

Influence of atmospheric parameters and pollutants on control of breathing in healthy neonates

Sylvie Besson¹, Philipp Latzin, MD^{1,2}, Georgette Stern, MSc¹, Marie-Pierre F. Strippoli, MSc², Claudia E. Kuehni, MD, MSc², Martin Rössli, PhD², Urs Frey MD, PhD¹

¹ Division of Paediatric Respiratory Medicine, Department of Paediatrics, Inselspital and University of Bern, Switzerland

² Institute of Social and Preventive Medicine (ISPM), University of Bern, Switzerland

Abstract

Exposure to air pollution increases the risk of Sudden Infant Death Syndrome (SIDS) and thus potentially influences control of breathing. This raises the question whether or not tidal breathing parameters related to control of breathing are influenced by atmospheric conditions and air pollution on the day of measurement.

In a prospective birth cohort study of 175 healthy term infants, we measured tidal breathing parameters including tidal volume (V_T), respiratory rate (RR), minute ventilation (Min.vent.), inspiratory time to total breath time (T_I/T_{tot}), ratio of time to peak tidal expiratory flow to expiratory time (T_{PTEF}/T_E), and peak tidal inspiratory flow (PTIF) at the age of 4-5 weeks. We then assessed the association of these tidal breathing parameters with postnatal environmental tobacco smoke exposure (ETS) and local atmospheric parameters as air temperature and humidity and pollution levels, id est nitrogen dioxide (NO_2), ozone (O_3), and PM_{10} on the DOM using multiple linear regression analysis, adjusting for anthropometric data.

We found no consistent evidence for an association between atmospheric parameters, outside temperature and humidity and tidal breathing parameters, when adjusting for multiple testing. Anthropometric data (postconceptional age, length and sex) were associated with control of breathing, but not urban pollutant levels and ETS on the measurement day.

Tidal breathing parameters, which are normally used to determine the maturational state of breathing control in infants, are influenced by anthropometric parameters. The acute effects of outside temperature and humidity, postnatal ETS, and outdoor air pollution levels on the DOM on control of breathing were negligible in our study of healthy term-born infants.