

Update and Preliminary Analyses of Predictors of Cord-blood IgE Positivity among Neonates, Belgium, Romania, and the Slovak Republic, 2003 – 2005

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Background

In various studies, elevated cord-blood IgE is a predictor for allergic disease, including ...

- Urticaria (food allergens at 12 months of age)
- Sensitisation (respiratory allergens at 4 – 10 years of age)
- Asthma (at 10 years of age)

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Objective

To determine the distribution and determinates of predictors of cord-blood IgE positivity among neonates, who will then be followed prospectively for the development of allergic diseases

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Null Hypothesis

Demographic, socio-economic, clinical, environmental, and behavioral factors and allergic disease status in first-degree relatives of pregnant women do not affect the concentration of cord-blood immunoglobulin E

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Definitions

Cord-blood IgE positivity = IgE concentration > 0.35 OD units (using Pharmacia Immuncap LLIgE)

Atopic diseases = Allergic conditions associated with the production of allergen-specific immunoglobulin E (IgE) antibodies, including hay fever, atopic eczema, and asthma

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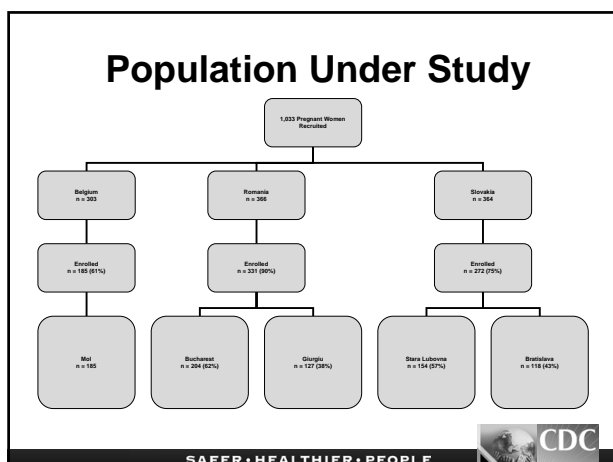


Methods

- Design: Cross-sectional
- Population under study: Pregnant women recruited, enrolled, and interviewed in hospitals of Belgium, Romania, and the Slovak Republic
- Predictors: Demographic, socio-economic, clinical, environmental, behavioral and family factors ascertained through maternal interviews
- Outcome: Total cord-blood IgE level
- Data analyses: Stratified and multivariate logistic regression

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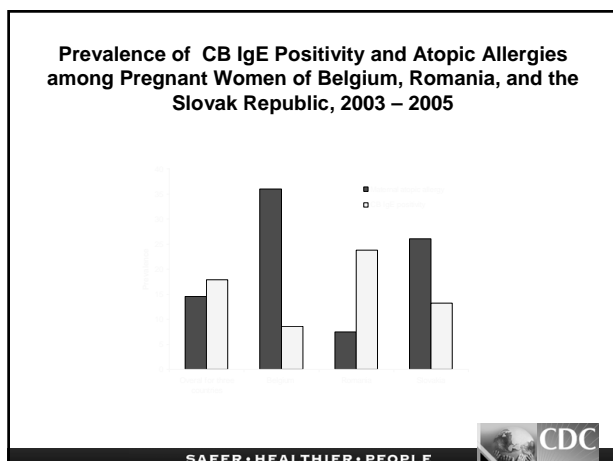




- ### Exclusion Criteria
- Mothers with ...
- Chronic autoimmune diseases
 - Gestational diabetes
 - Pregnancy induced hypertension/pre-eclampsia
 - Poly- or oligohydramnios
 - Tocolytics, corticosteroids, general anaesthesia or insulin during last three weeks of pregnancy or during delivery
- Neonates with ...
- < 37 weeks gestational age or < 2500 grams birth weight
 - Severe postnatal complications
 - Congenital malformations
 - Congenital or severe perinatal infections
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- ### Data Management and Analyses
- Data were cleaned and closed
 - Final data set was established
 - Questionnaire data concatenated and merged with laboratory data
 - Data analyses performed
 - Univariate (EpiInfo)
 - Stratified analysis (SAS)
 - Multivariate logistic regression to calculate adjusted odds ratios (SAS)
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- ### Multivariate Logistic Regression
- Steps to obtain logistic model included ...
- Hierarchical backward elimination
 - Assessment of collinearity
 - Assessment of interaction
 - Control for confounding
 - Assessment of trend
 - Calculation of Hosmer-Lemeshow goodness-of-fit statistic
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Distribution of Predictors, by Cord-blood IgE Level, Belgium, Romania, and the Slovak Republic, 2003 – 2005

