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RESEARCH ARTICLE
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EFFECT OF CONTINUOUS POSITIVE AIRWAY PRESSURE THERAPY ON LIPID PROFILE OF OBSTRUCTIVE SLEEP APNEA PATIENTS

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Abstract

Introduction: Obstructive sleep apnea syndrome (OSAS) is a common sleep disorder which causes repetitive episodes of partial or complete obstruction of upper airway during sleep, which lead to intermittent hypoxia, Sleep fragmentation, oxidative stress or inflammation. If OSAS is not treated on time then it may cause dyslipidaemia. Continuous positive airway pressure (CPAP) eliminates OSAS and help you breathe during sleep. In this study attempt is made to find that whether CPAP therapy in patients having OSAS really improve dyslipidaemia.

Materials and Method: Polysomnography for all these volunteers were done from 10 pm to 6 am after obtaining their written consent at Sleep Research Centre. Subjects having AHI ≥ 5, which was obtained from polysomnogram, were included in the study. At around 6:30 am, after polysomnography recording is over, blood sample was collected for finding lipid profile of these subjects. Then subjects were made to use CPAP while sleeping in night for 2 months. After Two months of CPAP use polysomnography recording and lipid profile test of these subjects were done again. Then comparison between all parameters of subjects before CPAP use and after CPAP use were done.

Results: CPAP use increases sleep efficiency%, mean TBI SPo2%, High-density lipoprotein (HDL) significantly. It decreases Apnea-Hypopnea Index (AHI) significantly. It also insignificantly decreases Total cholesterol (TC), Triglycerides (TG), low density lipoprotein (LDL), Very Low-Density Lipoprotein (VLDL).

Conclusions: CPAP treatment causes significant reduction in OSA, increases oxygen saturation and sleep efficiency significantly but improve dyslipidaemia insignificantly.

Keywords: Apnea-Hypopnea Index, sleep efficiency%, Body Mass Index, Obstructive sleep apnea

INTRODUCTION

Obstructive sleep apnea syndrome (OSAS) is a common sleep disorder which causes repetitive episodes of partial or complete obstruction of upper airway during sleep, which lead to intermittent hypoxia, Sleep fragmentation, oxidative stress or inflammation [2]
It was found that OSAS is present in about 24% of middle-aged males and 9% of middle-aged females [1].
If OSAS is not treated on time then it may cause dyslipidaemia, sympathetic overdrive, cardiovascular and other metabolic alterations [3- 5].
Continuous positive airway pressure (CPAP) is very common treatment for obstructive sleep apnea. It delivers constant and steady air pressure to eliminate OSAS and help you breathe during sleep. It also helps in elimination of micro-arousals, and oxidative stress during sleep; and improvement in clinical symptoms, including excessive daytime sleepiness and snoring. [6,7,8]
In this study attempt is made to find that whether CPAP therapy in patients having OSAS really improve dyslipidaemia.

MATERIALS AND METHODS

This is an interventional study that was carried out in the Sleep Research Centre, MGM Hospital, Kamothe Navi Mumbai. Total 30 subjects participated in this study. Age range of subjects were from 30 to 71 years. Polysomnography for all these volunteers were done from 10 pm to 6 am after obtaining their written consent at Sleep Research Centre, MGM Hospital, Kamothe Navi Mumbai. And subjects having AHI ≥ 5, which was obtained from polysomnogram, were included in the study. At around 6:30 am, after polysomnography recording is over, blood sample was collected for finding lipid profile of these subjects. Then subjects were made to use CPAP for 6 hours every night while sleeping. After Two months of CPAP use polysomnography recording and lipid profile test of these subjects were done again. Then comparison between all parameters of subjects before CPAP use and after CPAP use were done.

