THE ASSOCIATION BETWEEN OBSTRUCTIVE SLEEP APNEA AND SUBCLINICAL CAROTID ARTERY DISEASE: A SYSTEMATIC REVIEW AND META-ANALYSIS

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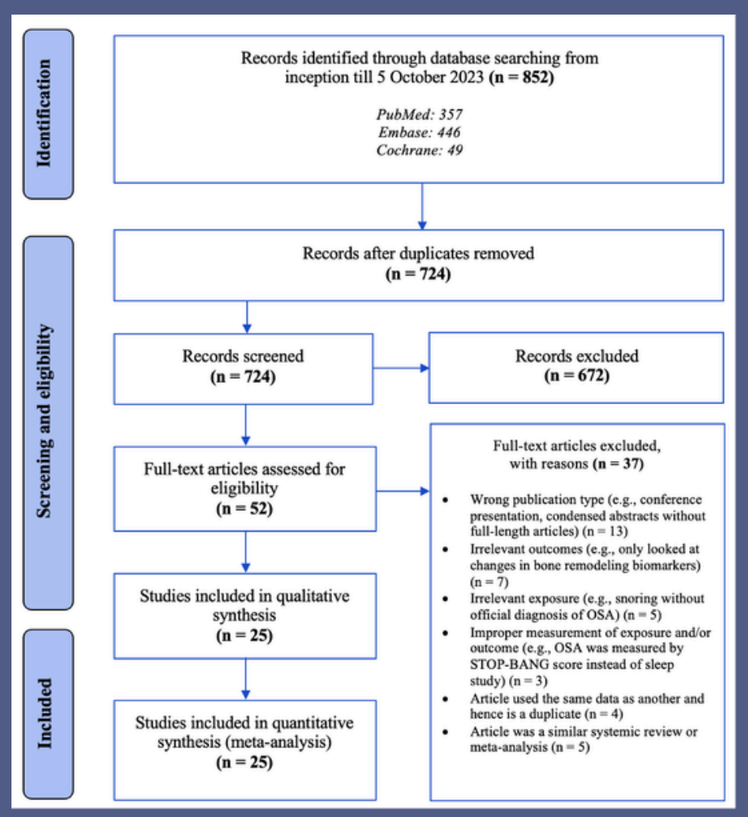
BACKGROUND & OBJECTIVES

Obstructive sleep apnea (OSA) is characterized by repeated episodes of upper airway collapse during sleep and is associated with cardiovascular and cerebrovascular disease. Carotid artery disease can result in devastating complications such as stroke. Given the ubiquity of OSA and the major consequences of carotid artery disease, it is imperative to establish the relationship between these two conditions.

