



BRIEF REVIEW

Medical Nutritional Therapy in the Management of Obstructive Sleep Apnea

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Abstract

Obstructive Sleep Apnea (OSA) is a prevalent sleep disorder in the US and Europe with an estimated prevalence range of 14-49% in middle aged men. Medical Nutrition Therapy (MNT) is a vital component of the clinical management of OSA, its co-morbidities and its sequelae. As experts in MNT, Registered Dietitian Nutritionists (RDN) are positioned to take a leading role in the treatment of OSA. There is a strong relationship between nutrition, OSA and its milieu, which supports the need to explore and implement therapeutic approaches to treating OSA that include nutrition. Several approaches have shown promise including reduced calorie levels, adjusted macronutrient distribution range and sodium restriction. More research is needed to identify optimal and safe therapeutic approaches to the nutritional management of OSA.

Keywords: Medical Nutrition Therapy; Obstructive Sleep Apnea; Dietitian; sodium; calorie; macronutrient

Introduction

Obstructive sleep apnea (OSA) is a prevalent sleep disorder in the US and Europe with an estimated prevalence range of 14-49% in middle aged men [1]. OSA is a chronic condition characterized by recurrent episodes of airway obstruction or collapse, resulting in intermittent hypoxia (IH) [2,3]. IH induces tissue hypoxia, which results in a number of deleterious processes including systemic inflammation, mitochondrial dysfunction, oxidative stress and sympathetic nervous system hyperactivity [4,5]. These processes contribute to worsening OSA and the pathogenesis of co-morbidities [4,6,7]. The most insidious clinical impact of moderate to severe OSA is an increased risk of all-cause mortality [8].

Medical Nutrition Therapy (MNT) is a vital component of the clinical management of OSA, its co-morbidities and its sequelae. As experts in MNT, Registered Dietitian Nutritionists (RDN) are positioned to take a leading role in the treatment of OSA. OSA and several of its co-morbidities have significant nutrition related implications. Obesity, type 2 diabetes, hyperlipidemia, chronic obstructive pulmonary disorder (COPD), resistant hypertension, asthma, and chronic kidney disease (CKD) all have nutritional involvement in varying degrees [9-19]. The prevalence of these comorbidities differ from one condition to another, with obesity having the highest prevalence. It has been estimated that 40-70% of obese individuals are also diagnosed with OSA [20]. Each co-morbidity of OSA has evidenced-based MNT treatment approaches when they present individually [10,21-26]. When they present as co-morbidities, the nutritional management becomes more complicated as

each condition has a unique impact on underlying metabolic and physiologic processes.

Managing the nutritional complexity of these co-morbid conditions requires a great deal of skill and clinical judgment. RDNs must complete a thorough nutrition assessment identifying the most important information obtained from the food and nutrition related history, anthropometric measurements, biochemical markers, findings from the nutrition focused physical examination and the client history [27]. The RDN must then employ critical thinking and synthesize the available information with evidence-based guidance and develop prioritized nutrition diagnosis and intervention plans that address the clinical concerns identified in the nutrition assessment. The nutrition diagnosis and intervention domains of the Nutrition Care Process (NCP) require a sound understanding of the nutrition related metabolic and pathophysiological processes of OSA and each co-morbid condition.

The sequelae of OSA also include conditions with significant nutritional involvement. Increased inflammation, oxidative stress, insulin resistance, worsening control of DM, HTN and dyslipidemia, elevated ghrelin levels, and increased risk of cardiovascular disease have an impact on nutritional status

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Received: Aug 28, 2020; **Accepted:** Aug 31, 2020; **Published:** Sept 02, 2020

and require nutritional management [28–32]. Furthermore, there are conditions that may be associated with OSA that have impact and on nutritional status and require MNT management such as pharyngeal dysphagia, chronic cough and laryngopharyngeal reflux, type 1 DM and nonalcoholic fatty liver disease [4,19,33,34]. More research is needed to explore the relationship between OSA and these co-morbidities; however, independent of OSA each condition has a recognized nutrition therapeutic component [35-37].

