TACSM Abstract

Seven Day E-cigarette Vapor Exposure Does Not Modify Ventilation Patterns in Long-Evans Rats

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ABSTRACT

Electronic nicotine delivery systems or e-cigarettes are devices used to deliver aerosolized liquids often containing nicotine and other chemicals. These devices were originally created as a way to assist with smoking cessation in adults; however, use of these devices is increasing in adolescent and young adult populations. The long and short term effects of vaping are still under active investigation. **PURPOSE:** The purpose of this study was to investigate the effects of 7 days of e-cigarette vapor exposure in adult rats on lung function and lung tissue inflammatory cytokine expression, specifically IL-1α. **METHODS:** Using random assignment, 10 adult male long-evans rats were assigned to vape (experimental) or air (control) groups. The animals were exposed to either air (n = 4) or 5% nicotine vapor (n=6) using a whole-body exposure chamber, twice a day for ten minutes for seven consecutive days. Ventilation recordings were completed on day 0 (before exposure) and day 8 (after exposure) using unrestrained whole-body plethysmography. Minute ventilation, tidal volume, and breathing frequency were assessed. Blood was collected on day 8 to look for the presence of cotinine (a nicotine metabolite). Whole lung tissue was also collected on day 8 for inflammatory cytokine assay, IL-1α ELISA. **RESULTS:** Cotinine was found to be present in the serum samples of the vape groups (86.6 ng/ml +/- 1.0 ng/mL) but not the air groups (0.0 ng/mL) confirming drug exposure. Baseline ventilation data collected on day 0 and post-exposure ventilation data collected on day 8 were compared between air and vape groups across three different parameters: minute ventilation, frequency, and tidal volume. These parameters were compared resulting in three distinct two-way ANOVAs comparing the variables time and treatment. No significant difference was found among any of the comparisons ($p > 0.05$ for all). Similarly, no difference in lung inflammatory cytokine IL-1α was observed in the lung tissue of the air (85.6 pg/mL +/- 10.2 pg/mL) or vape (82.7 pg/mL +/- 14.9 pg/mL) exposure groups ($p > 0.05$, t-test). **CONCLUSIONS:** In this study, 7 days of e-cigarette vapor exposure did not affect ventilation parameters or increase the presence of inflammatory cytokine, IL-1α, in whole lung tissue. Limitations to this study include a small sample size (n = 10) and unreliable negative-pressure which were used to produce the vapor for the e-cigarette exposure. Future studies will modify the vape exposure system and include a larger sample size.