In his insightful commentary (1) on our paper, which examined the relation between snoring and risk of type II diabetes mellitus (2), Dr. Kingman Strohl raised two interesting issues. The first concerns the role of sleep disorders, in the context of “Syndrome Z,” in the causation of diabetes and cardiovascular disease. The second concerns the opposite effects of alcohol consumption on incidence of type II diabetes and risk of snoring.

Substantial evidence indicates that sleep disorders, especially sleep apnea and habitual snoring, are associated with cardiovascular disease risk factors such as hypertension and with risk of cardiovascular disease (3). Thus, the term “Syndrome Z” has been used to describe the coexistence of sleep apnea with the typical characteristics of “Syndrome X,” such as hypertension, obesity, diabetes, and hyperlipidemia (4). Because lifestyle factors like obesity, smoking, and inactivity are important determinants of both cardiovascular disease risk and habitual snoring, it is of interest to know whether snoring predicts risk of diabetes or cardiovascular outcomes, independent of lifestyle factors.

In the Nurses’ Health Study, age-adjusted associations between self-reported snoring and risks of hypertension (5), myocardial infarction or stroke (6), and type II diabetes (2) were somewhat attenuated after adjustment for smoking, obesity, and exercise. One interpretation of these findings is the effects of habitual snoring are partly explained by lifestyle factors. However, in our current study the multivariate relative risks remained statistically significant even in analyses stratified according to levels of body mass index, which suggests that habitual snoring has independent associations with diabetes and cardiovascular disease, although we cannot rule out the possibility of residual confounding. On the other hand, the associations between body mass index and exercise and risk of diabetes did not change appreciably when snoring was added to the model (2). This suggests that the adverse effects of obesity and physical inactivity are not mainly mediated through sleep disorders. One obvious caveat of our study is that we did not measure sleep apnea directly, and heavy snoring is only a crude marker of sleep apnea in epidemiologic studies. Nevertheless, from a clinical and public health point of view, behavioral approaches that have clear beneficial effects on cardiovascular disease risk, including weight loss, smoking cessation, and increased physical activity, are also useful for the prevention and treatment of snoring (5). For diabetic patients with obstructive sleep apnea (7), medical treatment such as continuous positive airway pressure has been shown to improve insulin sensitivity.

Light-to-moderate alcohol consumption has been associated with improved insulin sensitivity (8) and a lower risk of type II diabetes (9). On the other hand, alcohol drinking, especially drinking prior to sleeping, has been associated with snoring because alcohol has a relaxant effect on dilator muscles of the upper airway (10). In the Nurses’ Health Study (5), women who consumed ≥15 g of alcohol per day were significantly more likely to snore than were nondrinkers after age, smoking, body mass index, and other covariates were accounted for, but lighter drinking was not associated with increased risk. It is conceivable that heavy drinking could increase risk of type II diabetes by adversely influencing snoring habits, in addition to its adverse effects on glucose metabolism (11).

Sleep-related disorders, including heavy snoring, are common and can have important health consequences. The available evidence suggests that sleep habits should be considered together with other lifestyle factors such as diet and exercise when investigating causes of and preventive strategies against major chronic diseases.

REFERENCES

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