

## EFFECTS OF ETS AND OTHER INDOOR HOUSEHOLD EXPOSURES ON THE UPPER RESPIRATORY HEALTH OF INFANTS

J Biagini, G LeMasters, L Levin, T Reponen, J Lockey and P Ryan. University of Cincinnati, Cincinnati, OH 45267

### UPDATED ABSTRACT

**Introduction:** Many studies have found associations between environmental tobacco smoke (ETS) and indoor exposures such as mold and childhood asthma, but studies on combined indoor exposures on children's upper respiratory symptoms (URS) and upper respiratory infections (URI) are few. This study examined infants' risk for developing URS or URI in relation to mold, ETS and pet exposures.

**Methods:** Eligible infants (n=633) were identified by birth records and had one parent that was atop by positive skin prick test (SPT). Exposure information was collected at the time of parent SPT. All infants were under 18 months of age. Parents were asked to complete monthly diaries related to their infants' URS and URI.

**Results:** When controlling for race, gender and socioeconomic status, multivariate logistic regression showed an increased risk of sinus infections with exposure to >20 cigarettes/day (OR 3.77 (95% CI 1.91 - 7.44)), while a decreased risk was observed with dog exposure (OR 0.48 (0.25 - 0.96)). An increased risk of ear infections was observed with daycare attendance (OR 2.85 (1.72 - 4.08)) and ≥2 siblings (OR 1.49 (1.01 - 2.12)). An increased risk of rhinitis was observed with mold exposure (OR 1.35 (1.00 - 1.82)), ≥20 cigarettes per day (OR 1.72 (1.10 - 2.68)) and daycare attendance (OR 2.57 (1.67 - 3.96)). An increased risk of allergic rhinitis was observed with mold exposure (OR 2.13 (1.03-4.42)), while a decreased risk was observed with sibling (OR 0.51 (0.27 - 0.99)) and ≥2 siblings (OR 0.19 (0.06 - 0.60)).

**Conclusions:** This analysis suggests that mold is a risk factor of rhinitis and allergic rhinitis, while ETS is a risk factor of sinus infections and allergic rhinitis. Daycare attendance increases the risk of ear infections and rhinitis. Exposure to dog decreases the risk of sinus infections. Siblings increase the risk of ear infections, while having a protective effect for allergic rhinitis, supporting the 'sibling effect.'

### METHODS

#### Subject Eligibility.

- Located in the Greater Cincinnati/Northern Kentucky area.
- Gestation ≥35 weeks.
- At least one parent SPT positive.

#### Subject Recruitment.

- Subjects identified from birth records.
- Recruitment from February 2002-November 2003.

#### Data Collection.

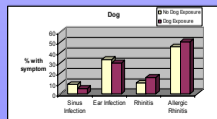
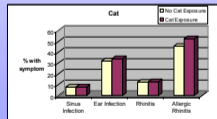
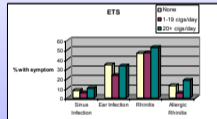
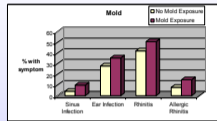
- Questionnaire at parent SPT
- exposures such as ETS, cats, dogs, siblings and daycare attendance.
- In-home mold/water damage evaluation.
- Monthly Diaries
  - oRespiratory health including sinus and ear infections and rhinitis symptoms.
- Infant SPT at ~12 months of age.

#### Statistical Analysis.

- Associations among ETS, mold, cat, dog, sibling and daycare exposures with four upper respiratory symptom outcomes, controlling for gender, race and SES. SAS PROC logistic used with the Pearson scale to correct for overdispersion, specifying backward selection with a p-value of 0.20.
- Sinus infections, Ear Infections and Rhinitis
  - oControl for number of monthly diaries returned utilizing the events/rails syntax.
- Allergic Rhinitis
  - oControl for number of monthly diaries by entering as a covariate.



Graphs 1-4: Percentage of Infants with Symptom by Exposure.



### RESULTS

Table 1: Unadjusted Associations of Symptoms with Exposure.

