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Risk Factors Associated with Asthmatic Children

Author

Dr Anwar T Elgasseir

Department of Paediatric, Misurata Teaching Hospital

Faculty of Medicine, Misurata University

Misurata, Libya.

Tel: 0925443430.

Email: Gasseir@yahoo.com

Abstract

Objectives: *The aims of this study were to estimate hospital admission rates of asthma and to identify the risk factors associated with asthma in children, regarding family history of atopic diseases, environmental factors, and feeding practice in early infancy.*

Patients and Methods: *Descriptive study (Longitudinal hospital based study) in Paediatric Department, Misurata teaching hospital, extended for 22 month, from February 2012-Nov 2013. Children were recruited to the study if they were aged between 3 month and 14 year, had history of persistent wheeze or recurrent wheeze. Prospectively collected data on Asthmatic admitted cases include; history, clinical examination, investigations, and treatment, are recorded on a data collecting form. To know the pattern of wheeze, the patients were grouped to three groups; < 3 years, 3 – ≤ 6 years, > 6 years.*

Results: *In our hospital, 4.3% of children (82 children) who are admitted to the hospital suffer from acute exacerbation of asthma. The majority of asthmatic children admitted are below 3 years (71%) with mean age 14 months. About 86% of asthmatic children above 6 year are persistent asthmatic and just 14% of children older than 6 year are late onset asthmatic. Regarding family history of atopic disease 50% of persistent asthmatic had family history of atopic diseases. Paternal indoor smoking was reported in 67% of persistent asthmatic. Approximately 95% of infants associated with viral upper respiratory tract infection (URTI) compared to only 57% of children older than 6 years were associated with URTI.*

Conclusion: *Viral infection considered to be an important risk factor in exacerbation of asthma in young children. Other risk factors appear to predispose children to developing persistent asthma including atopy in the family and paternal smoking. Duration of breast feeding and the age for introduction of cow's milk not differ markedly between different asthmatic groups.*

Keywords: *Asthma; Risk Factors; Atopic Patients; Indoor Smoking; Infant Feeding Practice.*

Introduction

Asthma is a common chronic disease in children. "It is chronic inflammatory disorder characterised by episodic airway obstruction due to hyper-responsiveness of the airways to various endogenous and exogenous provocative stimuli reversed either by treatment or spontaneously". Paediatric asthma is a major global health problem, which exert a substantial burden on the family, healthcare services, and on a society as a whole. A national survey of over 17 000 households in the united states showed that the annual burden experienced by 2.7 million children affected with asthma comprises 7.3 million days when the patient was restricted to bed, 10.1 million days of school absence, 12.9 million contacts with a doctor, and 200 000 hospitalizations resulting in 1.9 million days of hospital admissions ⁽¹⁾. Furthermore, asthma can considerably impair the child's ability to enjoy and partake in activities such playing, and can affect their academic and career success because of poor school attendance associated with asthma attacks. Asthma prevalence studies lack consistency, possibly because of the ill defined diagnostic criteria and non-standardised study protocols.

The prevalence of asthma in childhood varies significantly from country to other and also within the same country ⁽²⁾. Evidence from the International Study of Asthma and Allergies in Childhood (ISAAC) showed that distribution of childhood asthma varies between global populations from less than 2% to approximately 33% of the population. Prevalence reaches 17-

30% in the UK, New Zealand, and Australia, whereas areas of low prevalence (1-7%) include Eastern Europe, China, and Indonesia ⁽²⁾. Furthermore, the prevalence also appears to vary within countries. For example, across India it ranges from less than 5% to approximately 20% ⁽²⁾.

It is unclear why the variation in the prevalence of asthma is so large. One theory involves a greater understanding of hygiene and health care in western world, which may lead to a different exposure to infection early in life. Consequently, this may render the immune system susceptible to an atopic response ⁽³⁾. Other risk factors associated with asthma in children including childhood respiratory disease ⁽⁴⁾, allergen exposure ⁽⁵⁾, dietary changes ^(6,7), and socioeconomic differences ⁽⁸⁾ may also play a role in the variation in the prevalence of asthma in children.

