

The association between obstructive sleep apnea and the severity of subsequent glaucoma: a population-based cohort study

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INTRODUCTION

Glaucoma is a prevalent ocular disease that causes large numbers of visual impairment and legal blindness worldwide. About the risk factors, old age is a well-established predisposing factor for glaucoma in which the individuals aged older than 40 years are under higher risk of glaucoma development and the prevalence of glaucoma reached 3.3% percent in those aged more than 70 years old. Obstructive sleep apnea (OSA) is a breathing disease resulted from impaired ventilation, which can lead to surge of sympathetic tone, hypercapnia, hypoxia and unstable blood flow. In previous literatures, they had demonstrated the possible relationship between OSA and glaucoma

AIM

To evaluate the impact of pre-existing obstructive sleep apnea (OSA) on the severity of following glaucoma using the national health insurance research database (NHIRD) in Taiwan.

METHOD

A retrospective cohort study was conducted and patients with the glaucoma diagnosis were enrolled. Then the study population was divided into 11,778 cases with pre-existing OSA and another propensity-score matched 11,778 cases without such condition. The primary outcome was defined as the numbers of anti-glaucomatous drugs, the incidence of laser trabeculoplasty, trabeculectomy and cyclodestructive procedure. Cox proportional hazard regression was applied to estimate the adjusted hazard ratio (aHR) and corresponding confidence interval (CI) of OSA on the outcomes.

RESULTS

There were 67, 782 and 60 cases received laser trabeculoplasty, trabeculectomy and cyclodestructive procedure in the OSA group, while another 69, 239 and 64 events of same procedures occurred in the control group. Considering the effect of all the potential confounders, no significant difference concerning the incidence of laser trabeculoplasty, trabeculectomy and tube shunt surgery, and cyclodestructive procedure between the OSA and non-OSA groups were observed (all the 95% CIs included 1) (Table 1). Besides, the numbers of anti-glaucomatous medication did no differ between the two group (P>0.05) (Figure 1). In the subgroup analyses, age older than 60 years, male sex and the types of glaucoma did not influence the severity of glaucoma in OSA patients (all CI included 1).

| Event | Non-OSA n=11778 | OSA n=11778 |
|---------------------------------------|--------------------|---------------------|
| Laser trabeculoplasty | | |
| Incidence rate [#] (95% CI) | 0.740(0.590-0.940) | 0.740(0.580-0.940) |
| AHR (95% CI) | Reference | 0.978 (0.698-1.371) |
| Trabeculectomy and tube shunt surgery | | |
| Incidence rate [#] (95% CI) | 2.600(2.290-2.960) | 2.020(1.750-2.340) |
| AHR (95% CI) | Reference | 0.855 (0.720-1.016) |
| Cyclodestructive procedure | | |
| Incidence rate [#] (95% CI) | 0.690(0.540-0.880) | 0.660(0.510-0.850) |
| AHR (95% CI) | Reference | 0.927 (0.651-1.320) |

Table 1. Incidence risk of study event among propensity score matched groups
OSA: obstructive sleep apnea, AHR: adjusted hazard ratio, CI: confidence interval
[#] Incidence rate, per 10000 person-months

