

Title : The Association between Sleep Quality, Emotional Stress, and PM_{2.5} Exposure among Residents in Taipei Metropolitan Area

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Introduction : Air pollution may lead to sleep disorders, but whether it affects the sleep quality in the early stages is still unclear. Sleep quality is often influenced by personal stress or emotions. Therefore, this study aims to explore the relationship between sleep quality, emotional stress, and PM_{2.5} exposure.

Methodology : We recruited study subjects without major illnesses and conducted questionnaire in outpatient of family medicine in Taipei City Hospital from 2022 to 2023. We applied the Pittsburgh Sleep Quality Index and Depression Anxiety Stress Scales 21 on study subjects. The daily average PM_{2.5} concentration over the past one year for each study subject was estimated by local monitoring data and modelling. The Wilcoxon signed-rank test was used to analyze the associations between sleep quality, stress, anxiety, or depression. Furthermore, it was used to compare the differences on PM_{2.5} exposure between the study subjects with normal or bad sleep quality, stress, anxiety, or depression.

Result : Study subjects with bad sleep quality showed significantly higher scores in stress, depression, and anxiety when compared to normal ones. Then, subjects with bad sleep quality had significantly higher daily average PM_{2.5} exposure in past one year. After excluding subjects with bad stress, depression, and anxiety, the association between sleep quality and PM_{2.5} exposure still existed. In addition to stratified by age, subjects aged above or below 65 were both found that those with bad sleep quality were exposed to significantly higher PM_{2.5} concentrations when compared to normal ones.

Conclusion : After controlling for emotional stress and other influencing factors, this study observed that exposure to PM_{2.5} in different age groups has the possibility of affecting sleep quality in big city.

Contribution : This study provides evidence of the impact of air pollution on sleep quality, and longer-term causal relationships can be further explored.

Keywords: Sleep quality, PM_{2.5}, emotional stress, air pollution, Taipei metropolitan area