ABSTRACTS

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Abstracts are listed alphabetically within each section according to the name of the presenter of the paper. Please consult the congress programme for more details.

ORAL PRESENTATIONS

HIGH EXHALED NITRIC OXIDE (eNO) IS ASSOCIATED WITH WORK-RELATED RESPIRATORY ALLERGY IN NON-ATOPIC BAKERS

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Background: The aim of this study was to evaluate the determinants of elevated (>35 ppb) exhaled nitric oxide (eNO) for various clinically relevant endpoints in baker's allergy and asthma.

Methods: A cross-sectional study of 544 bakers was conducted in 31 bakeries using an interviewer-administered questionnaire. Skin-prick tests (SPT) tested for skin reactivity to common aeroallergens. Specific IgE to wheat *(f4)* and rye (*f5*) was quantified using ImmunoCAP (Phadia). A hand-held portable sampling device (NIOX MINO®) was used to determine eNO levels during the work shift according to ATS/ERS recommendations (2005).

Results: The mean age of workers was 33 years, 57% were female, 43% current smokers and 38% were atopic (SPT positive >1 common aeroallergen). Work-related (WRS) ocular-nasal symptoms (42%) were more prevalent than asthma (25%) symptoms. A higher proportion of workers were sensitised to wheat (41%) than rye (35%). Probable baker's asthma (WRS, sensitisation and previous history of a positive methacholine challenge test) was estimated in 5%. The mean eNO was 24 ppb, with 18% having moderately increased (21-35 ppb) and 17% high (>35 ppb) levels. High eNO was significantly ($p < 0.05$) associated with male gender (OR=1.7), current smokers (OR=0.6), exercise (OR=2.6), recent chest infection (OR=2.3), atopy (OR=4.6), doctor diagnosed asthma (OR=2.7) and hay fever (OR=2.6). A strong positive correlation (r=0.72, $p < 0.001$) was observed between eNO and specific IgE to either wheat or rye in non-atopic workers. In multivariate models (adjusted for gender, smoking and recent chest infection) *non-atopic* workers with high eNO (>35 ppb), were twice as likely to report work-related chest symptoms (OR=3.0) and even more likely to report hay fever (OR=2.8) or doctor diagnosed asthma (OR=4.6). These non-atopic workers with high eNO were also more likely to have increased IgE to wheat (OR=7.2) or rye (OR=8.6); baker's rhinitis (OR=7.2); and a clinical diagnosis of baker's asthma (OR=11.2).

Conclusion: This is the first study to demonstrate an association between eNO, work-related symptoms, IgE reactivity to flour dust allergens and baker's rhinitis and asthma. High eNO (>35 ppb) could be used as a marker for work-related respiratory allergy among non-atopic bakers.

SOUTH AFRICAN PRIMARY IMMUNODEFICIENCY - THE REGISTRY AND THE WAY FORWARD

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Although IgA deficiencies have been reported as frequently as 1/300 people, primary immunodeficiency diseases (PIDs) are regarded a rare group of genetic diseases. However population prevalence of diagnosed PID in the USA by telephonic audit of 10 000 households in 2007 revealed a prevalence of 1/1 200 persons including severe immunodeficiencies. Delayed diagnosis is still common even in better resourced countries, mostly because of lack of awareness. In South Africa data of almost 90 patients have been recorded on the PID Registry at Tygerberg Hospital since November 2006. Patient enrollment is slow at about 30 new registrations per annum despite visits to hospitals in Johannesburg and Durban by the registry administrator. A wide spectrum of immunodeficiencies is reflected including a number of autoinflammatory diseases and suspected genetic susceptibility to tuberculosis. Diagnosis is at an average age of 10 years with a range of 6 months to 60 years. Antibody deficiencies still constitute the largest single group as in international registries and the majority of patients are on intravenous immunoglobulin therapy. In the past 6 months 3 new patients were diagnosed with severe combined immunodeficiencies; this may reflect an improving awareness. Almost 90% of patients are from the Western Cape and Gauteng, which probably correlates with availability of PID diagnostic facilities in these regions and also dense population. Black patients are still totally underrepresented at just over 4%, most likely because of lack of access to diagnostic facilities and treatment. Collaboration with other African countries, especially the North African regions has been established, where consanguinity reflects in a higher prevalence of PID than in western countries. Workshops in Africa on immune diagnostics and treatment with locally applicable guidelines for recognition of PID in developing countries are being established subsequent to the first African PID Congress ASID in October 2008.

