JMSCR Vol||14||Issue||01||Page 17-21||January 2025

http://jmscr.igmpublication.org/home/
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v14i01.04

IGM Publication Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Assessing the Effect of Weight loss through (Lifestyle Interventions, Physical Activity, Diet), on Severity of Obstructive Sleep Apnea (OSA) – Article Review

Authors
Dr Ahmed Hassan Abbas Hassan[1], Dr Juan Toral Sanchez[2]
[1]Consultant Family Medicine, Omar Bin Al Khatab Health Centre, Doha, Qatar.
[2]Consultant Family Medicine, Al Wakra Health Centre, Qatar.

Introduction

Obstructive sleep apnea (OSA) is a highly prevalent condition associated with quality-of-life impairment as well as cardio-vascular diseases and mortality. [1,2].
Obesity is a modifiable risk factor which can be addressed for OSA.
Lifestyle Interventions, particularly targeting weight loss, have been targeted in different medical trials, to assess its effect.
Two decades ago, prospective observational studies reported that a 10% weight gain over 4 years is associated with a 32% increase in the apnea–hypopnea index (AHI) and, conversely, a 10% weight loss predicts a 26% decrease in AHI [3].
More recently, some randomised controlled trials (RCTs) with up to 4-year follow-up indicated that weight loss is associated with decreased OSA severity with an average change in AHI of 0.78 events/h for every kilogram of weight lost, and that a small proportion of patients can achieve remission of OSA (AHI < 5 events/h) [4,5].
Frequent partial hypopnoe or complete (apnoea) closure of the upper airway during sleep leads to oxygen desaturation, increased respiratory effort, arousal, and sleep fragmentation. Patients typically present with witnessed apnoeas, loud intermittent snoring, and excessive daytime somnolence [6].
The evidence to support the role of excess weight as a causal factor in the aetiology of OSA is convincing. In a population study involving 2148, prevalence of obesity was significantly higher in those with OSA than those without, whether male (22% versus 8%) or female (32% versus 18%) [7].
Using data from the population-based Wisconsin Sleep Cohort Study[1], Young et al. estimated that, in 41% of adults with mild or worse sleep disordered breathing (SDB) (AHI ≥ 5) and in 58% of those with moderate or worse SDB (AHI ≥ 15), sleep disordered breathing (SDB) was attributable to excess weight (defined as BMI ≥ 25 kg/m)[8].
In the Sleep Heart Health Study based on 5615 adults, the odds ratio for an AHI of 15 or greater with a BMI difference of 10 kg/m2 was 2.4 [9].

Continuous positive airway pressure CPAP

It is well documented throughout the literature that patients with OSA are at a higher risk for other comorbid conditions such as hypertension, type 2 diabetes, stroke, atrial fibrillation, and cardiovascular disease [10].

Continuous positive airway pressure (CPAP) is considered as the most effective treatment for the condition and is currently the standard treatment. [11-12]

Although CPAP therapy has been shown to reduce these risks and improve health outcomes, adherence to treatment is often complicated by social, psychological, and financial factors. Common factors of noncompliance identified throughout the literature are comfort, convenience, claustrophobia, cost, and disturbance of bed partners [13].

The standard treatment for sleep apnea is continuous positive airway pressure (CPAP) which provides a stream of pressurised air to keep the airways open and prevent pauses in breathing and hypoxia while sleeping (American Academy of Sleep Medicine, 2008).

The benefits of CPAP therapy are well documented in the literature showing significant reductions in disease severity and daytime sleepiness [14].

Although clinical benefits of CPAP therapy are evident, treatment of OSA is often more challenging as treatment does not abate all the risks of morbidities and problems with treatment adherence are often present[15].

Aim

The aim of this study is to collect and review the data we currently have from diffe trials regarding lifestyle interventions and weight loss effect on the severity of obstructive sleep apnea OSA.

Methods

The data used in the review has been collected from databases: pubmed, the national library of medicine, and Google scholar.

Keywords: obstructive sleep apnea, lifestyle interventions, weight loss.

The effect of weight loss on OSA, literature analysis

Carneiro-Barrera et al studied the effect of weight loss on OSA on 89 Spanish participants, all were men aged 18 to 65. Patients were randomized starting from 1st of April 2019 till 23rd of October 2020.

They all had moderate to severe OSA, receiving continuous positive pressure (CPAP) therapy, assigning 49 individuals to the control group (CPAP therapy) and 40 to the intervention group.

The result was evaluated at 8 weeks and 6 months.

The control group continued CPAP treatment.

The intervention group were involved in 8-week weight loss and lifestyle modification programme. This lifestyle modification programme involved nutritional modification, sleep hygiene, aerobic exercise and alcohol, tobacco cessation combined with CPAP.

The result revealed a greater decrease in AHI in the intervention group (51% reduction, with a mean change of -21.2 events/h, $p<0,05$) compared to the control group (mean change of 2.5events/h, $p<0,05$) after 8 weeks.

