Asthma and Allergic Rhinitis in the Gulf and Near East:
Epidemiology, risk factors of asthma and co-morbid allergic rhinitis

Mona Al-Ahmad MBBCh FRCPC
Department of Allergy, Al-Rashed Allergy Center
Kuwait
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Disclosure of interest

No conflict of interest
Asthma and Upper airway co-morbidities in the Gulf & Near East

Genetic factors

Epidemiology & Risk Factors

Asthma & Upper airway co-morbid Diseases

Triggers of Childhood Asthma

Asthma & Sleep disorders
Etiological Factors – Gene and Environment

Learning objectives

(1) To review the epidemiology asthma and co-morbid allergic rhinitis for the Gulf and Near East area
(2) Review data related to both children and adult population
(3) Review risk factors of asthma and co-morbid allergic rhinitis in the area
Prevalence of Asthma & Allergic Rhinitis Among School Children

Articles

Worldwide variation in prevalence of symptoms of asthma, allergic rhinoconjunctivitis, and atopic eczema: ISAAC

*The International Study of Asthma and Allergies in Childhood (ISAAC) Steering Committee*
Prevalence of Asthma & Allergic Rhinitis Among School Children
Gulf & Near East

1991-1998
2000-2004
2001-2005
Prevalence of Asthma & Allergic Rhinitis Among School Children

Asthma ISAAC phase one centers

- Morocco: 11.3%
- Tunisia: 16.3%
- Algeria: 14.3%
- Lebanon: 5.6%
- Iran: 2.6%
- Kuwait: 16.8%
- KSA: 8%
- Oman: 20.7%

Physician diagnosis of asthma

Waked M. J Med Liban. 2006
Behbehani N. Ann Allergy asthma immunology. 2000
Al-Riyami BM. Respirology. 2003
Masjedi MR. Iran J Allergy Asthm immunolo. 2004
AlFrayh AR. Ann Allergy Asthma immunol.2001
Ait Khaled et al. ISAAC phase three in Africa. Allergy. 2007
Prevalence of Asthma & Allergic Rhinitis Among School Children

Allergic Rhinitis ISAAC phase one centers

Morocco: 10.4%
Tunisia: 35.8%
Algeria: 18.2%
Lebanon: 15.4%
Kuwait: 17.1%
Oman: 10.5%
KSA: 20%
Iran: 9.3%
Tunisia: 35.8%

Waked M. J Med Liban. 2006
Behbehani N. Ann Allergy asthma immunology. 2000
Al-Rawas OA. Respirology. 2008
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AlFrayh AR. Ann Allergy Asthma immunol.2001
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Prevalence of Asthma & Allergic Rhinitis Among School Children

Asthma ISAAC phase three centers

Physician diagnosis of asthma

Janahi A. Pediatr Pulmonol. 2006
Abu-Ekteish F. Allergy & Asthma proceedings. 2009
Owayed A. Med Principle practice. 2008
Waked M. Public Health. 2008
El-Sharif N.A. Ann Allergy asthma immunol 2003
Al-Rawas A. Respirology. 2008
AlFrayh AR. Ann Allergy Asthma immunol.2001
Mohammad Y. East Mediterian health J. 2010
Prevalence of Asthma & Allergic Rhinitis Among School Children

Allergic Rhinitis ISAAC phase three centers

- Oman: 10.5%
- Qatar: 30.5%
- Jordan: 10.9%
- Kuwait: 22.2%
- Lebanon: 21.2%
- Syria: 10.1%
- Iraq: ? %
- Egypt: 10.3%
- Iran: 12.3%
- Algeria: 20.7%
- Tunisia: 14.7%
- Morocco: 14.7%
- UAE: 14.9 - 22.9%
- KSA: 25%
- Oman: 10.5%
- UAE: 14.9 - 22.9%

References:
- Janahi A. Pediatr Pulmonol. 2006
- Abu-Ekteish F. Allergy & Asthma proceedings. 2009
- Owayed A. Med Principle practice. 2008
- Waked M. Public Health. 2008
- El-Sharif N.A. Ann Allergy asthma Immunol. 2003
- Al-Rawas A. Respirology. 2008
- AlFrayh AR. Ann Allergy Asthma immunol. 2001
Asthma - ISAAC (1997-8)
N Ait Khaled, IUATLD

Morocco
Casablanca: 12%
Rabat: 6.6%
Marrakech: 17%

Algeria
Algiers West: 4.8%
Algiers Centre: 6.6%

Tunisia
Sousse: 15.2%

Ethiopia
Addis Ababa: 2.8%
Jima: 2.2%

Kenya
Nairobi: 15.4%
Eldoret: 6.8%

Conakry Guinea
10.3%

Abidjan
Ivory Coast
11.8%

Nigeria
Ibadan: 18.4%

South Africa
Cape Town: 13.1%

Ait Khaled et al. ISAAC phase three in Africa. Allergy. 2007
“Hay fever ever” - ISAAC (1997-8)
N Ait Khaled, IUATLD