METHODS

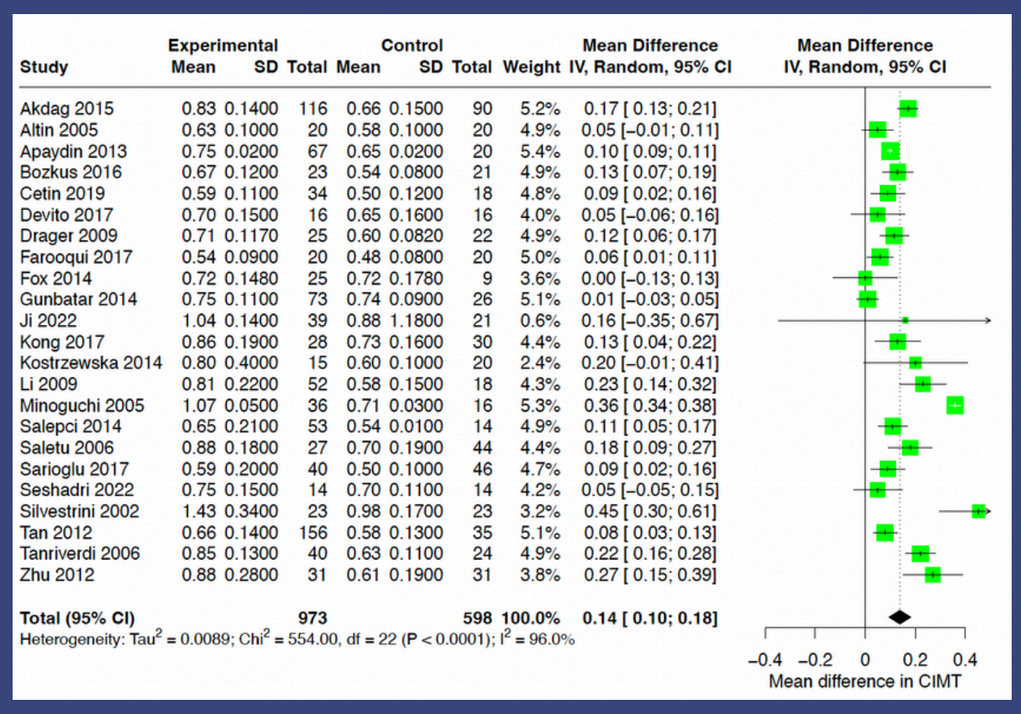
- Systematic search of MEDLINE, Embase and Cochrane Library from inception to 5 October 2023
- Studies that reported on the association between OSA and carotid artery disease in adults aged 18 years and above were included
- Outcomes of interest included any markers of carotid artery disease.



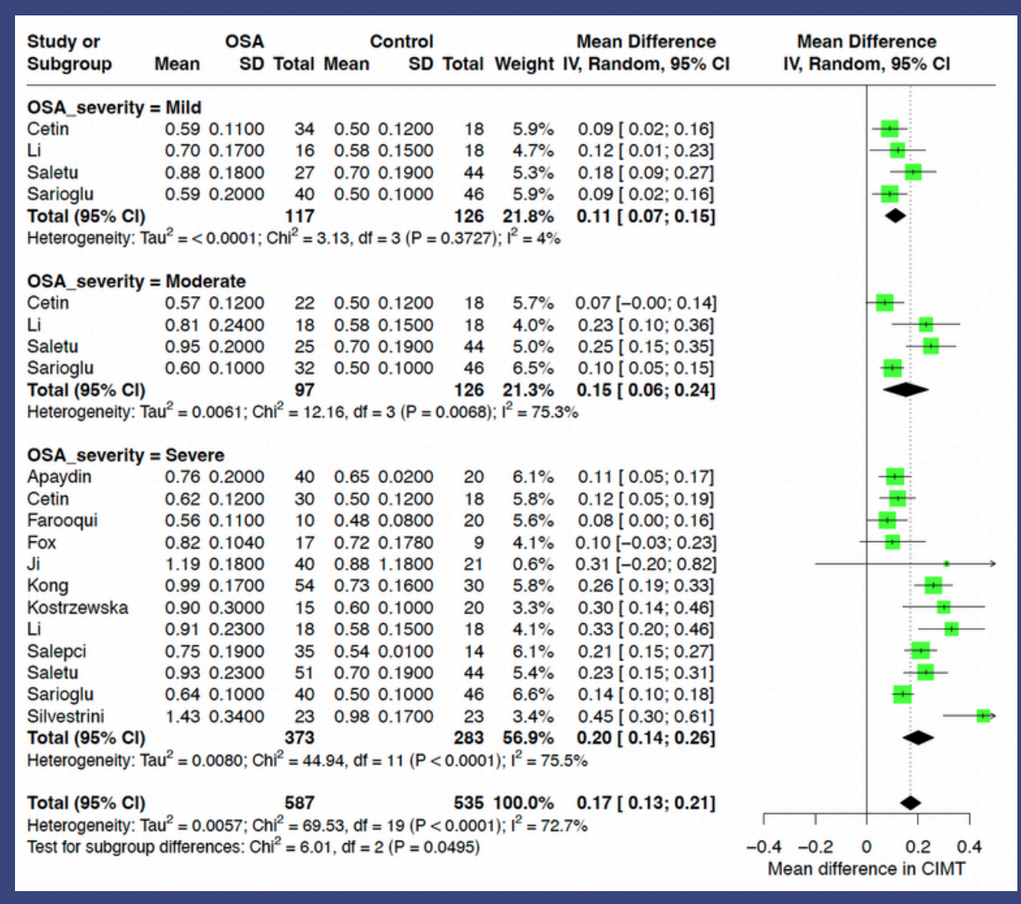
PRISMA flow diagram of the study selection process