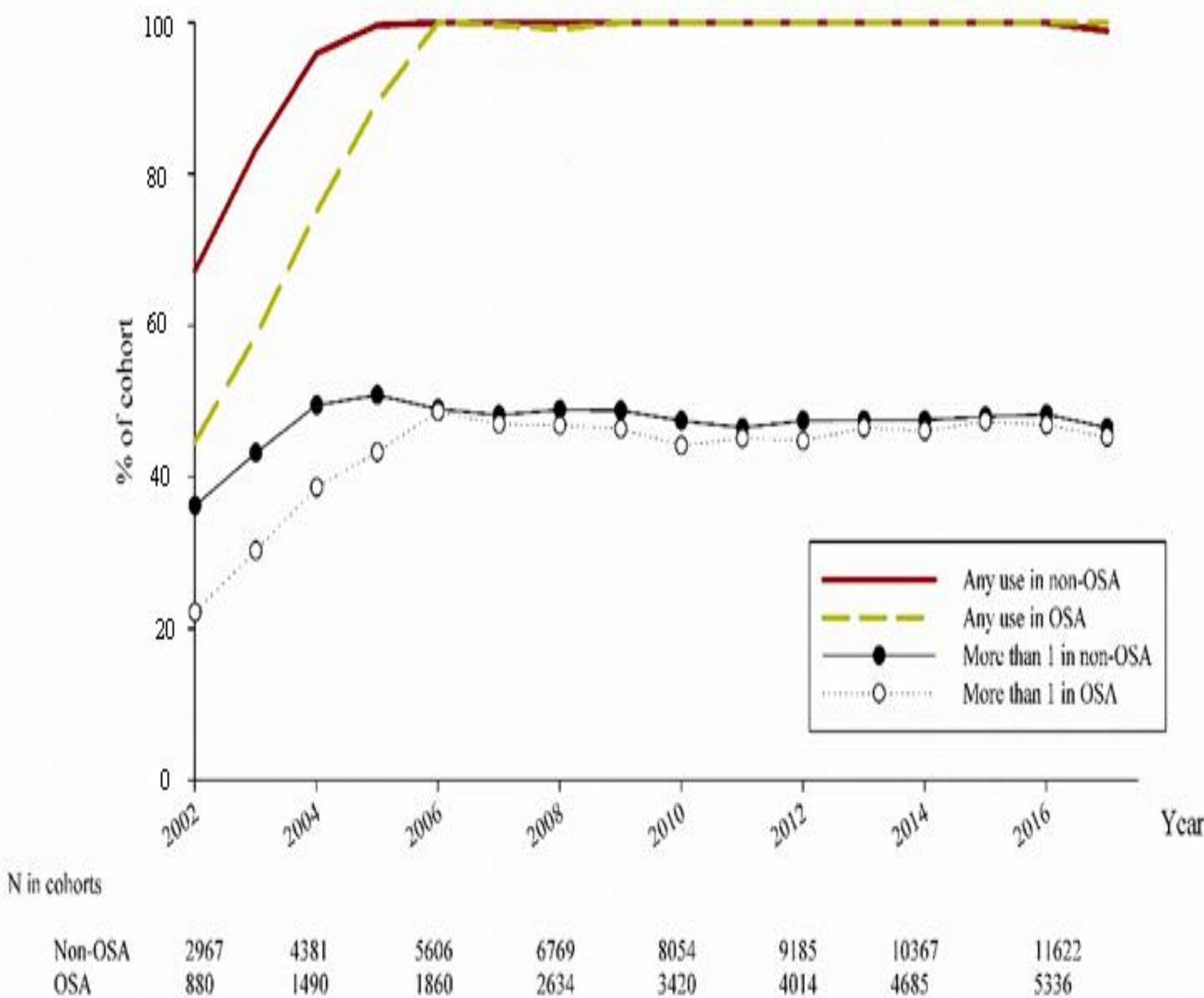


Figure 1. The number of anti-glaucomatous medications in every year between obstructive sleep apnea group and control group
N: number, OSA: obstructive sleep apnea

CONCLUSIONS

The current study illustrated that the percent of multiple anti-glaucomatous medications application, the incidence of glaucoma laser therapy, and the ratio of glaucoma-related surgeries are similar between the OSA and non-OSA groups after adjusting multiple potential risk factors including steroid. To our knowledge, few studies had surveyed this issue concerning glaucoma severity and concurrent OSA before. Although some studies proposed the glaucoma severity was associated with OSA, the little case numbers and the absent of categorizing glaucoma treatments limited the confidence of those researches. In conclusion, the pre-existing OSA did not increase the severity of subsequent glaucoma, regarding the numbers of medications and frequencies of surgeries.

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