In the current system, multiple visits for diagnosis and treatment are necessary which may impact the engagement of patients with subsequent therapy.

Table 1. Patients that following up at one year were examined. The patients were stratified by sex and placed into a logistic regression model predicting group. The models for females showed that there were no variables significant. The model for males, however, had a significant AHI variable (p-value = 0.026) and a significant two way interaction between age and AHI (p-value = 0.023).

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References