

COMPREHENSIVE LIFESTYLE INTERVENTIONS IN OBSTRUCTIVE SLEEP APNEEA

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Abstract

There is a complex link between obesity and obstructive sleep apnea (OSA), and there are new guidelines for comprehensive lifestyle interventions (CLI) for weight loss, with beneficial results on obese patients with OSA. A structured algorithm is proposed, step by step, according to BMI. All these recommendations are evidence based, a large meta-analysis is further discussed as an evidence base.

Implications in clinical practice outline: the effectiveness of lifestyle changes in reducing OSA outcomes, higher efficiency for complex interventions on male patients with severe OSA, duration of the intervention and combination with CPAP usage are not statistically correlated with lifestyle interventions effects on OSA. Different types of food affect sleep quality, high fat diets and processed meat are correlated with OSA. Higher adherence to Mediterranean Diets, that is very common used in CLI is a predictor for OSA outcomes improvement. Metabolic bariatric surgery MBS, indicated for a specific group of patients will ameliorate OSA. Building a long term partnership with the patients with OSA and obesity will ensure adherence to therapeutically measures and finally good results in improving quality of life.

Keywords: lifestyle interventions, Mediterranean Diet, obstructive sleep apnoea, OSA, obesity, weight loss.

Abstract

Există o legătură complexă între obezitate și apneea obstructivă în somn (AOS) și avem la dispoziție date noi privitoare la intervențiile ample asupra stilului de viață necesare pentru pierderea în greutate, cu rezultate benefice la pacienții obezi cu AOS. Este propus un algoritm structurat, pas cu pas, conform IMC. Toate recomandările sunt bazate pe dovezi, în continuare fiind discutată o mare meta-analiză, relevantă în acest sens.

Implicațiile în practica clinică arată eficacitatea schimbărilor stilului de viață în reducerea complicațiilor asociate cu AOS, eficiență sporită pentru intervențiile complexe la pacienții de sex masculin cu AOS severă, faptul că durata intervenției și combinarea cu utilizarea CPAP nu sunt corelate statistic cu efectele schimbării stilului de viață asupra AOS. Diferite tipuri de alimente afectează calitatea somnului, dietele bogate în grăsimi și carne procesată sunt corelate cu AOS. Aderarea la dietele mediteraneene, care face parte foarte frecvent din



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intervențiile asupra stilului de viață, este un predictor pentru îmbunătățirea rezultatelor AOS. Chirurgia metabolică bariatrică, indicată pentru un grup specific de pacienți, va ameliora AOS. Construirea unui parteneriat pe termen lung cu pacienții cu AOS și obezitate va asigura aderența la măsurile terapeutice și, în final, rezultate favorabile în ceea ce privește îmbunătățirea calității vieții.

Cuvinte cheie: intervenții asupra stilului de viață, dietă mediteraneană, apnee obstructivă în somn, obezitate, scădere în greutate.

Introduction

Obesity has been described already as an exacerbating factor for obstructive sleep apnea OSA and weight loss interventions are defined as an adjunctive therapy tool⁽¹⁻⁴⁾. Complex link between obesity and OSA is suggested, obesity being an enhancing factor for cardiovascular and metabolic OSA comorbidities^(5,6).

End of 2018 was an important moment of reviewing all evidences about weight loss interventions in OSA, when a scientific panel, evaluated current literature. Meanwhile, the scientific panel, after assesment has developed clinical recommendations for overweight and obese patients with OSA⁽⁷⁾. The panel included sleep specialists and pneumologists, behavioral scientists and weight management experts and is part of American Thoracic Society. Grading of Recommendations, Assesment, Development and Evaluation GRADE approach was used to

identify key messages and to develop further evidence based recommendations.

Comprehensive lifestyle interventions

Comprehensive lifestyle interventions (CLI) are defined as complex treatment that includes :

- 1) Nutritional intervention, with low or very low calorie diet
- 2) Physical activity counseling, with personalised approach, based on training abilities and preferences
- 3) Behavioral guidance for lifestyle changes, this will include mindfulness based techniques and other behavioral changes⁽⁷⁾.

Recommendations are designed for patients and for clinicians, being strong or conditional. Strong recommendations-for patients, the recommended action will be followed by a large percentage of patients, only a small percentage not. Conditional recommendations- for

Specific advice for diets, parts of CLI	
General recommendation	1200-1500 kcal/day women 1500-1800 kcal/day men
Reducing caloric intake	By 500-100 kcal/day
Dietary composition	No specific macronutrients percentage proven to be more successful in weight loss
Diet recommendation	Tailored to patient preference to maximize adherence

Specific advice for exercise, physical activity part of CLI	
Aerobic activity	150 min/ week
Avoid elevators and other ambulatory conveniences	
Type of physical activity recommended	Tailored to patient preference in order to maximize adherence
On long term, level of physical activity	200-300 min/ week

Table 1. Specific advices for patients with OSA

parameter	d	Statistical significance
AHI	-0.61 and -0.46	P<0.0001
ODI	-0.61 and -0.46	P<0.0001
EDS	-0.41	P=0.003