SUMMARY FINDINGS OF SKIN-PRICK TEST RESULTS FROM AN ALLERGY PRACTICE IN BOTSWANA

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Objective: Aeroallergen sensitisation patterns have been reported for South Africa and Zimbabwe. Similar Botswana studies are lacking. We review aeroallergen skin-prick test (SPT) results for Botswana, and compare these with those of neighbouring countries. Sensitisation to common foods was also examined.

Methods: All patients who had SPT from October 2008 to May 2009, at a private allergy practice in Gaborone, Botswana, were included. Positive reaction was defined as a 3 mm wheal greater than negative control. Depending on clinical presentation, testing panel included: trees (plane, oak, acacia), grass (Bermuda, Timothy, maize), weed (English plantain), moulds (mix, Alternaria, Aspergillus), cat, dog, dust mites, *Blomia tropicalis*, cockroach, milk, soya, egg white, wheat, peanut.

Results: Fifty-five patients were analysed, 6 of whom underwent food testing only. The mean age was 10.5 years (SD 11.8; range: 4 months - 51 years), 67% were male and 75% were black. Grass pollen sensitisation was most common followed by Alternaria (29%), dog (20%), acacia tree (20%), weed (20%), cat (19%), cockroach (12%) and dust mites (6%). For foods, egg was most common (6/10) followed by peanut (4/8) and milk (1/8). No patients reacted to Blomia, oak, soya or wheat. Rhinitis was the commonest presentation (71%), followed by asthma (42%) and eczema (38%). Asthmatics were more likely to be cockroach allergic than non-asthmatics (p=0.02). Rhinitis patients were more likely to be grass allergic (p=0.01). Conjunctivitis sufferers were more likely to be sensitised to Bermuda grass (p=0.03). All food allergy patients had eczema.

Conclusion: Bermuda grass is the commonest aeroallergen causing rhinoconjunctivitis in Botswana. Unlike Zimbabwe and Cape Town, dust mite sensitisation is uncommon. Cockroach sensitisation is significant in asthmatics, similar to urban populations in the USA. Egg and peanut were the commonest food allergies. Larger population studies are needed to confirm these findings.

EFFECT OF AIR POLLUTANTS/ALLERGENS MEDIATED OXIDATIVE STRESS ON BRONCHIAL ASTHMA

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Backround: Exposure to noxious mutagenic pollutants and allergens can activate neutrophils and macrophages to produce reactive oxygen species (ROS) and reactive nitrogen species (RNOS). The subsequent oxidative stress induced in this way may increase the risk of developing exacerbated conditions of asthma through the promotion of T-cell response. The purpose of this study is to investigate the implication of pollutants and allergens in the exacerbation of asthmatic conditions and the involvement of oxidative stress.

Methods: Lung function was evaluated using spirometric measurements in 60 asthmatic children (6-14 years old) with clinical history of asthma. Total equivalent antioxidant capacity (TEAC), superoxide dismutase (SOD) and glutathione peroxidase (GPx) were evaluated using kits commercially available from Randox-Company. Malondialdehyde (MDA) was estimated by thiobarbituric acid reaction.

Results: A general lung obstruction profile was detected in all our patients (from mild to severe) corresponding to the clinical score ranging from 3 to 8 and confirmed by FEV (forced expiratory volume) % ranging from 71% to 75% and by the measured ratio FEV/FVC (forced volume calculated). Haematological results displayed a high level of eosinophils (2.8-20%) for the majority of patients corresponding to the IgE values exceeding 500 kU/l. Positive *Phadiatop* has been observed in these patients who also displayed low values of TEAC and GPx (<1.42 mmol/l and <700 U/ml, respectively) and high values of 8 isoprostane (>7.5 pg/ml) in contrast with high levels of MDA (>3.5 mmol/l). However, exacerbated conditions of asthma were clinically confirmed only in 18 patients (clinical score: 6 - 8) with FEV/FVC ratio ranging from 43% to 75%.

Conclusion: Exacerbations of asthma are a consequence of hyperproduction of eosinophils and IgE by oxidative stress generated by the combustion products acting as adjuvants in the immune system of those patients sensitised to the observed allergens.

MITE AND COCKROACH SENSITISATION IN PATIENTS WITH ALLERGIC RHINITIS IN THE FREE STATE

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Aim and objectives: Previous studies on patients with allergic rhinitis living in the Free State province of South Africa showed that grass pollens are the predominant allergens with house-dust mite sensitisation being less prevalent than in the coastal areas and a low rate of sensitisation to the storage mite *Lepidoglyphus destructor.* No studies have been conducted on sensitisation to the other storage mites, spider mites or cockroaches. The aim of this study was to determine the prevalence of sensitisation to various house-dust mites, storage mites, spider mites and cockroaches in patients with allergic rhinitis living in the Free State.

