

Indoor air concentrations of endotoxin in primary schools - Preliminary report for exposure and asthma among children

Authors: Cristiana Pereira¹, Ana Mendes¹, Lívia Aguiar¹, Maria Paula Neves¹, Mariana Pinto², André Moreira², João Paulo Teixeira¹

¹ Department of Environmental and Occupational Health, National Health Institute, Porto, Portugal

² Department Immunoallergology, HSJ-FMUP, Porto, Portugal

Presenting Author: Email: cristiana.pereira@insa.min-saude.pt | Tel.: +351 223 401 156

INTRODUCTION:

Children spend most of their daytime in school, mainly indoors. Overlooked and chronic exposure to pollutants in childhood may result in acute respiratory symptoms and future health problems, namely respiratory affections. Endotoxin is a lipopolysaccharide (LPS) molecule found in the outer membrane of Gram-negative bacteria, occurring ubiquitously in indoor environments. Although some inconsistencies are still found in the literature, exposure to endotoxin has been associated with asthma and other respiratory manifestations in several studies (Thorne, Kulhánková, Yin, Cohn, Arbes & Zeldin, 2005) (Rabinovitch et al., 2005) (Gehring et al., 2001).

OBJECTIVES:

This report aims to assess the concentration of endotoxin present in indoor air at schools and verify a possible correlation between the levels found and asthma among children.

MATERIALS AND METHODS:

This project enrolls a total of 20 primary schools in Porto, Portugal, comprising an overall population of 3500 children. This report will discuss the results obtained in selected classrooms of 10 primary schools (n=35), where endotoxin concentrations were assessed using the Limulus Amebocyte Assay (Lonza) as previously described (Duquenne, 2012) and following the European Standard EN 14031:2003. Lung function tests and anthropometry were also performed, after written consent from parents, to 450 pupils of the selected classrooms. Health questionnaires on respiratory and allergy symptoms were applied both to pupils and parents.

RESULTS AND DISCUSSION:

The results will, on one hand, provide insight into the average levels of endotoxin present in ambient air of schools, setting a measure of exposure, and will also enable to establish a possible contribution from exposure to health effects in children.

Using objective measures to estimate exposure and effect, along with the information collected by means of questionnaires will take us a step forward on the evaluation of endotoxin presence effects in indoor environments.

CONCLUSION:

If an abnormal presence of endotoxin in schools' air is proven and if this correlates with respiratory symptoms in children, some measures can be taken. Procedures to improve indoor air quality in schools as well as the elaboration of recommendations and good practices, along with monitoring plans shall be proposed, implemented and evaluated.

ACKNOWLEDGMENTS:

This study is supported by FCT PTDC/DTP-SPA/1522/2012 (How can indoor air quality affect children allergies and asthma - ARIA)

REFERENCES:

1. Thorne, P., Kulhánková, K., Yin M., Cohn, R., Arbes, S. & Zeldin, D. (2005) Endotoxin exposure is a risk factor for Asthma. The National Survey of endotoxin in United States housing. *American Journal of Respiratory and Critical Care Medicine.* 172: 1371 - 1377
2. Rabinovitch, N., Liu, A., Zhang, L., Rodes, C., Foarde, K., Dutton, S., et al (2005). Importance of the personal endotoxin cloud in school-age children with asthma. *J Allergy Clin Immunol.* 116 (6): 1053-1057
3. Gehring, U., Heinrich, J., Jacob, B., Richter, K., Fahlbusch, B. & Schlenvoigt, G. (2001) Respiratory symptoms in relation to indoor exposure to mite and cat allergens and endotoxins. *Eur Respir J.* 18:555 - 563
4. Duquenne, P., Marchand G., & Duchaine, C. (2012). Measurement of endotoxins in Bioareosols at workplace: A critical review of literature and a standardization issue. *Ann. Occup. Hyg.* 1-36