Predictor	Cord-blood IgE Negative		Cord-blood IgE Positive		p-value
	N	(%)	N	(%)	
Maternal education level					
Secondary	301	(74.3)	84	(64.1)	< 0.01
University	93	(23)	46	(35.1)	
Residence during pregnancy					
City	193	(47.7)	93	(71)	< 0.01
Suburban	11	(2.7)	3	(2.3)	
Rural, non-farm	18	(4.4)	1	(0.8)	
Farm	1	(0.2)	-	-	
Village	179	(44.1)	34	(25.9)	

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Distribution of Predictors, by Cord-blood IgE Level, Belgium, Romania, and the Slovak Republic, 2003 – 2005

Predictor	Cord-blood IgE Negative		Cord-blood IgE Positive		p-value
	N	(%)	N	(%)	
Animal ownership					
Own pet (dog, rabbit, hamster, bird)	176	(43.5)	45	(34.3)	N/S
Own cat	65	(16.3)	27	(20.6)	0.04
Keep animal inside	72	(17.8)	21	(16)	N/S
Own livestock	129	(31.9)	27	(20.6)	0.01
Smoking status					
Mother smoked before pregnancy	160	(39.5)	63	(48.1)	< 0.01
Mother smoked during pregnancy	47	(11.6)	30	(22.9)	N/S
Father (or others) smoked at home	164	(40.5)	75	(57.2)	< 0.01

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Distribution of Predictors, by Cord-blood IgE Level, Belgium, Romania, and the Slovak Republic, 2003 – 2005

Predictor	Cord-blood IgE Negative		Cord-blood IgE Positive		p-value
	N	(%)	N	(%)	
Allergic Status					
Maternal atopic diseases	93	23	23	17.6	N/S
Maternal food, drug, or insect allergy	123	30.4	37	28.2	N/S
Paternal atopic diseases	51	12.6	15	11.5	N/S
Paternal food, drug, or insect allergy	47	11.6	13	9.9	N/S
Siblings with atopic diseases	23	5.7	9	6.8	0.02
Siblings with food, drug, or insect allergy	33	8.1	6	4.6	N/S

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Determinants of Cord-blood IgE Positivity, Belgium, Romania, and the Slovak Republic, 2003 – 2005

Predictor	crude odds ratio	(95% CI)	adjusted odds ratio	(95% CI)
Live in city	3.33	(2.04,5.4)	2.57	(1.07,6.18)
Live in flat	1.88	(1.26,2.81)	N/S	
Live near heavy traffic	1.6	(1.05,2.42)	N/S	
Live near agricultural field	0.52	(0.34,0.8)	N/S	
Exposure to agricultural chemicals	0.32	(0.16,0.77)	N/S	
Own cat	1.75	(1.03,2.95)	N/S	
Own livestock	0.56	(0.35,0.89)	N/S	
Mother smoked during pregnancy	2.27	(1.24,4.16)	N/S	
Father (or other) smoked at home	1.95	(1.3,2.91)	2.44	(1.25,4.77)
Maternal university education	1.82	(1.19,2.79)	2.58	(1.03,6.5)

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Summary

- The prevalence of cord-blood IgE positivity among neonates whose mothers resided in the city during pregnancy was more than two times greater (32.5%) than those whose mothers resided in a village (16%).
- The prevalence of cord-blood IgE positivity among neonates whose mothers resided in suburban areas was 21.4%.

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Summary (continued)

- The prevalence of cord blood IgE positivity among neonates whose mothers smoked during pregnancy was 39%.
- The prevalence of cord-blood IgE positivity among neonates whose mothers smoked before pregnancy was 28.3%.
- The prevalence of cord-blood IgE positivity among neonates whose mothers were exposed to secondary tobacco smoke was 31.4%.

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Conclusions

After adjusting for confounding, the following exposure variables were significantly associated with CB-IgE positivity:

- Maternal residence in a city during pregnancy;
- High maternal education level (university or higher);
- *In utero* exposure to tobacco smoke.

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Limitations

- Possible selection bias because of variable enrollment among pregnant women recruited
- A large number of missing variables
- Possible misclassification bias (with respect to predictors) because of self-reporting
 - Non-differential type → type II error
 - Differential type → systematic bias



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Future Analyses

- Determine the distribution and determinates of predictors of clinical (*atopic eczema*) manifestations of allergic disease among the birth cohort
- Model the relationship of cord-blood IgE positivity and laboratory and clinical manifestations of allergic disease among the birth cohort
- Examine the association between placental contamination and laboratory and clinical manifestations of allergic disease among the birth cohort



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Acknowledgment P5 Team

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