In follow up, 6 months after intervention the intervention group showed a 57% reduction of AHI, with a mean between-group difference of -23.8 events/h [16].

In Sleep AHEAD (Action for Health in Diabetes) conducted by Kuna et al. which was a 10-year follow-up examining 306 middle aged and older adults with overweight or obesity and type 2 diabetes to assess the effects of an intensive lifestyle intervention (ILI) with weight loss on OSA severity.

Participants with (BMI>=25), diabetes mellitus type 2 and either mild, moderate or severe OSA were randomised to receive either ILI for weight loss with a goal at least 10% in year 1 or diabetes support and education (DSE) as a control group.

The intervention group received a specialised behavioural weight loss program focusing on diet modifications, then polysomnography (PSG) was performed to assess AHI at the baseline and years 1, 2, 4 and 10.

The study showed that the intensive lifestyle intervention group had significant reductions in body weight and AHI compared to the DSE group at 1-, 2- and 4-years follow-ups, although it was noted that the effects continued to be apparent at the 10-year mark, although there was some attenuation of these effects over time (p<=0.0001).

Also OSA remissions were more prevalent among ILI participants (34.4%) compared to the DSE group (22.2%) especially among individuals with mild and moderate OSA at 10 years.

Overall, the severity of OSA was generally diminished with ILI, and this enhancement was associated with reduction in body weight, initial OSA severity, and lifestyle intervention, regardless of weight fluctuations. [17-18].

Georgoulis et al. randomised 187 patients, (Seven patients were excluded post-randomization).

Patients were overweight men and women, diagnosed with moderate-to-severe OSA [apnea-hypopnea index (AHI) ≥ 15 events/h] through an attended overnight polysomnography, to one of the three study groups - a standard care group (SCG) or one of the two intervention arms: a Mediterranean diet group (MDG) and a Mediterranean lifestyle group (MLG).

Each of the three study groups was provided with standard care for OSA management (CPAP).

Besides, the SCG was given written healthy lifestyle advice.

Meanwhile, participants in the intervention groups underwent a 6-month behavioural program focused on achieving weight loss (aiming at a 5-10%) and improving adherence to the Mediterranean diet.

The MLG also received counselling on physical activity and sleep habits.

Polysomnographic data and OSA symptoms were evaluated pre- and post-intervention.

No harms from the interventions applied were reported.

The results revealed that the mean AHI change was -4.2 (-7.4, -1.0) for the SCG, -24.7 (-30.4, -19.1) for the MDG, and -27.3 (-33.9, -20.6) for the MLG. (p<0.05).

Post-intervention age-, sex-, baseline- and CPAP use-adjusted AHI was significantly lower in the MDG and the MLG compared to the SCG (mean difference: -18.0, and -21.2, respectively, both P < 0.001), and the differences remained significant after further adjustment for body-weight change (P = 0.004) and 0.008, respectively).

Other respiratory event indices, daytime sleepiness and insomnia were also significantly lower in both intervention arms compared to the SCG (all P < 0.05). The MLG only presented higher percent rapid-eye-movement sleep and lower daytime sleepiness compared to the MDG (both P < 0.05).

The conclusion of the study was that diet with lifestyle intervention alongside standard care leads to notable improvements in both OSA severity and associated symptoms compared to standard care alone. These benefits were still evident regardless of CPAP usage or weight reduction. [19].

Spörndly-Nees et al. conducted a trial of 60 participants with moderate to severe obstructive sleep apnea, with a follow-up at 18 months

They were randomised to either a control group treated with CPAP only and an experimental group treated with CPAP and a behavioural sleep medicine (BSM) intervention targeting physical activity and eating behaviour changes.

The study was unique as it documented the long-term effects on OSA of a BSM intervention aimed at enhancing physical activity and eating behaviors in addition to CPAP treatment.

Being in the intervention group implied an improvement in AHI at follow-up compared with being in the control group, when adjusted for baseline AHI and BMI (P = .029).

A higher AHI at baseline was associated with higher AHI after 18 months (P < .0001), whereas baseline BMI was not associated with the outcome at 18 months.

Additionally, a higher proportion of participants in the experimental group (36.7%) experienced an improvement in OSA category compared with the control group (6.7%).

The results concluded that addition of a BSM intervention targeting physical activity and sound eating habits proved to be effective in reducing AHI and improving OSA severity on a long-term basis compared with CPAP treatment alone. [20].

Conclusion

The four studies concluded the effectiveness of lifestyle interventions, and weight loss on the severity of obstructive sleep apnea.

But there were some limitations.

In Carneiro-Barrera et al study, all patients were males, and females were excluded from the study

Spörndly-Nees study, and Georgoulis study did not include analysis of contribution of different components of lifestyle intervention, so it becomes difficult to know how much each component contributed towards OSA severity improvement.

All studies did not include mild OSA patients, except the Sleep AHEAD.

So, more trials are needed to cover the previous limitations, and to explore the long-term effects.