Infection with viruses causes 50-60% of exacerbations among asthmatic patients; however the type of infection may vary within asthmatic population ^(9,10). For example, rhinovirus is more common in older children, adults and atopic patients and the severity of infection dictates both the extent of bronchial hyperresponsiveness and the severity of the asthma attack ⁽⁹⁾. Furthermore, higher viral titres strongly correlate with a more severe exacerbation of asthma ⁽¹¹⁻¹³⁾. Paediatric asthma exerts a tremendous burden not only in families but also on healthcare resources for management of exacerbations of asthma. In our study we try to identify the risk factors of asthma that may contribute to reducing this burden. Increased understanding of the risk factors should enable existing therapies to be better targeted,

while facilitating the development of new treatment options. Know the risk factors of paediatric asthma should improve the asthma severity, reduce hospital admission and outpatient visit and lead to huge social benefits. This paper discusses the rate of hospital admission, and risk factors associated with paediatric asthma.

Patients and Methods

Design

Descriptive study (Longitudinal hospital based study) in Paediatric Department, Misurata teaching hospital, extended for 22 month, from February 2012-Nov 2013.

Study Sample

All hospital admissions, of children under the age of fourteen year and older than three month who presented to paediatric department with clinical symptoms of acute Asthma are included in the study. Prospectively collected data on Asthmatic admitted cases include; history, clinical examination (with degree of severity), investigations, and treatment, are recorded on a data collecting form.

Data from 80 subjects are expected to be available for analysis (70 subjects are estimated, with precision of $\pm 5\%$ using a 95% confidence interval). The sample size is increased to allow for possible loss.

Participants - Inclusion Criteria

Eligible Children were recruited to the study if they were aged between 3 month and 14 year, had history of persistent wheeze or recurrent wheeze. Recurrent wheeze was defined in children with

two or more episodes of airway obstruction with asthmatic symptoms, such as wheezing, cough and breathlessness that was responsive to β_2 agonist and after other conditions have been excluded were enrolled for the study. Persistent symptoms were defined as those occurring on more than three days/nights per week for at least six weeks⁽¹⁴⁾. Every child had history taken and fully examined. Personal or family history of atopy was considered as strong risk factor. The tendency towards atopy was defined as atopic dermatitis or allergic rhinitis in the children themselves, or a parent or sibling with asthma, allergic rhinitis, or atopic dermatitis⁽¹⁴⁾.

After clinical examination the children were treated according to severity which based on pulse rate, respiratory rate, usage of accessory muscles of respiration, presence or absence of audible wheeze, and Oxygen saturation (So₂ %). To know the pattern of wheeze, the patients were grouped to three groups; < 3 years, 3 – \leq 6 years, > 6 years. We consider patient had persistent asthma if his symptoms started below 3 years and persisted beyond 6 years where late onset asthma considered if patient his asthma symptoms had started after 3 years⁽¹⁵⁾. Verbal consent was obtained from parents for their children to participate in the study.

Participants - Exclusion Criteria

Children were excluded from the study if they had a history of preterm birth below 34 weeks, an episode of mechanical ventilation, a major congenital malformation or other form of chronic lung disease and other definite systemic disease.

Results

In our hospital, 4.3% of children (82 children) who are admitted to the hospital suffer from acute exacerbation of asthma. Total number of ward admissions during the study period was totally 1897. There were significantly more boys than girls in the study population (63%), with ratio approximately 1.7:1. The majority of asthmatic children admitted are below 3 years (71%) with mean age 14 months, where children 3 – ≤ 6 years, and > 6 years are 21% and 8% (mean age 4.2, 9.4 year) respectively (Figure 1). If we look to the patient in the 3 – ≤ 6 years group we found 82% of patient of this group their asthma symptoms were started below 3 years. In addition about 86% of children above 6 year are persistent asthmatic where their asthma symptoms were started below 3 years (persistent asthma, 7% from total asthmatic children) and just 14% of children older than 6 year their asthma were started above 3 year (late onset asthma, 1% from the total asthmatic patients) (Figure 2). 83% of persistent asthmatic had personal atopic disease, but just 35% in other children. Regarding family history of atopic disease (50% of persistent asthmatic had family history of atopic diseases) family history of asthma is more common than dermatitis in persistent group, 33% and 17% respectively (Table 1).

Cow's milk had been introduced before 3 months of age in 67% of the persistent group, compared to 71% in other children. In addition, paternal indoor smoking was reported in 67% of persistent asthmatic, and only 40% in other children.

Approximately 81% of children ≤ 6 years (95% of infants) associated with viral upper respiratory tract infection (URTI) compared to children older than 6 years only 57% were associated with viral URTI (diagnosed clinically). Fever is seen in 86% of infant admitted with asthmatic attack, but fever recorded just in 43% of patient older than 6 year. Contact to cat and /or dog is seen in 14% and 16% in children older than six year, and younger than six year respectively.

