Focusing on Omega-3 Fatty Acids for Treatment of Obstructive Sleep Apnea and its Cardiovascular Complications

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ABSTRACT

The aim of this review is to focus on the role of omega-3 fatty acids on OSA and associated CVD risk, as well as provide novel hypotheses on their functional impact. Obstructive sleep apnea (OSA) is associated with increased cardiovascular disease (CVD) morbidity and mortality and is highly prevalent in obesity. The American Academy of Sleep Medicine recommends dietary induced weight-loss as a behavioral treatment option for OSA. Since a complex, rather than linear, relationship exists between weight loss and OSA improvement, dietary intervention studies must focus not only on the direct effects of weight loss, but whether dietary-quality may also affect OSA severity, through potential improvements in neuromuscular function of the upper airway.

Key words: Obstructive sleep apnea; Cardiovascular disease; Omega-3 fatty acids

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OMEGA-3 FATTY ACIDS AND OSA

Omega-3 fatty acids are classified as polyunsaturated fatty acids; also known as essential fatty acids since they cannot be synthesized in the human body and must be obtained from the diet[16]. The omega-3 family includes alpha-linolenic acid (ALA), eicosapentaenoic (EPA), and docosahexaenoic acids (DHA). ALA can be found in plant based foods (flaxseeds, canola, soy, perilla, and walnut oils), while EPA and DHA are found in marine foods (seafood and in greatest amounts in ‘fatty’ fish like sardines, herrings, scomber fishes as various mackerel species, salmon[16].

A previous cross-sectional study found an independent, inverse relation between red blood cell DHA-levels and OSA severity in 350 consecutive patients undergoing sleep studies, independent of age, body mass index, fish intake and fish oil supplements, alcohol consumption and smoking[17]. Others have found that increasing the levels of marine omega-3 fatty acids in neuronal tissues can stabilize the upper airway innervations, musculature, and feedback control systems[18]. Since severe OSA is associated with increased expression of several pro-inflammatory cytokines (especially increased levels of IL-6, TNF-α) and oxidative stress within the muscular compartments of upper airway tissue[19], the tissue concentration of the anti-inflammatory and anti-oxidative n-3 PUFAs may increase upper-airway muscle-contractile function via an improved upper airway muscle force-generating capacity of dilator muscles (Figure 1).

OMEGA-3 FATTY ACIDS AND OSA RELATED CVD COMPLICATIONS

Marine omega-3 fatty acids may also be able to reduce cardiac dysfunction and even the occurrence of premature death in patients with OSA. Higher blood levels of EPA plus DHA are associated with reduced fatal cardiac events. Both EPA and DHA[20] have been associated with improving vascular and cardiac hemodynamics, endothelial function, controlled blood pressure, reduced hypertriglyceridemia, and reduced insulin-insensitivity[21-23]. To what extent marine omega-3 fatty acids improve the OSA-associated cardiovascular-risks, requires further investigation.

CONCLUSION

The 2015 U.S. Dietary Guidelines for Americans[24] recommends that the general population without established cardiovascular morbidity should consume at least 250 mg/day of EPA+DHA in order to reduce the risk of CVD[25]. In spite of these recommendations, the intake of marine omega-3 fatty acids is low among the average U.S. adult population (41 mg/day and 72 mg/day of EPA and DHA from foods and supplements, respectively)[26]. Whether the aforementioned dietary recommendation or other doses of marine omega-3 fatty acids are suitable for OSA patients at high risk of CVD and with suboptimal marine omega-3 intake remains to be established. Future research is needed to examine the effect of marine omega-3 fatty acids on OSA severity and associated cardiovascular risk. Potential improvements in OSA severity may, in turn, lead to improvements in cardiovascular risk.

CONFLICT OF INTERESTS

The authors declare that they do not have conflict of interests.

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