

Effect of ambient fine particles, extreme temperatures and the interactions on preterm birth

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Background/Aim

To quantitatively evaluate the effect of fine particles (PM_{2.5}) in Beijing Tongzhou District on preterm birth and to explore the interactive effect between PM_{2.5} and extreme temperatures on preterm birth.

Methods

We collected birth records of 13 hospitals, air pollutant and meteorological data from January 1, 2013 to December 31, 2015 in Tongzhou District, Beijing. Extended Cox proportional hazard regression models with time-dependent covariates were performed to assess the effects of PM_{2.5} and ambient extreme temperatures and their interactive effect on preterm birth.

Results

PM_{2.5} was significantly associated with preterm birth. For every 10µg/m³ increase in PM_{2.5} mass concentration, the OR value was 1.0043 (95%CI: 1.0002,1.0084). Extreme low temperatures were significantly associated with preterm birth. With a 1.0°C decrease in extreme low temperature, OR value was 1.3163 (95%CI: 1.1713, 1.4792). The protective effect of extreme high temperatures on preterm birth was statistically significant. With a 1.0°C increase in extreme high temperature, OR value was 0.8710 (95%CI: 0.8182, 0.9271). There were significant interactive effects between ambient PM_{2.5} and extreme temperatures on preterm birth (p<0.05).

Conclusions

Ambient PM_{2.5} exposure during pregnancy was significantly associated with preterm birth in Tongzhou District, Beijing. Extreme low temperatures also had a significant positive correlation with preterm birth. There are significant interactive effects between ambient PM_{2.5} and extreme temperatures on preterm birth. This study will provide some methodological support, and may also shed a new light on preventing the birth-related hazards of PM_{2.5} and extreme temperatures exposure.