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Research Article

Impact of Post-traumatic Stress Disorder on Adherence to CPAP Treatment Obstructive Sleep Apnea among American Veterans

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Abstract

Introduction: Adherence to continuous positive airway pressure (CPAP) treatment for obstructive Sleep apnea (OSA) is variable. Patients with both OSA and PTSD may not have complete restoration of sleep quality with CPAP therapy owing to flare ups of nightmares associated with restoration of sleep continuity may negatively affect adherence to CPAP therapy.

Methods: Patients' records diagnosed to have OSA by polysomnography for last 3 years were reviewed. Thirty seven patients with OSA and PTSD were compared with 159 patients with OSA without PTSD. Age, gender, BMI, and AHI index were recorded. Adherence data recorded; Days CPAP used/30 days, and hours used per night. Linear regression analysis was developed to determine if adherence is affected by presence of PTSD.

Results: Mean age of patients was 61.8+ 12.5 years. Mean BMI was 33.9 + 7.2 kg/m² and mean AHI 34.3+ 24.6 per hour. Both groups were similar in age (61.7 + 10.7 Vs 61.9 + 13.02 years, p=0.92), gender (male; 89% VS 97%), BMI (33.5 + 8.75 Vs 34.01 + 6.89 kg/m², p=0.74), AHI (33.4 + 12.7 Vs 34.5+ 26.2 per hour, p=0.86). There was no difference in days CPAP was used per month (22.6 + 9.6 VS 21.9 + 10.1 days, p=0.70) or average nightly use when CPAP was used (5.07 + 2.78 Vs 5.26 + 3.06 hours, p=0.74). In multi regression, while adjusting for age, sex, BMI and AHI, PTSD was predictive of adherence (coefficient -1.65, p=0.02).

Conclusion: Presence of PTSD in patients with OSA negatively affects adherence with CPAP therapy.

Keywords: Sleep apnea; OSA; PTSD; CPAP adherence

Introduction

Sleep disordered breathing is becoming more prevalent with ongoing obesity epidemic. Peppard et al. recently reported the prevalence estimates of moderate to severe sleep-disordered breathing (apnea-hypopnea index, measured as events/hour, ≥15) as 10% among 30–49-year-old men; 17% among 50–70-year-old men; 3% among 30–49-year-old women; and 9% among 50–70 year-old women [1]. Presence of OSA is higher with cardiovascular conditions; 30-80% with hypertension, 30-50% with ischemic heart disease, 40-90% with stroke, about 50% with heart failure and 40-60% with end stage renal disease [2]. OSA is also associated with increased stroke risk [3]. The prevalence for psychiatric disorders are also high even after controlling for other chronic medical conditions [4].

OSA patients experience frequent awakenings from partial closure of upper airways resulting in hypoxemia and sleep fragmentation, thus presenting itself with symptoms of excessive sleepiness and fatigue. Likewise, Polysomnographic studies in OSA patients demonstrate altered sleep architecture, especially, elevated arousal indices and decreased percentage of REM sleep [5]. Data suggests that these arousals lead to repeated disturbances in REM sleep circuits among brainstem, forebrain and hypothalamus which are mediated by cholinergic activation and GABAergic inhibition pathways [6]. In addition to physical consequences of abnormal REM sleep, these patients also suffer from impaired emotional health [7].

Another common disorder with adverse consequences on sleep and emotional health is Posttraumatic Stress Disorder (PTSD), which is very common especially among combat veterans. Similar pathology of REM sleep fragmentation and increased frequency of microarousals have also been demonstrated in PTSD. Patients having PTSD suffer from non-restorative sleep and nightmares following a traumatic event. Sleep problems lead to decreased functioning and impaired quality of life in these patients, frequently leading to weight gain, a major risk factor for OSA. Obstructive sleep apnea is a common comorbid condition of PTSD and contributes to fatigue, frequent awakenings and insomnia in these patients [8]. With increasing severity of sleep apnea as measured by apnea hypopnea index, there is trend in worsening of PTSD symptoms [9]. Together, these disorders affect quality of sleep and life of these patients [10]. CPAP is the mainstay therapy for OSA [11]. Patients receiving CPAP usually show improvement in their REM sleep percentage [12]. Higher percentage of REM sleep which reflects better sleep quality is associated with increased to CPAP therapy [13]. However, in the beginning CPAP therapy , there is a rebound of REM sleep, defined

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as an increase in the duration of REM sleep, more than or equal to 20% of total sleep time [14]. This REM rebound can lead to increased frequency of nightmares at the beginning of therapy, Moreover, ability to recall these nightmares increases in these patients due to improvement in cognition with CPAP therapy [15].

PTSD patients are not only at high risk of adverse clinical outcomes including suicide; these patients are also non-adherent to their treatment in general which suggests importance of intensive therapy from the onset of their symptoms. CPAP therapy used to treat OSA is beneficial in reducing severity of PTSD symptoms, but adherence is even lower in these patients as compared to patients having OSA only [16].