Table 2. Significant results

Correlations	Processed meat	Fat	Dairy
AHI frequent consumption	42.5+/-30.7	36.6+/-27.5	39.7+/-31 > 2 servings/ day
AHI rare consumption	28.9+/-22.7	18.2+/-10.1	26.2+/-15.6
P values	0.56	0.01	0.4

Table 3. Correlations between AHI and processed meat and dairy consumption

Characteristic	baseline	After 6 months	P value
Gender	Male 34.6	Female 34.6	
Age	52.2+/- 10.5	52.2+/-10.5	
Med Diet Score	28.5+/- 4.1	35.3+/- 8.1	<0.001
Physical activity Metabolic equivalent task (min/week)	1424.1+/- 1375.3	1760+/-1532	0.116
BMI (kg/m2)	36.6+/-4.3	33.8+/-4.3	<0.001
AHI (events/h)	55.5+/-33.6	45.5+/-29.9	<0.001
Arousal index (events/h)	54.3+/-20.2	43.7+/-18.7	0.006
MeanO2 sat	92.1+/-2.8	93.2+/-2.1	<0.001
Lowest O2 sat	77.8+/-7.6	81.4+/-6.9	<0.001

Table 4. Adaptation, based on study results from ref 25



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patients, most patients would like to follow suggested actions but in reality will not. Strong recommendations for clinicians-adherence to this recommendation, according to the guideline could be used as a performance indicator. Conditional recommendation for clinicians- recognize that different patients could select different choices and the clinician will help patients in managing decisions according to values and preferences⁽⁷⁾.

Algorithm for evidence based recommendations⁽⁷⁾:

- For patients with OSA and BMI ≥ 25 kg/m² is a
- strong recommendation for participation in CLI
- other conditional recommendations are:
- CLI instead of low calorie diet +/- physical activity counselling
- Low calorie diet rather than no diet
- Increased physical activity instead of no physical activity
- For patients with OSA and BMI ≥ 27 kg/m² without improvement, despite CLI, and without contraindications (active cardiovascular disease) a conditional recommendation of anti-obesity pharmacotherapy should be evaluated, under specialised advise.
- For patients with OSA and BMI ≥ 35

kg/m², no amelioration seen after CLI and without contraindications, the panel developed a conditional recommendation for bariatric surgery evaluation.

Clinicians have to involve their patients in different strategies evaluation, building a partnership rather than imposing solutions. A multidisciplinary team should be taken into consideration in order to find best solutions for patients. Below, specific advices are noted⁽⁸⁾ in table 1. Like all these guidelines are suggesting, lifestyle interventions targeting diet, physical activity, tobacco/alcohol cessation and sleep hygiene are recommended in OSA treatment as important tools.

A comprehensive systematic review and meta-analysis, realised by a prestigious "Mind, Brain and Research Centre "from Granada, published in Obesity Review in 2019⁽⁹⁾, aimed to assess lifestyle interventions effectiveness directly on : apnoea hypopnea index AHI, excessive daytime sleepiness EDS, oxygen desaturation index ODI and other secondary measurements for OSA and to quantify which intervention will lead to best improvements⁽⁹⁾.

13 randomised controlled trials RCTs and 22 uncontrolled trials have been included in the comprehensive research. Significant results are shown in the table below⁽⁹⁾.

Secondary parameters like arousal index,

SaO₂ , sleep efficiency , REM, light and deep sleep have been investigated.

In all RCTs significant increase was observed for arousal index and sleep efficiency ($d=0.96$ and 0.73)⁽⁹⁾.

In total 35 studies with 1420 participants obese with moderate to severe OSA have been analysed considering lifestyle intervention. All studies are defining diet + physical activity as lifestyle intervention, but none is directed to tobacco or alcohol consumption, although very common for these patients and related to increased risk for this condition meaning also a worsened prognostic⁽¹⁰⁻¹²⁾ and function.

Reductions in AHI, ODI , EDS are clinically relevant, even if full remission of OSA is not the case. Leptin, the hormone that exerts an inhibition on respiratory centre modulation⁽¹³⁾ has been proved to be reduced after lifestyle interventions. Through this mechanism that involves leptin reduction, lifestyle measurements will lead to significant enhancements of resting lung volume and the upper airway structure and function and a better energy balance⁽¹⁴⁾.

All these trials have shown improvements in sleep efficiency and arousal index. The explanation may be firstly that AHI reduction means less sleep fragmentation , but has to be added the beneficial effect of a balanced diet and physical activity on general sleep quality⁽¹⁵⁾. Important is that lifestyle interventions are improving sleep quality, with a general impact on quality of life^(16,17) with positive effects on depressive symptoms and cognitive impairments. Still unclear in this meta-analysis remains the effect on non REM sleep, meanwhile some great benefits of lifestyle interventions have been reported on light sleep and deep sleep^(18, 19,20). In accord with previous findings⁽²¹⁾ as greater the severity of OSA was at the beginning, and as

the complex the lifestyle intervention was, the obtained result was higher.

