

## Letter

### Bias in the Methodology: Sleep Quality Is Related to Worsening Knee Pain in Those With Widespread Pain

To the Editor:

We read with great interest the article in *The Journal* entitled, "Sleep Quality Is Related to Worsening Knee Pain in Those with Widespread Pain: The Multicenter Osteoarthritis Study" by Dai, *et al*<sup>1</sup>. The authors reported the association between sleep quality and odds of developing knee pain, and how widespread pain modified this relationship. We highly appreciate the great efforts the authors did by using a prospective cohort while simultaneously considering the potential effect of body pain at other sites. However, there are some methodologies and interpretations in the study that need more clarification.

First, the questionnaires conducted at baseline may not be able to fully represent the sleeping quality of patients during the 2-year follow-up. Since there was no evidence illustrating that sleep quality would be consistently unchanged, questionnaires for the past 7 days before baseline would not be able to assess the sleep quality of the entire 2 years. Seven days seemed not to be long enough to represent the actual status, for instance, if a patient experienced bad sleep quality during the week of assessment, but had good sleep quality for the next 2 years. In this case, they could be misclassified into the "poor sleep quality" group, causing information bias. We suggest that sleep quality assessment should be investigated continually in the follow-up period, and the definition of categorization should be more detailed.

Second, we are worried about the pain-relieving treatments of patients, which might present as residual confounders in the study. Although the study has stated that the information of medication use was collected at the 60-month visit, only nonsteroidal antiinflammatory drugs were taken into account when it came to the adjustments of confounders in the statistical analysis. In general, medical treatments such as tramadol<sup>2</sup>, acetaminophen<sup>3,4</sup>, steroid joint injection<sup>4</sup>, and hyaluronic acid joint injection<sup>4,5</sup> are commonly used to treat knee pain clinically. However, they were not included in the adjustments of the Dai, *et al* study<sup>1</sup>, which may lead to confounding bias. We recommend these treatments should be considered as potential confounders and included in the multivariable adjustments.

Last but not the least, we had queries about the causality of sleep quality and knee pain. Did good sleep improve knee pain, or might it be possible that persons with better knee conditions tend to have better sleep quality? This study suggested that better sleep quality could have lower odds in developing worsening knee pain<sup>1</sup>. In a previous study, however, persons with knee pain tended to experience more sleep disturbance than others<sup>6</sup>. In the Dai, *et al* study<sup>1</sup>, the relationship between sleep quality and knee pain was

only statistically significant in the cross-sectional analysis, but not in the longitudinal one. Therefore, we wondered if the results would only represent a correlation rather than causality. More investigation and research are expected to verify the relationship.

Hence, we are convinced that a continual sleep quality assessment during the follow-up as well as the consideration of several pain-relieving treatments are essential to enhance credibility. Finally, advanced studies are recommended to prove the correlation or causality corresponding to the work of Dai, *et al*<sup>1</sup>.

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