As adherence to CPAP therapy is a big challenge in this patient population, we sought to study the effect of comorbid PTSD in patients suffering from OSA.

Methods

We retrospectively reviewed the Computerized Patient Record System of consecutive veterans' patients who were diagnosed to have sleep apnea by polysomnography for last 3 years (January 1, 2009 to December 31st, 2011) at James A. Lovell federal healthcare center, North Chicago, Illinois. In compliance with federal regulations, permission to perform the study was granted by the Institutional Review Board. We recorded the clinical history of PTSD, demographics (age, gender, BMI) and AHI index was recorded from sleep study. PTSD diagnosis was based on DSM IV criteria [17] made by clinicians. Total sample of 196 patients included 37 patients with OSA and PTSD, while 159 patients with OSA but without PTSD. Adherence to CPAP therapy was measured by Respironics Smart Cards (Respironics, Inc., Murrysville, PA). Recorded data from the card included; Days CPAP used/30 days, and hours used per night when CPAP was used Adequate adherence was defined as PAP usage > 4 h/ night for 70% of the Days [18].

Statistical Analysis

The means and standard deviations (SDs) of continuous variables were compared using the Student 2-tailed t-test. P values ≤ 0.05 (2-tailed) were considered statistically significant. Multi-Regression modelling was developed to determine if adherence is affected by presence of PTSD while adjusting for age, gender, AHI and BMI. All analyses were performed with statistical software Epi Info™ (Center for Disease Control and Prevention, Atlanta, GA, USA).

Results

Mean age of patient population was 61.8 + 12.5 years. Mean BMI was 33.9 + 7.2 kg/m^2 and mean AHI 34.3 + 24.6 per hour. Both groups were similar in age (61.7 + 10.7 Vs 61.9 + 13.02 years, p=0.92), gender (male; 89% VS 97%), BMI (33.5 + 8.75 Vs 34.01 + 6.89 kg/m^2, p=0.74), AHI (33.4 + 12.7 Vs 34.5 + 26.2 per hour, p=0.86). There was no difference in days CPAP was used per month (22.6 + 9.6 VS 21.9 + 10.1 days, p=0.70) or average nightly use when CPAP was used (5.07 + 2.78 Vs 5.26 + 3.06 hours, p=0.74). In multi regression model while adjusting for age, sex, BMI and AHI, PTSD was found to be predictive of adherence (coefficient -1.65, p=0.02).

Discussion

In our study, we determined that PTSD negatively affects CPAP treatment adherence in patients with sleep apnea. Following 2 studies have reported similar results. El Sohl et al. [19] carried out a retrospective case control study in which it was determined that in large number of OSA patients with and without PTSD having almost same baseline characteristics as our study population, CPAP adherence was found to low in OSA patients having PTSD. In another retrospective case control study done by Collen et al., adherence to CPAP therapy of relatively younger patients with OSA and PTSD was again found to be negatively associated with the presence of PTSD. Collen et al. [16] also noted increased adherence to CPAP therapy in patients taking sedative drugs for treatment of insomnia and PTSD. Both of these studies determined objectively by using adherence data cards as in our study [16,19].

During the search for the effect of nasal continuous positive airway pressure (Nasal CPAP) on the symptoms of Gulf War illness related PTSD, it was learnt that CPAP as a treatment of OSA in these patients was associated with improvements in nightmares and PTSD [20]. Nasal CPAP exerts a marked effect on the sleep pattern. It has been found long ago that CPAP significantly reduces stage I/ II non-rapid eye movement (NREM) sleep and markedly increases stage III/IV NREM and dense REM sleep (REM rebound) on the first treatment night [21].

Adherence to CPAP treatment depends upon multiple factors. Age, sex, marital status, and socioeconomic status do not affect CPAP adherence consistently. Race, however, has an impact on CPAP adherence. African Americans have been shown as five-and-a-half times more likely to be non-adherent than whites with a nightly duration of CPAP use of 1 to 2 hours less [22-24]. Patients with severe OSA as measured by the apnea–hypopnea index are more likely to be compliant compared to patients with mild OSA. High nasal resistance secondary to smaller nasal cross-sectional area and reduced volume also affects CPAP use and initial acceptance of this treatment [25-27]. Interface type may have variable impact, although no significant evidence for superiority of oral masks or nasal pillows over conventional nasal masks has been found [28-31]. Education and support with initial set up in lab may positively affect CPAP adherence [32]. Identification of high risk patients for non-adherence by psychological evaluation may provide an opportunity for additional measures to improve [33]. Anxiety, depression, stress, anger, and social desirability, have not shown any significant effect on CPAP adherence [34,35]. The patient's perception of the benefit in symptoms following CPAP use, and their view of this treatment in terms of health value, has been shown to be related to better adherence [36,37]. Patients who experienced greater improvements in daily functioning had higher levels of CPAP adherence [35]. Finally, social variables, such as social support, partner interaction, and partner sleep quality, have been explored in several investigations to determine their impact on CPAP adherence behavior [24].