Methods: Fifty consecutive patients with moderate-severe persistent allergic rhinitis who were attending the ENT clinic at Universitas Hospital underwent skin-prick testing and/or ImmunoCAP RAST testing for common aeroallergens, house-dust mites, storage mites, spider mite and cockroaches.

Results: Forty-six per cent of patients were sensitised to one of the house-dust mites, with house-dust mite sensitisation being significantly more common in patients who had previously lived at the coast. Storage mites were not common aeroallergens, while 46% of patients were sensitised to the spider mite *T. urticae. B. germanica* was the cockroach species most commonly sensitised on ImmunoCAP RAST testing, with 38% of patients being sensitised.

Conclusions: House-dust mites, *T. urticae* and the cockroach *B. germanica* appear to be important aeroallergens in the Free State province of South Africa. Storage mite sensitisation is not common.

WORK-RELATED ASTHMA PHENOTYPES IN DENTAL HEALTH CARE WORKERS IN SOUTH AFRICA

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Introduction: Exposure in the dental environment has been shown to increase the risk of respiratory disease in dental health care workers (HCWs). This study investigated the prevalence of work-related asthma phenotypes in dental HCWs and the risk factors associated with these phenotypes.

Materials and methods: A cross-sectional study was conducted on 454 dental HCWs including dental students in 5 academic dental institutions in South Africa. A self-administered, modified ECRHS questionnaire eliciting the health and employment history was used. Blood samples were obtained from participants to assess atopy status. Pre- and postbronchodilator spirometry was conducted using ATS guidelines. Multiple logistic regression analyses were conducted to assess the association between risk factors and the definitions of asthma controlling for known confounders (age, smoking, gender).

Results: The study demonstrated a 6.9% prevalence of atopic asthma, 5.9% non-atopic asthma and 4.0% for work-related asthma (WRA). Almost half of the study population was atopic and this factor was a significant predictor of WRA. A history of ocular-nasal symptoms was significantly associated with WRA (OR: 5.9; 95% CI: 1.9 - 17.8). Furthermore, work-related ocular-nasal symptoms were more strongly associated with WRA (OR: 6.7; 95% CI: 2.4 - 19.1). Workers with non-atopic asthma were more likely (OR: 2.98; 95% CI: 1.21 - 7.38) to have a longer employment duration (>20 years).

Conclusion: Dental HCWs with ocular-nasal symptoms and longer employment duration are at increased risk of presenting with work-related asthma. Identification of various asthma phenotypes is useful for ongoing surveillance and clinical management of dental HCWs.

WORK-RELATED ALLERGY AND ASTHMA IN SPICE MILL WORKERS – THE IMPACT OF PROCESSING DRIED SPICES ON IgE REACTIVITY

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Background: Three spice mill workers developed work-related allergy and asthma after prolonged exposure to high levels (>10 mg/m^3) of inhalable spice dust. Patterns of sensitisation to a variety of spices and putative allergens were identified.

Methods: Work-related allergy and asthma were assessed on history, clinical evaluation, pulmonary function and fractional exhaled nitric oxide (FeNO). Specific IgE reactivity to a range of common inhalant, food and spice allergens was evaluated using ImmunoCAP and allergen microarray. The presence of non-IgE mediated reactions was determined by basophil stimulation (CAST-ELISA). Specific allergens were identified by immunoblotting to extracts of raw and dried processed garlic, onion and chilli pepper.

Results: Asthma was confirmed in all 3 subjects, with work-related patterns prominent in worker 1 and 3. Strong specific IgE responses to multiple spices and pollen were observed in worker 1 and 2, and weak responses in worker 3, who was sensitised exclusively to garlic and chilli pepper. Microarray analysis demonstrated prominent profilin reactivity in both atopic workers 1 and 2. Immunoblotting demonstrated a 50 kDa cross-reactive allergen in garlic and onion, and allergens of approximately 40 kDa and 52 kDa in chilli pepper. Dry powdered garlic and onion demonstrated greater IgE binding.

Conclusions: This study demonstrated IgE reactivity to multiple spice allergens in workers exposed to high levels (>10 mg/m^3) of inhalable spice dust. Processed garlic and onion powder demonstrated stronger IgE reactivity than the raw plant. Atopy and polysensitisation to various plant profilins, alluding to pollen-food syndrome, represent additional risk factors for sensitiser-induced work-related asthma in spice mill workers.