

Effects of PM_{2.5} on Emergency Room Visits for Cardiovascular and Respiratory Diseases in Central Taiwan



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Abbreviations: CVD: Cardiovascular Diseases; RDs: Respiratory Diseases; EPA: Environmental Protection Administration; GAM: Generalized Additive Model

Background and Objective

PM_{2.5} is one of the hazardous pollutants in air, its chemical composition is complex, which causes adverse effects on cardiovascular diseases (CVD) and respiratory diseases (RDs) due to climate change and human activities. Therefore, the aim is to assess the PM_{2.5} concentrations affects emergency room visits of CVDs and RDs.

Materials and Methods

Air pollutant's data selected from the air quality monitoring station of Environmental Protection Administration (EPA) in central Taiwan during the period of 2006 to 2008. Registry of CVDs and RDs emergency room visits collected from the 2006 to 2008 of the National Health Insurance database. Unidirectional retrospective case-crossover and Time-series, which were performed by Conditional logistic regression and Poisson Generalized Additive Model (GAM), respectively, were designed to estimate the effects of PM_{2.5} with emergency room visits for CVDs and RDs in central Taiwan.

Results

A 10 $\mu\text{g}/\text{m}^3$ increase in PM_{2.5} significantly associated with increase in 3.9% risk (95%CI: 0.8%-7.1%) for RDs (Lag0) in

emergency room visits. Significant effects were observed with PM_{2.5} among people with fewer than 65 years of age. During dust storm periods, a 10 $\mu\text{g}/\text{m}^3$ increase in PM_{2.5} was associated with increase risks of 138.4% (95%CI: 12.8%-403.7%) for CVDs (Lag0) and 61.9% (95%CI: 16.9%-124.3%) for RDs (Lag0) in emergency room visits. Adjusted NO₂ and SO₂, PM_{2.5} levels in urban area on the effects of emergency room visits were significant higher than rural area. A 10 $\mu\text{g}/\text{m}^3$ increase in PM_{2.5} was associated with increase of 7.5% (95% CI: 3.0%-12.3%) for RDs (Lag0). A 10 $\mu\text{g}/\text{m}^3$ increase in PM_{2.5} was associated with increased risk of 17.3% (95% CI: 4.2%-32.1%) for CVDs in emergency room visits among women (Lag2).

Conclusion

PM_{2.5} levels were more significant on RDs than CVDs in urban and in industrial area. However, high PM_{2.5} levels during dust storm periods had significant effects on CVDs than RDs. Stronger effects of PM_{2.5} on RDs and CVDs among women. Therefore, women with fewer than 65 years of age should not expose to PM_{2.5}, especially during dust storm.



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