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LETTER TO THE EDITOR

Comments on: "Sleep disturbances increase the risk of dementia: A systematic review and meta-analysis"

Dear Editor

We read an article written by Shi et al. [1] with interest. The authors performed a systematic review and meta-analysis of 18 longitudinal studies to determine whether sleep disturbances (including insomnia, sleep disordered breathing, and other sleep problems) increase the risk of dementia. The meta-analysis was done by computing overall relative risk (RR) of incident dementia. The main findings from this study showed that sleep disturbances might increase risk of all-cause dementia, Alzheimer's disease, and vascular dementia. Although all included studies had longitudinal design with an average 9.49 years of follow-up, there were issues with interpreting results when odds ratio (OR) and RR were treated equally and when there was high heterogeneity in the meta-analysis.

Odds ratio is commonly used as measures of association, especially when they are obtained from logistic regression model. OR may provide an approximation of the RR when disease prevalence or incidence are rare. Some experts suggest a prevalence or incidence of less than 10% as the cut-off point [2]. When disease prevalence is high, OR should be interpreted as the ratio of disease odds given exposure status because OR tends to overestimate RR. A study on a large sample of meta-analyses [3] showed that heterogeneity for OR and RR were similar when event rates were low, but were different considerably when event rates were high. The prevalence of dementia in two studies that reported OR in this meta-analysis [4,5] were 50% and 15.7%, respectively. Combining such studies with others that reported OR, but had low incidence of dementia might cause inconsistency between studies and difficulty in interpretation of pooled RR.

Caution should be used when interpreting results from a meta-analysis with high heterogeneity. A meta-analysis with considerable heterogeneity (I^2 = 75%–100%) means there is a high variability in the effect estimates that is more than just from a sampling error [6]. In this study, the meta-analysis of risk of all-cause dementia in insomnia and other sleep problems have I^2 of 84.8% and 75.3%, respectively. Combining studies with such high level of inconsistency might make the pooled results meaningless. Thus, investigation of heterogeneity should be explored prior to performing meta-analysis. Conducting subgroup analysis is one way to determine the causes of heterogeneity. One explanation of high heterogeneity in these meta-analyses was the combination of studies that reported hazard ratio (HR) with studies that reported OR. Subgroup analysis between studies that reported different effect estimates can be used to determine whether it explains heterogeneity.

In conclusion, selecting studies that reported different risk estimates and identifying and measuring heterogeneity are critical steps in meta-analysis. It might be difficult or unable to interpret results from meta-analysis with considerable heterogeneity.

Conflicts of interest

The authors do not have any conflicts of interest to disclose.

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