URBAN AIR POLLUTION AND IVF OUTCOMES: A RETROSPECTIVE STUDY

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Background

There is growing data to support an adverse relationship between air pollution and fertility. Many studies have shown that traffic-related air pollution, the most common source of urban air pollution in North America, has a negative effect on both spontaneous and IVF pregnancy outcomes [1].

Objective

This objective of this study was to explore urban air pollution exposure and IVF outcomes.

Materials and Method

The study was a single-center retrospective study of autologous IVF outcomes from fresh and frozen embryo transfer cycles between 2005-2021. Air pollution data for fine particulate matter ($PM_{2.5}$) and nitrogen dioxide (NO_2) were obtained from The Canadian Urban Environmental Health Research Consortium (CANUE). The data were illustrated using bivariate maps of long-term air pollutant exposure ($PM_{2.5}$ and NO_2) and IVF clinical outcomes by 5 km^2 urban areas. Clinical outcomes were regressed against air pollution exposure using logistic, Poisson, and negative binomial regression models. Clinical outcomes included 1) pregnancy outcome (logistic); 2) number of stimulation days (Poisson); 3) number of oocytes retrieved (negative binomial); 4) number of mature oocytes (negative binomial); 5) failure to reach egg retrieval (logistic); and 6) failure to reach embryo transfer (logistic).

Results

Analysis of the data includes 1,765 fresh embryo transfers (ET) and 1,535 frozen ETs. Long-term air pollution within patients' household area ranged from 4.8 to 12.6 $\mu g/m^3$ for $PM_{2.5}$ and 3.2 to 28 ppb for NO_2. There was a negative association between pregnancy rate and NO_2 exposure; odds ratio for a 10 ppb increase in NO_2 was 0.76 (95% CI: 0.60-0.97). A suggestive positive association between increased failure to reach embryo transfer and NO_2 exposure occurred; odds ratio for a 10 ppb increase in NO_2 was 1.4 (95% CI: 0.97-2.01). No other associations were present.

Conclusion

Nitrogen dioxide has demonstrated negative associations to some IVF outcomes, which agrees with other international studies. Only spatial variation has been examined, next we will confirm temporal exposures during the IVF cycle (e.g. 85 days prior to retrieval, ovarian stimulation, egg retrieval to ET, ET to pregnancy test, etc). Understanding of the impact of urban air pollution on IVF outcomes warrants further research on interventions to ameliorate negative fertility outcomes and support policy change to improve air quality in the future.

Support

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References:

1. Thampy et al., Association between traffic-related pollution exposure and fertility-assisted births. Envir Res Health, 2023: **1**(2): p. 1-9.