RESULT

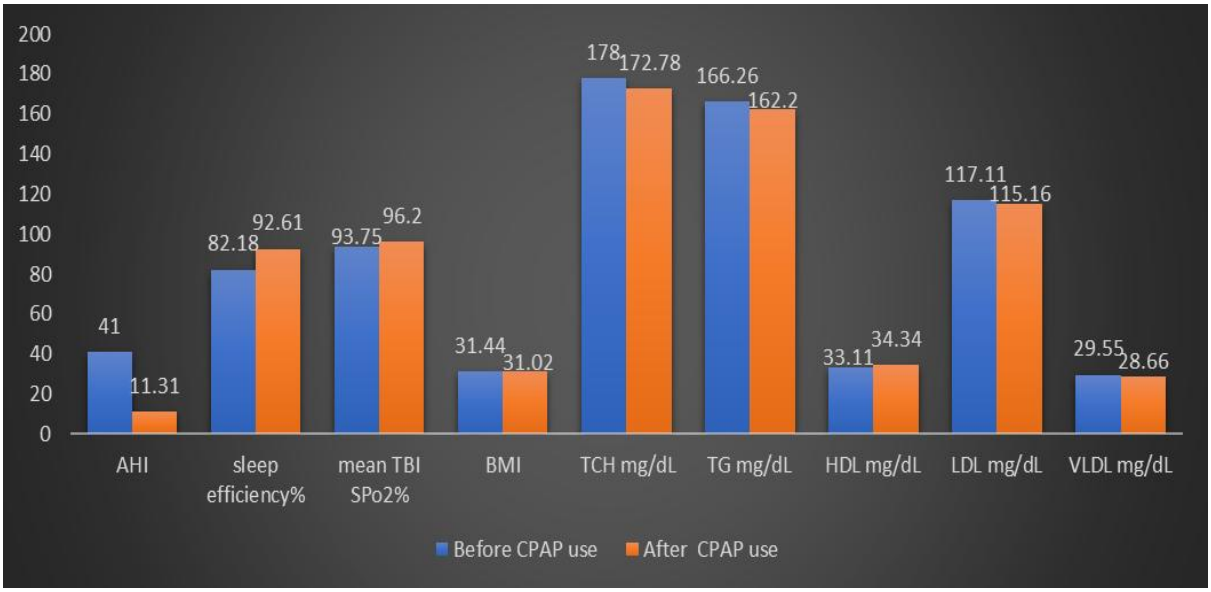
All data collected were statically analysed using SPSS 19.0. software. The data were presented using descriptive statistics such as mean, and standard deviation (SD). Further comparison of the all parameters of the subjects before CPAP use and after CPAP use was done using paired t test. The recorded values were expressed as Mean±SD. The level of significance was set at 5%. All p–values less than 0.05 were considered to be significant.

Table 1. comparison of mean± standard deviation of all parameters of subjects before CPAP use and after CPAP use.

	Before CPAP use	After CPAP use	p-value
Apnea-Hypopnea Index (AHI)	41.00 ± 33.84	11.31 ± 4.90	0.000018*
sleep efficiency%	82.18 ± 11.95	92.61 ± 2.83	0.000008*
mean TBI SPo2%	93.75± 3.77	96.20 ± 1.16	0.00015*
BMI	31.44 ± 5.52	31.02 ± 5.52	0.000002*
Total cholesterol (TC) mg/dL	178.00 ± 48.52	172.78 ± 35.61	0.11
Triglycerides (TG) mg/dL	166.26 ± 91.59	162.20 ± 81.27	0.06
High-density lipoprotein (HDL) mg/dL	33.11 ± 11.61	34.34 ± 10.20	0.005*
low density lipoprotein (LDL) mg/dL	117.11 ± 44.38	115.16 ± 36.16	0.29
Very Low-Density Lipoprotein (VLDL) mg/dL	29.55 ± 11.37	28.66 ± 8.52	0.17

AHI before CPAP use is 41.00 ± 33.84, after CPAP use is 11.31 ± 4.90 and the difference is statistically significant (p-value 0.000018).
sleep efficiency before CPAP use is 82.18 ± 11.95, after CPAP use is 92.61 ± 2.83, and the difference is statistically significant (p-value 0.000008).
Mean TBI SPo2% before CPAP use is 93.75± 3.77, after CPAP use is 96.20 ± 1.16, and the difference is statistically significant (p-value 0.00015).
BMI before CPAP use is 31.44 ± 5.52, after CPAP use is 31.02 ± 5.52, and the difference is statistically significant (p-value 0.000002).
Total cholesterol (TCH) before CPAP use is 178.00 ± 48.52, after CPAP use is172.78 ± 35.61, and the difference is not statistically significant (p-value 0.11).
Triglycerides (TG) before CPAP use is 166.26 ± 91.59, after CPAP use is162.20 ± 81.27, and the difference is not statistically significant (p-value 0.06).
High-density lipoprotein (HDL) before CPAP use is 33.11 ± 11.61, after CPAP use is 34.34 ± 10.20, and the difference is statistically significant (p-value 0.005).
Low density lipoprotein (LDL)before CPAP use is 117.11 ± 44.38, after CPAP use is 115.16 ± 36.16, and the difference is not statistically significant (p-value 0.29).
Very Low-Density Lipoprotein (VLDL) before CPAP use is 29.55 ± 11.37, after CPAP use is 28.66 ± 8.52, and the difference is not statistically significant (p-value 0.17).