Sleep hygiene is a component that should not be neglected, coaching/ psychological support, as is described in CLI will bring additional benefits⁽²²⁾.

Implications of this meta-analysis in clinical practice:

- 1) lifestyle change is proved to be effective at reducing OSA outcomes
- 2) higher efficiency for complex interventions on male patients with severe OSA
- 3) duration of the intervention and combination with CPAP usage are not statistically correlated with lifestyle interventions effects on OSA

Discussions

- **Different types of food and sleep quality** - Whereas lifestyle interventions are generally clear, a discussion about the bidirectional role of different types of food in sleep quality, or in OSA development should be considered⁽²³⁾.

An observational study on 104 patients with OSA and overweight has shown that overweight patients who ate a high fat diet (>35 % fat) had twice the severity of sleep apnea⁽²³⁾. Other correlations between AHI and processed meat and dairy consumption are summarized in the below table.

It has to be mentioned that patients consuming at presentation 2 dairy servings/ day have less severe symptoms, probably in link with anti-inflammatory effects. Still, low fat dairy should be recommended for OSA patients⁽²³⁾. Some conclusions can be drawn from this study:

- Dietary components: fat, processed meat, high fat dairy are correlated with high risk of OSA severity



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- For newly diagnosed OSA patients fat intake recommendations are <10% / day
- Patients should be discouraged in eating saturated fats and processed meat
- Dietary counseling under nutritionist surveillance is strongly recommended⁽²³⁾

In Australia, an interesting cross-sectional analysis have been done (n=784, age 35-80y).

Methods:

- Validated food questionnaires used to evaluate dietary intake
- Qualitative questionnaires for measuring night sleep quality and episodes of daytime sleepiness

Correlations found:

- Excessive fat intake positively with EDS and AHI
- Body Mass Index BMI mediated the association between fat intake and AHI, but no daytime sleepiness

Further studies could evaluate different diets and OSA implications.

- **Mediterranean Diet and OSA** - With a strong scientific evidence, Mediterranean diet MD recommended in many weight loss programs, is a good diet alternative for OSA patients.

The palatability of this diet, combined with high benefits proven already in obesity reduction can make MD a good option. How adherence to MD and physical activity could improve polysomnographic indices can be shown in the table below, results from a study conducted on 40 obese patients with moderate and severe OSA receiving CPAP therapy and weight reduction program by MD⁽²⁵⁾. At the end of the study, 80% remained obese, but with a lower BMI.

From this study, take home message could be that higher adherence to MD will help reduce prevalence of obesity and OSA⁽²⁵⁾.

Still, as has been mentioned in guidelines for CLI⁽⁸⁾ studies with low carb diets, MD, vegan diets, low glycemic load diets did not show any benefit of one diet vs another in relation with weight loss, important will be to obtain and maintain weight loss (practically caloric restriction will be the key) and to facilitate greater adherence to nutritional intervention. In line with these, a personalized nutritional approach will ensure long term weight maintenance and better adherence to lifestyle interventions.

- **Bariatric surgery**- since the CLI guideline⁽⁷⁾ mentioned bariatric surgery as a possible intervention to be taken into consideration for OSA and BMI ≥ 35 kg/m² and with

unsuccessful lifestyle interventions, some aspects about bariatric surgery should be mentioned, too.

The guidelines for perioperative management of OSA in metabolic bariatric surgery MBS show a prevalence of 35-94% OSA at MBS patients, suggesting a multidisciplinary approach since OSA and morbid obesity are associated with an increased perioperative risk⁽²⁶⁾:

- After MBS, on long term, cardiovascular, pulmonary and neurovascular outcomes are improved, this may be related to treatment benefits in OSA. CPAP continuation will be advised under specialist supervised opinion.
- CPAP use in perioperative period may reduce pulmonary complications, and remains the gold standard treatment for OSA. CPAP usage will be considered a therapeutic tool for patients with previously diagnosed atrial fibrillation.
- OSA patients are at risk, with a difficult intubation. The ramped position is indicated for induction and intubation, flat supine position will be avoided, due to obesity effects on lung volumes. Videolaryngoscopy is not routinely necessary and premedication with sedatives should be avoided.
- During immediate postoperative period CPAP should be supported by oxygen therapy.
- MBS is proven to reduce OSA severity in long term, despite the fact that OSA represents a perioperative risk factor in MBS.
- Postoperative results of $AHI < 5/h$ are very common, mainly for patients with initial mild OSA than severe OSA.
- The clear recommendation is that, until after bariatric surgery, an

objective documentation for free OSA is seen, patients should continue OSA therapy⁽²⁶⁾.

Conclusions

A comprehensive lifestyle intervention should become the key step in managing OSA at obese or overweight patients, realized under clinicians advise and with a multidisciplinary team, involving pneumologists, nutritionists and psychologists.

Building a long term partnership with the patient will ensure adherence to therapeutically approach and finally good results in improving quality of life.

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