References

1. Marshall NS, Wong KK, Cullen SR, Knuiman MW, Grunstein RR. Sleep apneaand 20-year follow-up for all-cause mortality, stroke, and cancer incidence and mortality in the Busselton Health Study cohort. J Clin Sleep Med. 2014;10(4):355–362.
2. Yaggi HK, Concato J, Kernan WN, Lichtman JH, Brass LM, Mohsenin V. Obstructive sleep apnea as a risk factor for stroke and death. N Engl J Med. 2005;353(19):2034–2041.
3. Peppard PE, Young T, Palta M, Dempsey J, Skatrud J. Longitudinal study of moderate weight change and sleep-disordered breathing. JAMA 2000:284:3015-3021.
4. Mitchell LJ, Davidson ZE, Bonham M. O'Driscoll DM, Hamilton GS. Truby H. Weight loss from lifestyle interventions and severity of sleep apnoea: a systematic review and meta-analysis. Sleep Med 2014:15: 1173-1183.
5. Joosten SA, Hamilton GS, Naughton MT. Impact of weight loss management in OSA. Chest 2017; 152:194-203.
6. W. T. McNicholas, “Diagnosis of obstructive sleep apnea in adults,” Proceedings of the American Thoracic Society, vol. 5, no.2, pp. 154–160, 2008.
7. J. Duran et al., “Obstructive sleep apnea-hypopnea and related clinical features in a population-based sample of subjects aged 30 to 70 yr,” American Journal of Respiratory and Critical CareMedicine, vol. 163, no. 3, pp. 685–689, 2001
8. T. Young, P. E. Peppard, and S. Taheri, “Excess weight and sleep-disordered breathing,” Journal of Applied Physiology, vol.99, no. 4, pp. 1592–1599, 2005.
9. T. Young, E. Shahar, F. J. Nieto et al., “Predictors of sleep-disordered breathing in community-dwelling adults: the Sleep Heart Health Study,” Archives of Internal Medicine, vol. 162, no. 8, pp. 893–900, 2002.
10. Giles TL, Lasserson TJ, Smith BH, White J, Wright J, Cates CJ. Continuous positive airways pressure for obstructive sleep apnoea in adults. Cochrane Database Syst Rev. 2006;3:CD001106.
11. Rosenberg R, Doghramji P. Optimal treatment of obstructive sleep apnea and excessive sleepiness. Adv Ther. 2009;26(3):295–312.
12. Gottlieb, D. J., & Punjabi, N. M. (2020). Diagnosis and Management of Obstructive Sleep Apnea: A Review. JAMA, 323(14), 1389–1400.
13. Rotenberg, B.W., Murariu, D. & Pang, K.P. (2016). Trends in CPAP adherence over twenty years of data collection: a flattened curve. Journal of Otolaryngology- Head & Neck Surgery, 45(43).
14. Patil, S. P., Ayappa, I. A., Caples, S. M., Kimoff, R. J., Patel, S. R., & Harrod, C. G. (2019). Treatment of adult obstructive sleep apnea with positive airway pressure: An American Academy of Sleep Medicine systematic review, meta-analysis, and GRADE assessment. Journal of Clinical Sleep Medicine, 15(2), 301-334.
15. Lisik, D., Pires, G. N., & Zou, D. (2023). Perspective: Systematic review and meta-

analysis in obstructive sleep apnea – What is lacking? Sleep Medicine, 111, 54-61.

16. Carneiro-Barrera A, Amaro-Gahete FJ, Guillén-Riquelme A i in. Effect of an interdisciplinary weight loss and lifestyle intervention on obstructive sleep apnea severity. JAMA Netw Open. 2022;5(4):e228212.
17. Kuna ST, Reboussin DM, Strotmeyer ES i in. Effects of weight loss on obstructive sleep apnea severity: 10-year results of the sleep AHEAD study. Am J Respir Crit Care Med. 2020. doi:10.1164/rccm.201912-2511oc
18. Foster GD, Borradaile KE, Sanders MH, Millman R, Zammit G, Newman AB, Wadden TA, Kelley D, Wing RR, Pi-Sunyer FX, Reboussin D, Kuna ST. A randomized study on the effect of weight loss on obstructive sleep apnea among obese patients with type 2 diabetes: the Sleep AHEAD study. Arch Intern Med 2009; 169: 1619-1626.
19. Georgoulis M, Yiannakouris N, Kechribari I i in. The effectiveness of a weight-loss Mediterranean diet/lifestyle intervention in the management of obstructive sleep apnea: Results of the "MIMOSA" randomized clinical trial. Clin Nutr. 2020.
20. Spörndly-Nees S, Åsenlöf P, Lindberg E, Emtner M, Igelström H. Effects on obstructive sleep apnea severity following a tailored behavioral sleep medicine intervention aimed at increased physical activity and sound eating: an 18-month follow-up of a randomized controlled trial. J Clin Sleep Med. 2020;16(5):705-713.