There is a bi-directional relationship between OSA and several of its co-morbidities for which MNT is considered a component of the frontline treatment. Obesity, HTN, insulin resistance, disordered glycemic control, metabolic syndrome and leptin resistance all have bidirectional relationships with OSA [20,30,38,39]. Thus, the importance of managing each co-morbid condition is magnified for achieving favorable clinical outcomes. As bi-directional relationships go, managing one condition may result in improvements in its bi-directional counterpart. More research is needed to elucidate the degree to which nutrition can impact OSA and its bi-directional co-morbidities, but there is enough information available in the published literature to warrant including nutrition in the therapeutic approach.

When considered in total, the strong relationship between nutrition, OSA and its milieu, firmly establishes the need to explore therapeutic approaches that include nutrition in the treatment of OSA. These approaches should be explored in research and, when the evidence is strong enough, implemented in clinical practice. The research regarding nutrition and OSA is limited but growing, and several approaches have received most of the attention in published studies. Macronutrient and calorie manipulation as methods to promote weight loss; and sodium restriction have shown promise as potential treatment approaches for managing OSA [40-42]. Macronutrient and calorie manipulation have been studied for their impact severity and symptoms of OSA; and for managing obesity in OSA. Dietary monitoring was also investigated as a potential area of nutritional management of OSA, but the available information is very limited [43]. In addition to the methods discussed so far, there are other aspects of nutrition therapy for OSA but reports regarding those aspects in the published literature are scant.

Nutrition Therapy in the Management of OSA

Dietary manipulation of macronutrient distribution and calorie content demonstrated effectiveness in decreasing the severity of OSA; and dietary treatment alone and in conjunction with exercise may be effective in improving symptoms of OSA [40,42]. Therapeutic lifestyle changes, including diet, exercise and emotional support are a first line treatment for the management of obesity in OSA [40,43]. Obesity is a major focus of the research on nutrition and OSA due to the high incidence of co-morbidity. Low-carbohydrate dietary approaches and Mediterranean style meal patterns have been shown to be beneficial in OSA and the effects may be beyond weight loss alone [40]. It has been suggested the effect of weight

loss on OSA may be more pronounced in mild OSA [44]. One study found an independent relationship between OSA and a preference for high fat foods, and a dislike of high fiber foods [45]. Additionally, high fat intake was associated with daytime sleepiness and apnea-hypopnea index (AHI) [46]. High alcohol intake is related to severity of OSA and low fiber intake was noted in OSA patients [47]. More research is needed to establish safe and effective nutrition therapy approaches based on calorie content and macronutrient distribution.

Sodium restriction has been explored in the treatment of OSA. Dietary salt has been associated with severity of OSA in individuals with hyperaldosteronism and resistant hypertension [15]. Restricting sodium to mitigate fluid retention in males with severe sleep apnea resulted in a limited decrease in apnea episodes [41]. These results suggest that sodium restriction may be beneficial in the management of OSA, especially in patients co-morbid conditions that result in fluid retention. There is not enough information available to come to definite conclusions, but sodium restriction is in order in cases where the co-morbidities are known to respond to sodium restriction such as congestive heart failure and HTN.

MNT and the importance of the RDN in the management of OSA is clear from a brief review of the literature. RDNs working in clinical and research settings should lead the effort to demonstrate the benefits of MNT in the management of OSA. OSA is a serious health issue that is associated with increased mortality, therefore all clinical therapeutic approaches that may contribute to improved clinical outcomes should be emphasized. Nutritional management of OSA goes beyond obesity management as nutrition is extensively involved with managing the sequelae of OSA. RDNs in clinical settings should be standard members of the interprofessional treatment team for managing OSA. RDNs in research setting should investigate MNT based interventions as therapeutic approaches for managing OSA and its sequelae.

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Citation: Morrow EA (2020) Medical Nutritional Therapy in the Management of Obstructive Sleep Apnea. *J Nutr Diet Pract* 4(3): 001-004.

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