- Morocco
  - Casablanca: 27%
  - Rabat: 18%
  - Marrakech: 21%

- Algeria
  - Algiers West: 13%
  - Algiers Centre: 24%

- Tunisia
  - Sousse: 15.2%

- Guinea
  - Conakry: 48%

- Ivory Coast
  - Abidjan: 49%

- Nigeria
  - Ibadan: 40%

- South Africa
  - 15%

- Kenya
  - 12%

- Ethiopia
  - 2%

Ait Khaled et al. ISAAC phase three in Africa. Allergy. 2007
## Trends in Asthma & Allergic Rhinitis Prevalence
### Gulf & Near East

<table>
<thead>
<tr>
<th>Country</th>
<th>Change in asthma prevalence</th>
<th>Change in Allergic rhinitis prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jordan</td>
<td>Increase (two folds)</td>
<td>Increase</td>
</tr>
<tr>
<td>Oman</td>
<td>Increase (younger group)</td>
<td>Same</td>
</tr>
<tr>
<td></td>
<td>Same (older group)</td>
<td></td>
</tr>
<tr>
<td>Kuwait</td>
<td>Same</td>
<td>Increase</td>
</tr>
<tr>
<td>Lebanon</td>
<td>Same</td>
<td>Increase</td>
</tr>
<tr>
<td>Iran</td>
<td>Increase</td>
<td>Increase</td>
</tr>
<tr>
<td>Morocco</td>
<td>Increase</td>
<td>Increase</td>
</tr>
<tr>
<td>KSA</td>
<td>Increase</td>
<td>Increase</td>
</tr>
</tbody>
</table>
Prevalence of Asthma & Allergic Rhinitis among Adolescents and Adults
Gulf & Near East

- Self- administered questionnaire to random sample of 10,000 school children and family
- Mean age 30 years old
- Self reported prevalence of allergic rhinitis (having symptoms in the past 12 months) was 36%
Asthma Insights and Reality in the Gulf and Near East

Mean age for adults and children

The current level of asthma control is far from optimal

Khadadah M et al. AIRGENE. Int J Tuberc lung dis. 2009
Asthma Insights and Reality in the Gulf and Near East

Asthma patients’ having ER visits during the past year

- **AIRGNE Total**: 52%
- **Jordan**: 63%
- **Kuwait**: 89%
- **Lebanon**: 21%
- **Oman**: 58%
- **UAE**: 28%
Risk Factors of Asthma & Allergic Rhinitis
Gulf & Near East
Risk Factors of Asthma & Upper airway co-morbid diseases

Allergic Rhinitis

- AR subjects had a 3-fold increased risk of asthma compared to subjects without AR.
- Immigrants had a significantly lower prevalence of co-morbidity of AR and asthma [adjusted odds ratio (OR) 0.53, 95% confidence interval (CI) 0.33–0.85] compared to UAE nationals, UAE nationality, younger age and family history of either AR or asthma were independent risk factors for the concurrence of these allergic diseases.
Risk Factors of Asthma & Allergic Rhinitis
Gulf & Near East
Rhino sinusitis

• N=90 patients with asthma and rhino sinusitis, cross-sectional
• Results:
  – 73% had rhino sinusitis
  – FEV1 was significantly lower in rhino sinusitis patients (P=0.002)
  – Patients with rhinosinusitis had more severe asthma, in stage 3 (42.4%)
Risk Factors of Asthma & Upper airway co-morbid diseases

Demographic Characteristics

- Computerized data of 44,814 patients with asthma (1.3%)
- 75% of asthmatics belonged to a low socio-economic environment with a salary lower than $200 per month.
- 31% were illiterate
- The rate in children was higher (2.08%) than in adults (1.09%)
- Asthma was associated more strongly with
  - depression (OR 25.6; 95% CI 3.32, 197.6)
  - obesity (OR 4.09, 95% CI 1.31, 12.73)
  - regular alcohol consumption (OR 11.78; 95% CI 1.55, 89.44)
Risk Factors of Asthma & Allergic Rhinitis

Indoor Allergens: DP/DF

• N= 549, HDM collected from bedroom floor
• Low levels of Der p 1 after assay for mite Derp 1 by ELISA
• The highest levels of Der p 1 ranged from 0.02 to 0.10 mg/g in 3.5% of the total samples

• N= 139 (Riyadh), SPT: 77.8% positive to HDM, 33.6% to cat, 19.2% to Cockroach.
• Prosopis juliflora positive in 72.1%, Bermuda grass in 53.8%, Chenopodium album in 47.1%
  Rye grass in 36.5% and Salsola kali in 36.5%. Moulds (18.2%) and Aspergillus fumigatus
  (18.2%) extracts