Symptom	Sinus Infections		Ear Infections		Rhinitis		Allergic Rhinitis	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Mold	1.35	1.00-1.82	1.31	0.99-1.73	2.57	1.67-3.96	2.13	1.03-4.42
ETS								
None (Ref)								
1-19 cigarettes/day	1.69	1.07-2.68	1.72	1.10-2.68	1.72	1.10-2.68	1.72	1.10-2.68
≥20 cigarettes/day	3.77	2.17-7.44	3.77	2.17-7.44	3.77	2.17-7.44	3.77	2.17-7.44
Cat Ownership	1.0 <sup>†</sup>		1.0 <sup>†</sup>		1.0 <sup>†</sup>		1.0 <sup>†</sup>	
Dog Ownership	0.48	0.25-0.96	0.48	0.25-0.96	0.48	0.25-0.96	0.48	0.25-0.96
Siblings								
None (Ref)								
1	1.27	0.71-2.23	1.04	0.79-1.37	0.89	0.72-1.11	0.97	0.80-1.17
2+	1.75	0.89-3.45	1.39	1.00-1.93	0.88	0.61-1.27	0.82	0.58-1.16
Daycare Attendance	1.80	0.87-3.70	2.86	1.73-4.90	2.86	1.67-4.85	0.89	0.37-2.07
Gender	0.83	0.60-1.17	1.14	0.89-1.45	1.08	0.89-1.32	1.41	0.77-2.60
Race	1.41	0.87-2.28	1.22	0.89-1.68	0.76	0.59-0.98	1.08	0.81-1.43
Other Exposures	1.68	1.17-2.42	1.20	0.87-1.72	1.09	0.97-1.23	1.84	0.78-4.48

Table 2: Adjusted Estimates of OR's and 95% CI's from Logistic Regression models for Indoor Exposures Related to Symptoms

Symptom	Sinus Infections		Ear Infections		Rhinitis		Allergic Rhinitis	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Mold	1.3	0.92-1.89	1.31	1.00-1.72	2.53	1.63-4.42	2.13	1.03-4.42
ETS								
None (Ref)								
1-19 cigarettes/day	1.69	1.04-2.69	1.69	1.04-2.69	1.69	1.04-2.69	1.69	1.04-2.69
≥20 cigarettes/day	3.77	2.17-7.44	3.77	2.17-7.44	3.77	2.17-7.44	3.77	2.17-7.44
Cat Ownership	1.0 <sup>†</sup>		1.0 <sup>†</sup>		1.0 <sup>†</sup>		1.0 <sup>†</sup>	
Dog Ownership	0.48	0.25-0.96	0.75	0.54-1.02	1.29	0.97-1.73	0.82	0.67-1.02
Siblings								
None (Ref)								
1	1.24	0.71-2.13	1.05	0.79-1.41	0.89	0.67-1.17	0.81	0.67-0.99
2+	1.91	0.94-3.89	1.49	1.01-2.12	0.71	0.48-1.05	0.99	0.66-1.49
Daycare Attendance	1.83	0.83-4.05	2.85	1.73-4.68	2.87	1.67-5.06	0.89	0.66-1.19

<sup>†</sup>Not significant in the model at the 0.20 level.

### LIMITATIONS

- Exposures are self reported.
- Potential non-response bias (monthly diaries returned).

### CONCLUSIONS

- Mold exposure increases the risk of rhinitis and allergic rhinitis.
- Exposure to ≥20 cigs/day increases the risk of sinus infections and rhinitis.
- Exposure to dog decreases the risk of sinus infections. No effect was observed with cat.
- Having ≥2 siblings increases the risk of ear infections, but decreases the risk of allergic rhinitis, supporting the 'sibling effect.'

### BACKGROUND

#### Mold and URS

- Many studies on adult URS and mold exposure found associations with nasal congestion, runny nose, rhinitis, allergic rhinitis and dry or sore throat.
- Studies in school-aged children have found associations with rhinitis, sinusitis, sore throat and colds.
- Studies have not included infants < 18 months of age.

#### ETS and URS

- ETS is a known risk factor of lower respiratory illness.
- Many studies report adverse effects from ETS on respiratory health, but do not stratify into upper and lower.
- Studies on school-aged children have found associations with sinus infection, cough and ear infection.

#### Pets and URS

- Effects of pet exposure in the literature is contradictory.
- Pet exposure has been associated with colds and ear infections in some studies, while having a protective effect for asthma and allergic sensitization in others.

### OUTCOME AND EXPOSURE DEFINITIONS

#### Outcome Definitions:

- Sinus infections, Ear infections and Rhinitis: 2 times parent reports symptom
- # monthly diaries is returned

- Allergic Rhinitis: parental report of one or more episode of rhinitis and a positive SPT

#### Exposure Definitions:

- ETS: sum of # of cigarettes each smoker reports.
  - oNone, 1-19 cigs/day, 20+ cigs/day
- Mold: Parental report on mold in any room excluding bathroom and basement on monthly diaries, yes/no
- Siblings: None, 1, 2+
- Cat ownership: yes/no
- Dog ownership: yes/no
- Daycare Attendance: parent report; yes/no