Figure 1. comparison of mean± standard deviation of all parameters of subjects before CPAP use and after CPAP use.



DISCUSSION

Obstructive sleep apnea (OSA) is associated with dyslipidaemia. However, the effects of continuous positive airway pressure (CPAP) treatment on lipid profiles are unclear. The purpose of a study was to investigate whether CPAP therapy in patients having OSAS really improve dyslipidaemia.
Robinson GV et al in 2004 noted that Patients who were treated with CPAP, along with diets control and increased levels of physical activity, lead to a fall in TC levels [9]. Our study shows insignificant fall in TC levels.
Mirrakhimov AE et al in 2012 noted that CPAP therapy lowered serum TC level in OSAS patients, however, TG, LDL, and HDL levels did not decrease. [10]. Our study shows significant increase in HDL and insignificant fall of rest of the lipids.
Imadojemu VA et al in 2007 noted that CPAP therapy enhances the sympathetic response to hypoxic chemoreflex stimulation may also contribute to the lowered serum TC level in OSAS patients, however, TG, LDL, and HDL levels did not decrease. [11] Our study shows significant increase in HDL and insignificant fall of rest of the lipids.

Dorkova Z et al in 2008 noted that, patients with severe OSA and metabolic syndrome, good compliance to CPAP may improve insulin sensitivity, reduce systemic inflammation and oxidative stress, and reduce the global CVD risk. [12] Cuhadaroglu C et al in 2009 noted that in patients with moderate-to-severe obstructive sleep apnea, compliant CPAP usage may improve insulin secretion capacity, reduce leptin, total cholesterol, and low-density lipoprotein levels. Leptin showed significant relationship with insulin resistance, and this relationship remained after 8 weeks of CPAP therapy.[13] Our study shows significant increase in HDL and insignificant fall of rest of the lipids.
J. Bo¨rgel et al in 2006 noted that CPAP use reduces mean AHI from 32.9¡21.5 to 2.2¡2.3 events? h-1 (p,0.001). It also increases Mean O2 saturation significantly and Sleep efficiency also improves; The mean HDL-C serum level increased significantly by ,2.7 mg/dL-1 (5.8%, p50.013). The mean serum concentrations of total cholesterol (-3.4 mg/dL-1; -1.44%), triglycerides (-8.6 mg/dL-1; -4.9%) and LDL-C (-5.5 mg/dL-1; -3.8%) decreased, but these changes did not reach statistical significance. On follow-up, the mean BMI remained unchanged (-0.9%, p5NS). Our study also shows similar findings.[14] our study shows similar findings.
Coughlin SR et al in 2007 found no significant change in any metabolic variables between active CPAP trial periods and placebo. [15] Xu,H et al in 2014 noted CPAP treatment in OSAS patients decreases TC for 0.15 and 0.16mmol/L, respectively. Other lipid profiles (i.e., TG, HDL and LDL), remains unchanged after CPAP treatment. [16] Our study shows significant increase in HDL and insignificant fall of rest of the lipids.
Lin, M.T et al in 2015 found that CPAP use decreases TC significantly but TG, HDL and LDL remains unchanged. (17) Nadeem, R et al in 2014 found that CPAP use does not change TG, HDL and LDL but decreases TC significantly (18) Our study shows significant increase in HDL and insignificant fall of rest of the lipids.

CONCLUSIONS

CPAP treatment causes significant reduction in OSA, increases oxygen saturation and sleep efficiency significantly but improve dyslipidaemia insignificantly.

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