Our study has several limitations. Retrospective, case control chart review studies provide low level of evidence. Our sample size was small and predominantly comprised of old male veterans with relatively severe OSA, therefore results should be applied to general population with caution. Adherence to CPAP therapy in patients

having OSA is multifactorial. We did not record other factors which can influence CPAP therapy in patients having both OSA and PTSD. As a retrospective case study, we were unable to sub classify PTSD based on severity, dissociative and non-dissociative subtypes and conventional treatment resistance. To date, these factors have not been studied in detail in previous studies and their influence on CPAP adherence is still unknown. Moreover, duration and type of psychotherapy and pharmacotherapy for PTSD, which can alter adherence to CPAP therapy is not considered in our study. Based on our study results, we suggest large prospective research trials designed to address all the components of adherence to CPAP including PTSD, should be considered.

Conclusion

PTSD patients treated with CPAP for OSA, are less-adherent to CPAP therapy and additional measures should be taken to ensure adherence to treatment in this population. Further clinical studies should be considered to determine factors to improve adherence to CPAP therapy in this particular population.

References

1. Peppard PE, Young T, Barnet JH, Palta M, Hagen EW, Hla KM. Increased prevalence of sleep-disordered breathing in adults. Am J Epidemiol. 2013; 177: 1006-1014.
2. Floras JS. Sleep apnea and cardiovascular risk. J Cardiol. 2014; 63: 3-8.
3. Redline S, Yenokyan G, Gottlieb DJ, Shahar E, O'Connor GT, Resnick HE, et al. Obstructive sleep apnea-hypopnea and incident stroke: the sleep heart health study. Am J Respir Crit Care Med. 2010; 182: 269-277.
4. Sharafkhaneh A, Giray N, Richardson P, Young T, Hirshkowitz M. Association of psychiatric disorders and sleep apnea in a large cohort. Sleep. 2005; 28: 1405-1411.
5. Gagnon K, Baril AA, Gagnon JF, Fortin M, Décary A, Lafond C, et al. Cognitive impairment in obstructive sleep apnea. Pathol Biol (Paris). 2014; 62: 233-240.
6. Fraigne JJ, Grace KP, Horner RL, Peever J. Mechanisms of REM sleep in health and disease. Curr Opin Pulm Med. 2014; 20: 527-532.
7. Malhotra L, Guo M, Carusona A, Stickgold R, Djonlagic I. The Impact of REM-Predominant And REM-Exclusive Sleep Apnea on Off-Line Motor Memory Consolidation During Sleep. Am J Respir Crit Care Med. 2013; 187: A2322.
8. Maher MJ, Rego SA, Asnis GM. Sleep disturbances in patients with post-traumatic stress disorder: epidemiology, impact and approaches to management. CNS Drugs. 2006; 20: 567-590.
9. van Liempt S, Westenberg HG, Arends J, Vermetten E. Obstructive sleep apnea in combat-related posttraumatic stress disorder: a controlled polysomnography study. Eur J Psychotraumatol. 2011; 2.
10. Jaoude P, Vermont LN, Porhomayon J, El-Solh AA. Sleep-disordered breathing in patients with post-traumatic stress disorder. Ann Am Thorac Soc. 2015; 12: 259-268.
11. Stuck BA, Leitzbach S, Maurer JT. Effects of continuous positive airway pressure on apnea-hypopnea index in obstructive sleep apnea based on long-term compliance. Sleep Breath. 2012; 16: 467-471.
12. Pan H, Ren R, Li Y, Yang L, Huang G, Lei F, et al. [Effects of continuous positive airway pressure on daytime sleepiness in patients with severe obstructive sleep apnea syndrome]. Zhonghua Yi Xue Za Zhi. 2014; 94: 412-415.
13. Somiah M, Taxin Z, Keating J, Mooney AM, Norman RG, Rapoport DM, et al. Sleep quality, short-term and long-term CPAP adherence. J Clin Sleep Med. 2012; 8: 489-500.
14. Lo Bue A, Salvaggio A, Insalaco G, Marrone O. Extreme REM Rebound during Continuous Positive Airway Pressure Titration for Obstructive Sleep Apnea in a Depressed Patient. Case Rep Med. 2014; 2014: 292181.
15. Lovin S, Rusu C, Mutica M, Necula A, Georgescu C. Dream Content Analysis at the Initiation of CPAP for Obstructive Sleep Apnea. J Sleep Disorders Ther. 2013; 2: 127.