RESULTS

- 25 studies were included
- Individuals with OSA had increased carotid intima-media thickness (CIMT) with a mean difference of 0.14 mm (95% CI = 0.10 mm – 0.18 mm; N = 23)
- Compared to non-OSA individuals, CIMT in mild, moderate and severe OSA patients was 0.11 mm (95% CI = 0.07 mm – 0.15 mm), 0.15 mm (95% CI = 0.06 mm – 0.24 mm) and 0.20 mm (95% CI = 0.14 mm – 0.26 mm) greater, respectively
- Individuals with OSA showed a trend towards a higher risk of developing carotid atherosclerotic plaques, although this association did not reach statistical significance (hazard ratio [HR] = 1.31; 95% CI = 0.86–1.99; I^2 = 24%; N = 7).



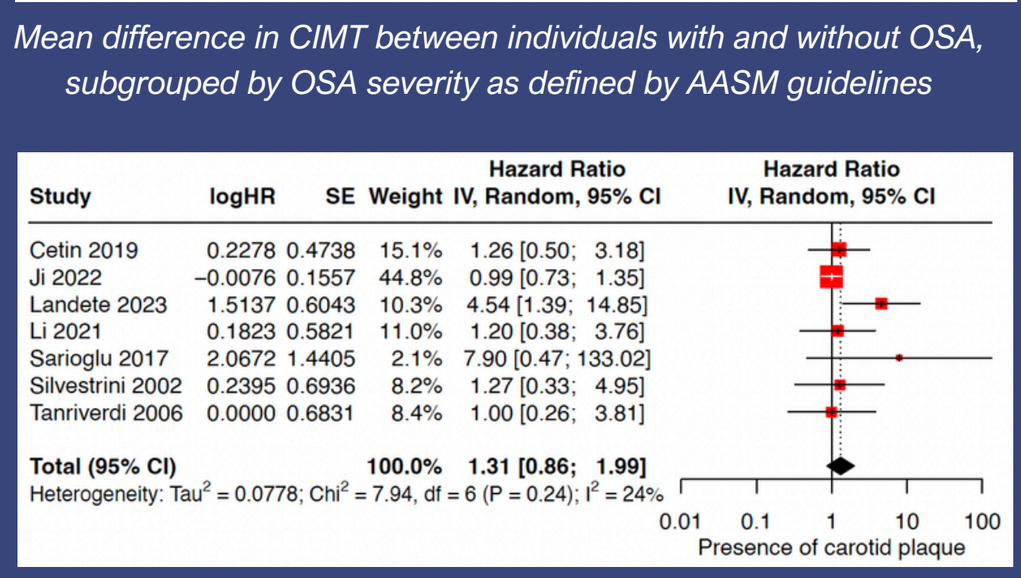
Mean difference in CIMT between individuals with and without OSA



Mean difference in CIMT between individuals with and without OSA, subgrouped by OSA severity as defined by AASM guidelines

DISCUSSION

- The relationship between OSA and subclinical carotid artery disease can be explained by several pathophysiological mechanisms – intermittent hypoxia leading to oxidative stress and systemic inflammation and increased sympathetic nervous system activity causing sustained hypertension.



Risk estimates of developing carotid atherosclerotic plaques in patients with OSA

CONCLUSION

OSA may be associated with a greater risk of subclinical carotid artery disease. Further studies are needed to determine if treatment of OSA may mitigate the risks and improve overall health outcomes.