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Disease Trajectories in Relation to Poor Sleep Health in the UK Biobank

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Abstract : Background: Insufficient sleep has been focused on as a public health epidemic. However, a comprehensive analysis of disease trajectory associated with unhealthy sleep habits is still unclear currently. Objective: This study sought to comprehensively clarify the disease's trajectory in relation to the overall poor sleep pattern and unhealthy sleep behaviors separately. Methods: 410,682 participants with available information on sleep behaviors were collected from the UK Biobank at the baseline visit (2006-2010). These participants were classified as having high- and low risk of each sleep behavior and were followed from 2006 to 2020 to identify the increased risks of diseases. We used Cox regression to estimate the associations of high-risk sleep behaviors with the elevated risks of diseases, and further established diseases trajectory using significant diseases. The low-risk unhealthy sleep behaviors were defined as the reference. Thereafter, we also examined the trajectory of diseases linked with the overall poor sleep pattern by combining all of these unhealthy sleep behaviors. To visualize the disease's trajectory, network analysis was used for presenting these trajectories. Results: During a median follow-up of 12.2 years, we noted 12 medical conditions in relation to unhealthy sleep behaviors and the overall poor sleep pattern among 410,682 participants with a median age of 58.0 years. The majority of participants had unhealthy sleep behaviors; in particular, 75.62% with frequent sleeplessness, and 72.12% had abnormal sleep durations. Besides, a total of 16,032 individuals with an overall poor sleep pattern were identified. In general, three major disease clusters were associated with overall poor sleep status and unhealthy sleep behaviors according to the disease trajectory and network analysis, mainly in the digestive, musculoskeletal and connective tissue, and cardiometabolic systems. Of note, two circularity disease pairs (I25→I20 and I48→I50) showed the highest risks following these unhealthy sleep habits. Additionally, significant differences in disease trajectories were observed in relation to sex and sleep medication among individuals with poor sleep status. Conclusions: We identified the major disease clusters and high-risk diseases following participants with overall poor sleep health and unhealthy sleep behaviors, respectively. It may suggest the need to investigate the potential interventions targeting these key pathways.

Keywords : sleep, poor sleep, unhealthy sleep behaviors, disease trajectory, UK Biobank
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