16. Collen JF, Lettieri CJ, Hoffman M. The impact of posttraumatic stress disorder on CPAP adherence in patients with obstructive sleep apnea. J Clin Sleep Med. 2012; 8: 667-672.
17. American Psychiatric Association: Diagnostic Statistical Manual of Mental Disorders, 4th edn. Washington, DC: American Psychiatric Association. 2000.
18. Engleman HM, Wild MR. Improving CPAP use by patients with the sleep apnea/hypopnea syndrome. Sleep Med Rev. 2003; 7: 81-99.
19. El-Solh AA, Ayyar L, Akinnusi M, Relia S, Akinnusi O. Positive airway pressure adherence in veterans with posttraumatic stress disorder. Sleep. 2010; 33: 1495-1500.
20. Amin MM, Gold MS, Broderick JE, Gold AR. The effect of nasal continuous positive airway pressure on the symptoms of Gulf War illness. Sleep Breath. 2011; 15: 579-587.
21. Issa FG, Sullivan CE. The immediate effects of nasal continuous positive airway pressure treatment on sleep pattern in patients with obstructive sleep apnea syndrome. Electroencephalogr Clin Neurophysiol. 1986; 63: 10-17.
22. Budhiraja R, Parthasarathy S, Drake CL, Roth T, Sharief I, Budhiraja P, et al. Early CPAP use identifies subsequent adherence to CPAP therapy. Sleep. 2007; 30: 320-324.
23. Scharf SM, Seiden L, DeMore J, Carter-Pokras O. Racial differences in clinical presentation of patients with sleep-disordered breathing. Sleep Breath. 2004; 8: 173-183.
24. Joo MJ, Herdegen JJ. Sleep apnea in an urban public hospital: assessment of severity and treatment adherence. J Clin Sleep Med. 2007; 3: 285-288.
25. Li HY, Engleman H, Hsu CY, Izci B, Vennelle M, Cross M, et al. Acoustic reflection for nasal airway measurement in patients with obstructive sleep apnea-hypopnea syndrome. Sleep. 2005; 28: 1554-1559.
26. Nakata S, Noda A, Yagi H, Yanagi E, Mimura T, Okada T, et al. Nasal resistance for determinant factor of nasal surgery in CPAP failure patients with obstructive sleep apnea syndrome. Rhinology. 2005; 43: 296-299.
27. Sugiura T, Noda A, Nakata S, Yasuda Y, Soga T, Miyata S, et al. Influence of nasal resistance on initial acceptance of continuous positive airway pressure in treatment for obstructive sleep apnea syndrome. Respiration. 2007; 74: 56-60.
28. Beecroft J, Zanon S, Lukic D, Hanly P. Oral continuous positive airway pressure for sleep apnea: effectiveness, patient preference, and adherence. Chest. 2003; 124: 2200-2208.
29. Anderson FE, Kingshott RN, Taylor DR, Jones DR, Kline LR, Whyte KF. A randomized crossover efficacy trial of oral CPAP (Oracle) compared with nasal CPAP in the management of obstructive sleep apnea. Sleep. 2003; 26: 721-726.
30. Khanna R, Kline LR. A prospective 8 week trial of nasal interfaces vs. a novel oral interface (Oracle) for treatment of obstructive sleep apnea hypopnea syndrome. Sleep Med. 2003; 4: 333-338.
31. Chai CL, Pathinathan A, Smith B. Continuous positive airway pressure delivery interfaces for obstructive sleep apnoea. Cochrane Database Syst Rev. 2006; CD005308.
32. Popescu G, Latham M, Allgar V, Elliott MW. Continuous positive airway pressure for sleep apnoea/hypopnoea syndrome: usefulness of a 2 week trial to identify factors associated with long term use. Thorax. 2001; 56: 727-733.
33. Poulet C, Veale D, Arnol N, Lévy P, Pepin JL, Tyrrell J. Psychological variables as predictors of adherence to treatment by continuous positive airway pressure. Sleep Med. 2009; 10: 993-999.
34. Stepnowsky CJ Jr, Bardwell WA, Moore PJ, Ancoli-Israel S, Dimsdale JE. Psychologic correlates of compliance with continuous positive airway pressure. Sleep. 2002; 25: 758-762.
35. Wells RD, Freedland KE, Carney RM, Duntley SP, Stepanski EJ. Adherence,

reports of benefits, and depression among patients treated with continuous positive airway pressure. Psychosom Med. 2007; 69: 449-454.

36. Engleman HM, Wild MR. Improving CPAP use by patients with the sleep apnoea/hypopnoea syndrome (SAHS). Sleep Med Rev. 2003; 7: 81–99.

37. Wild MR, Engleman HM, Douglas NJ, Espie CA. Can psychological factors help us to determine adherence to CPAP? A prospective study. Eur Respir J. 2004; 24: 461–465.

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