

## Impact of sleep characteristics and obesity on diabetes and hypertension across genders and menopausal status: the Nagahama study

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### Abstract

#### Study Objectives

The individual prevalence of sleep-disordered breathing (SDB), short sleep duration, and obesity is high and increasing. The study aimed to investigate potential associations between SDB, objective sleep duration, obesity, diabetes and hypertension across genders, and the effect of pre- or post-menopausal status.

#### Methods

A cross-sectional study evaluated 7051 community participants with wrist actigraphy for a week, and nocturnal oximetry  $\geq 2$  nights. SDB was assessed by 3 per cent oxygen desaturation index (ODI) corrected for sleep duration obtained from wrist actigraphy. Moderate-to-severe SDB was defined as ODI3% levels  $\geq 15$  per hour.

#### Results

Both logODI3% and body mass index showed independent negative associations with sleep duration ( $\beta = -0.16, p < 0.001$  and  $\beta = -0.07, p < 0.001$ , respectively). Moderate-to-severe SDB (men/premenopausal women/postmenopausal women; 23.7/1.5/9.5%, respectively) was associated with a higher risk of diabetes in premenopausal women (OR 28.1; 95%CI 6.35–124.6;  $p < 0.001$ ) and postmenopausal women (OR 3.25; 95%CI 1.94–5.46;  $p < 0.001$ ), but not in men (OR 1.47; 95%CI 0.90–2.40;  $p = 0.119$ ). Moderate-to-severe SDB was associated with a higher risk of hypertension in men (OR 3.11; 95%CI 2.23–4.33;  $p < 0.001$ ), premenopausal women (OR 3.88; 95%CI 1.42–10.6;  $p = 0.008$ ), and postmenopausal women (OR 1.96; 95%CI 1.46–2.63;  $p < 0.001$ ). Short sleep duration was not associated with diabetes or hypertension. The associations of obesity with diabetes or hypertension were indirectly mediated by SDB (24.0% and 21.5%, respectively), with possible sex differences emerging (men/women; 15.3/27.8% and 27.0/16.9%, respectively).

#### Conclusions

Notwithstanding the cross-sectional design, SDB and obesity, but not short sleep duration, were independently associated with diabetes and hypertension, with gender and menopausal status-related differences in risk emerging.

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