• N= 60 asthmatics sera for anti-allergen antibodies (Enzyme Immunoassay)
• Bermuda grass, Olive tree, Parietaria, Alternaria, Cat hair dander, Dog hair dander, Mite DPT,
  Mugwort, Birch tree and Timothy grass
• Mite DPT was the allergen identified in 16/25
Risk Factors of Asthma & Allergic Rhinitis

Outdoor Allergens

- *Salsola* pollen is a predominant cause of respiratory allergies in Kuwait
- N= 1106 patients with BA and AR
- SPT results:
  - Der p 1 41.6%
  - Der f 1 36.9%
  - Cockroach allergen (Bla g 1) 32.2%
  - females are more exposed to pollen, grasses and tress, but males are mostly exposed to mites and insects

Sattar HA. Eur Ann Allergy clin immunol.2003
Aldowaisan AD et al. Annals allergy asthma immunol. 2003
Risk Factors of Asthma & Allergic Rhinitis

Meteorological factors

- N= 4353 asthma patients followed up for a year
- The highest pollen count
  - September
  - Maximum relative humidity of 47%, no precipitation
  - High mean temperature of 39.7°C
  - High patient visit to the allergy center.
- Fungal spore counts were significantly higher in early winter (December), related to with high relative humidity and high precipitation with a low mean average temperature of 19.7°C (December exacerbation)

Risk Factors of Asthma & Allergic Rhinitis
Gulf & Near East

Air Pollutions

• N= 3270 pupils school health registry
  – 8.02% of pupils were absent from the school for at least one day during the year
  – The measured pollutants reached a peak during the spring season and then in autumn of the studied academic year.
  – Asthmatic children miss more days of school than those who do not have asthma.
  – This study finding shows that air pollution has an impact on asthma, which results in significant school absenteeism.

• N= 1318 children, Air measurement of SO(2) and TSP for a period of four years
• The prevalence of asthma significantly varied with the zone (p < 0.05), Respiratory diseases (p < 0.0001), Strongly polluted zone (p < or = 0.0001), Infectious diseases (p < 0.0001)
• Air pollution is a determinant factor but is not the only factor increasing the risk of asthma in children; other factors such as respiratory diseases, infectious diseases, genetic and passive smoking present a high-risk threat.

Bener A et al. J Asthma. 2007
Risk Factors of Asthma & Allergic Rhinitis
Gulf & Near East

Pet Ownership

- N= 1106 allergic patients, SPT & total IgE
- 44.9% had positive, and 55.1% had negative skin prick tests.
- 28.1% had asthma; 45.5% had allergic rhinitis
- 30.7% of patients had at least one animal at home
- 69.3% had never had pets in the home
- Cats (26.7%), goats (15%) and birds (14.7%) were the most common present within the house
- Prevalence of asthma, and rhinitis was significantly more common in families with animals than in those without

Risk Factors of Asthma & Allergic Rhinitis
Gulf & Near East

Pet Ownership

- N=160 asthmatic children (9-16 years).
- Risk factors were assessed by questionnaires, determination of sensitization status (skin tests and IgE), and home allergen exposure (mite, cat, dog, cockroach; ELISA)
- Home allergen levels and frequency of pet ownership were very low (cat, 4.1%; dog, 1.5%). The risk of cat sensitization increased significantly among cat owners (odds ratio [OR], 3.53; 95% CI, 1.33-9.41; P = .01)
- Pet ownership markedly increased the risk of sensitization to pets. Despite low allergen exposure, the pattern of childhood asthma in Kuwait follows that described in Western communities (strong association with sensitization)
Risk Factors of Asthma & Allergic Rhinitis
Gulf & Near East

Bakhuour exposure: An Arabian incense

- Arabic version of ISAAC questionnaires with Arabian incense related asthma symptoms
- N= 2441 surveyed children:
  - 15.4% had current asthma
  - Bakhour use more 2X/week was three times more likely to affect child breathing compared to no bakhour use (adjusted OR 3.01; 95% CI 2.23–4.08),
  - This effect was 2.55 times higher in asthmatics (adjusted OR 2.55; 95% CI 1.97–3.31) compared to non-asthmatics
  - Arabian incense burning is a common trigger of wheezing among asthmatic children in Oman. However, it is not associated with the prevalence asthma.
Conclusion

• Prevalence of asthma and allergic rhinitis is increasing in the Gulf and Near East countries, more in the Gulf than Near East countries
• Risk factors for asthma and upper airway co morbidities
  – Common with other parts of the world
  – Includes: allergic rhinitis, rhino sinusitis, outdoor allergens, indoor allergens, air pollution, pet ownership
  – Others common to the region, i.e. Arabian incense
• The Gulf and Near East has one of the highest levels of Emergency room visits, hospitalisations, and work/school absence, and level of asthma control is far from optimal
• Lack of epidemiological studies to further explore the variations in time trends
• Lack of epidemiological data of asthma and allergic rhinitis among adult population
• Need for team work related to explore different environmental triggers of respiratory allergic disease