Poor sleep may bolster genetic susceptibility to asthma, potentially doubling risk

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Poor quality sleep may bolster a person's genetic susceptibility to asthma, potentially doubling their risk of being diagnosed with the condition, suggests a large UK Biobank study, published in *BMJ Open*

Respiratory Research.

A healthy sleep pattern seems to be linked to a lower risk of asthma, prompting the researchers to suggest that spotting and treating sleep disorders early on might lessen the risks, irrespective of genetic predisposition.

People with asthma often report sleep disturbances, including broken/short sleep and insomnia. But it's not clear if sleep quality itself might influence asthma risk, or whether healthy sleep patterns might lessen this risk, say the researchers. In a bid to find out, they drew on 455,405 UK Biobank participants who were between 38 and 73 years old when enrolled between 2006 and 2010.

Participants were asked about their sleep patterns, based on five specific traits: early or late chronotype ("morning lark" or "night owl'); sleep duration; insomnia; snoring; and excessive daytime sleepiness. A healthy sleep pattern was defined as early chronotype; clocking up 7–9 hours of sleep every night; never or rare insomnia; no snoring; and no frequent daytime sleepiness.

Based on their responses, 73,223 people met the criteria for a healthy sleep pattern; 284,267 an intermediate sleep pattern; and 97,915 a poor sleep pattern.

The genetic make-up of all UK Biobank participants is routinely mapped, and a genetic asthma risk score for each of the 455,405 people in this study was drawn up according to the number of genetic variants associated with asthma in their genome.

Around 1 in 3 participants were classified as "high" genetic risk (150,429) and another third (151,970) as "intermediate" risk. The remainder were classified as "low" risk. Participants' respiratory health

was tracked up to the date of an asthma diagnosis, death, or until 31 March 2017, whichever came first.

During a monitoring period of just under 9 years, 17,836 people were diagnosed with asthma. They were more likely to have potentially influential risk factors than those who weren't diagnosed with the condition. These were lower levels of education and a greater likelihood of unhealthy sleep traits and patterns; obesity; higher genetic asthma risk scores; higher levels of smoking and drinking; high blood pressure, diabetes, depression, acid reflux; and greater exposure to air pollution.

Some 7,105 people at high genetic risk of asthma and 5,748 at intermediate genetic risk were diagnosed with the condition during the monitoring period. Compared with those at low genetic risk, those with the highest risk were 47% more likely to be diagnosed with asthma, while those with a poor sleep pattern were 55% more likely.

But people at high genetic risk who also reported poor sleep patterns were 122% more likely to be diagnosed with asthma than those with both a healthy sleep pattern and a low genetic risk—in other words, they were more than twice as likely to be diagnosed with asthma.

All five sleep traits were independently associated with lower risks for asthma, with never/rare insomnia and sleep duration of 7-9 hours a night seemingly the most influential, with risk reductions of 25% and 20%, respectively.

Further in-depth analysis on a smaller group of people indicated that a healthy sleep pattern might reduce the risk of asthma in those at high genetic risk by 37%, suggesting that a healthy sleep pattern might help offset asthma risk, regardless of genetic susceptibility, say the researchers.

In theory, at the population level, a low genetic risk combined with a healthy sleep pattern might translate into 19% fewer cases of asthma, suggest the researchers. The association between sleep and asthma may be two-way, they suggest, offering some possible explanations for their findings.

"The negative impact of sleep disorders on asthma, which is generally considered a chronic inflammatory disease, might be mediated by sleep-induced chronic inflammation. Previous studies have demonstrated that sleep disorders, such as unfavorable sleep duration and insomnia, are associated with chronic inflammation.

"In theory, the immune response to inflammation could generate pro-inflammatory cytokines that result in cellular infiltration and airway inflammation, further increasing the risk of asthma," they write.

This is an observational study, and as such can't establish cause, and the researchers acknowledge several limitations to their findings. As the UK Biobank only provided information on 38–73 year-olds, the effect on children and younger adults is still unclear, added to which the findings apply only to people of European ancestry. Lastly, the UK Biobank may be subject to a "healthy volunteer" selection bias.

Nevertheless, the researchers conclude, "Considering that poor sleep combined with high genetic susceptibility yielded a greater than twofold asthma risk, sleep patterns could be recommended as an effective lifestyle intervention to prevent future asthma, especially for individuals with high-risk genetics."

More information: Highlighting the importance of healthy sleep patterns in the risk of adult asthma under the combined effects of genetic susceptibility: a large-scale prospective cohort study of 455405 participants, *BMJ Open Respiratory Research* (2023). DOI:

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