

Rural Malagasy children: High prevalence of wheezing and atopy

Wolff PT¹, Götschke M², Rakotozanany A³, Robinson A³, Wolff LK⁴, von Mutius E⁵, Illi S⁵

¹ Pediatric Allergy and Pneumology Practice, Pfullendorf, Germany, ² Ludwig-Maximilians-University, Munich, Germany, ³ Department of Child Health, Centre Hospitalier Universitaire Mère Enfant Tsaralalana, Antananarivo, Madagascar, ⁴ Krankenhaus Salem, Heidelberg, Germany, ⁵ Helmholtz Zentrum München, Neuherberg, Germany



Background

- Knowledge of atopic diseases in Africa is limited
- For half (25/49) of the Sub-Saharan African (SSA) countries including Madagascar, no data is available regarding the impact of allergies.

Aim

- To assess the prevalence of asthma and the association with atopy in children in a rural province of Madagascar

Methods

- Malagasy Kids with Asthma and Allergy (MAKI)-Study
- March – May 2013 in Fihaonana, 80 km N Antananarivo
- Cross-sectional study in 8 villages in the rural highlands – a region with poor infrastructure and mostly farming (crop and livestock) as income source
- N = 212 children, 8 – 15 years
- Spirometry with BDR in most of the children
- Skin prick tests, defined as wheal size ≥ 3 mm
- Modified ISAAC questionnaire
- Univariate and multivariate stepwise logistic regression models to predict the odds of wheezing



Results

Atopy and wheeze

- Wheeze ever was reported in 76 children (36.0%) and current wheeze in 59 children (28.2%).
- Inhalant sensitization was observed in 27.0%, with cockroach showing the highest prevalence (20.8%) followed by D.pt. (4.3%).
- Current symptoms of rhinoconjunctivitis and of eczema were reported by 34.0% and 5.3% of the children, respectively.

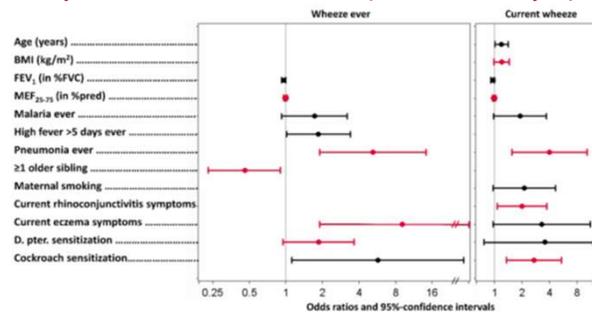
Lifestyle factors

- No lifestyle factors were significantly associated with wheeze.

	N	n (%)	P value*		
			wheeze ever	Derm.pt. +	cockroach +
Wearing shoes on examination	212	66 (31)	0.622	0.704 [†]	0.348
Rooms per household (incl. kitchen)			0.757	0.052 [†]	0.288 [†]
Up to 2 rooms	209	85 (41)			
3 rooms	209	55 (26)			
4 rooms or more	209	69 (33)			
7 or more persons per household	211	94 (45)			
Older siblings			0.050	0.102 [‡]	0.150 [‡]
0	209	45 (22)			
[...]					
>5	209	28 (13)			
Mobility			0.778	0.269 [§]	0.833
Bicycle	210	83 (40)			
Scooter	211	10 (5)			
Car	210	1 (0.5)			
Only one bed per household	210	8 (4)			
Someone in household with glasses	211	33 (16)	0.456	0.614 [§]	0.602

Lifestyle factors: n=number, N=total number; *p-value: chi-square test (χ^2 -Test) or [†]Fisher test or [‡]Mantel-Haenszel-test

Study characteristics and wheeze (univariate analysis)



- Results in red remained as significant independent factors in the final stepwise models.

Other atopic outcomes

- Neither rhinitis nor eczema, though associated with wheeze, showed an association with atopic sensitization

Atopic vs. non-atopic wheeze

- Atopic wheeze was almost as prevalent (13.3%) as non-atopic wheeze (19.3%) in children with SPT-testing.
- The only relevant factors for atopic wheeze in stepwise analysis were BMI – heavier children had a higher risk (OR=1.58, 95%-CI 1.14-2.21, p=0.007) and current eczema symptoms (OR=5.42, 95%-CI 1.03-28.62, p=0.047). Breast feeding, though protective in univariate analysis, did not remain in the final model.
- Relevant factors for non-atopic wheeze in stepwise analysis were reduced MEF25-75 (in %pred) (OR=0.97, 95%-CI 0.95-0.99, p=0.002), having had a pneumonia ever (OR=5.00, 95%-CI 1.52-16.43, p=0.008) and having ≥ 1 older sibling (OR=0.35, 95%-CI 0.14-0.85, p=0.020).

Comparison with urban data (VAVANY Study)

- Prior to the current study, the same principal investigator performed a similar study in N=1093 children from an urban area in the capital of Madagascar. In this VAVANY-Study, a high prevalence of wheeze and an association of poverty with low lung function was observed.^{1,2}
- Prevalence of wheeze ever was higher in rural areas of the current study (36.0%) than in urban (24.9%, p<0.001) areas.
- Similarly, lung function (FEV1/FVC) was significantly lower in rural (89.6 \pm 9.8) than in urban (94.4 \pm 6.3, p<0.001) areas.

Conclusions

- The prevalence of children's asthma in rural Madagascar was high. Surprisingly, the prevalence was even higher than in urban living children (Metro Antananarivo; VAVANY-Study).
- The atopic asthma phenotype was predominant.
- In contrast to the biodiversity hypothesis, lifestyle of the rural living and poor population had no relevant effect.
- Asthma is not only an issue in industrialized countries, but also in non-affluent regions
- It seems that the relevance of asthma in contrast to pneumonia is underestimated in developing countries.

References

- (1) Wolff et al. Journal of Asthma 2012, 38(1):4–7.
- (2) Wolff et al. Ped. Pulmonology 2013, 129(5):735-742.

Acknowledgments

Design

Birgit Mosmann-Wolff, Pfullendorf, Germany

Organization

Tsilavy Ernaivo, Antananarivo, Madagascar
Immanuel L. Wolff MA, Washington D.C., USA

Funding

Funding

The MAKI-study was funded by the first author (PTW).
There is no conflict of interest

Correspondence

- 1 Private Practice, kids-doxx, Pfullendorf, Germany
- 2 Ludwig-Maximilians-University, Munich, Germany
- 3 Hôpital Mère Enfant Tsaralalana, Antananarivo, Madagascar
- 4 Krankenhaus Salem, Heidelberg, Germany
- 5 Helmholtz Zentrum München, Neuherberg, Germany

Peter T Wolff, Am Berghof 67, 88630 Pfullendorf, Germany
peter.t.wolff@gmail.com

ORCID