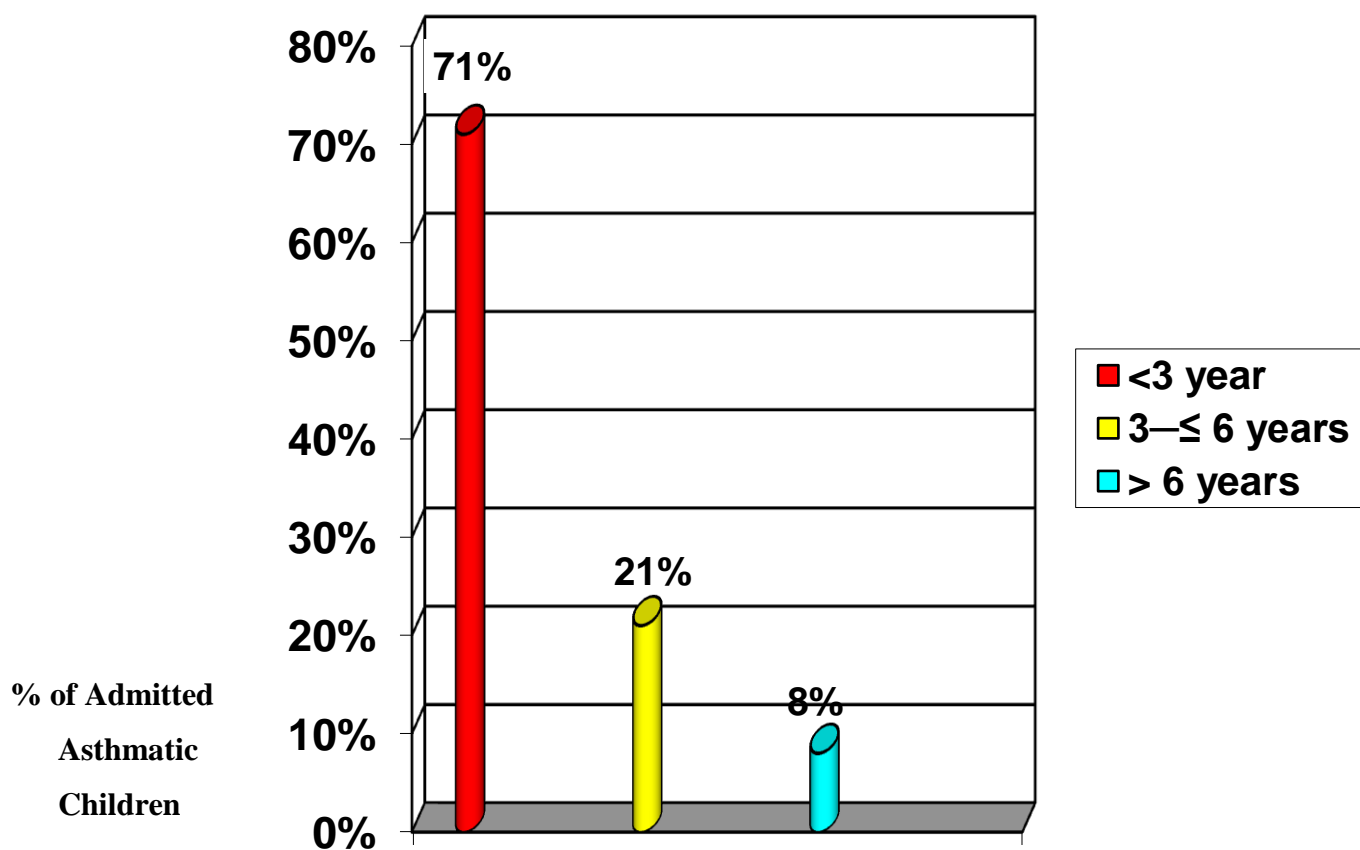


Figure1. Asthmatic Children

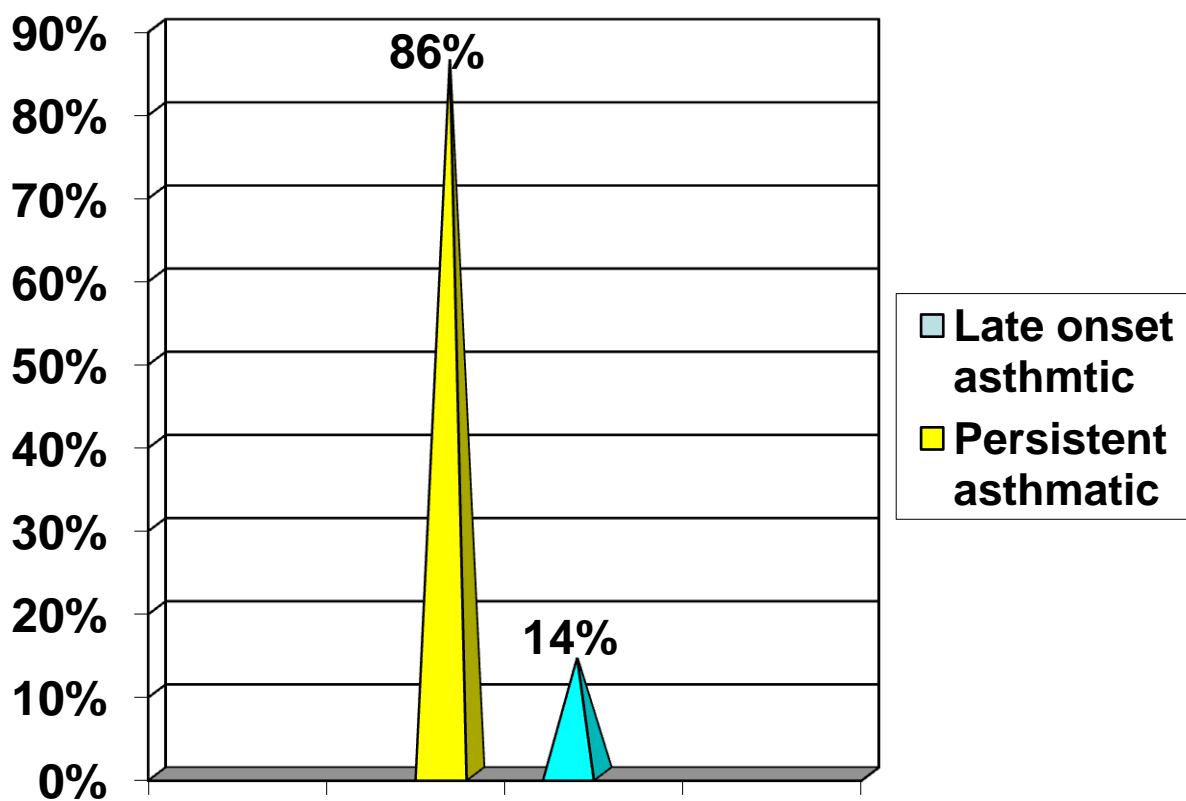


Figure 2. Asthmatic children older than 6 years

Table 1. Risk Factors Associated With Persistent Asthmatic Compared to Asthmatic Children ≤ 6 year

Risk Factors Associated With Admitted Asthmatic Children		Persistent Asthmatic	Asthmatic children ≤ 6 year
Personal atopic diseases		83%	35%
Family History	Asthma	33%	8%
	Dermatitis	17%	5%
Family history of atopic diseases		50%	15%
Cow's milk introduce before 3 months		67%	71%
Indoor smoking		67%	40%
Cat and/or dog contact		14%	16%
Viral upper respiratory tract infection		57%	81%

Discussion

The hospital admission rates of asthmatic children have increased in many countries of the world significantly but in our hospital, only 4.3% of children (82 children) who are admitted to the hospital suffer from acute exacerbation of asthma which considered low compared to other countries. In the study of Meurer J.R. it was seen, that 13.2% of their admissions of children were of asthma ^(16,17). In Hong Kong, asthma considered the most commonly seen conditions resulting in hospital admission, where 15% of children who are admitted to the hospital suffer from asthma. Stromber L. from department of pediatrics country hospital, Sweden found that 11% of the admissions in the hospital were of asthma ⁽¹⁸⁾.

Our study shows that, nearly 95% of wheezing episodes during the first year are associated with viral URTI (81% in children ≤ 6 years). In other study, 70% of wheezing in infant was associated with viral URTI ⁽¹⁹⁾, of which respiratory syncytial virus (RSV), rhinovirus, and influenza B virus were the most frequently cultured ⁽²⁰⁾.

Stein and colleagues examine the relation between viral infection before 3 years and the prevalence of atopy and asthma in childhood. Of the 1246 children enrolled at birth, the results showed that infection with RSV had greater risk of subsequent wheezing in the first 6 years of life. In addition, no association was found between the incidence of RSV infection and the subsequent development of allergic disease ⁽²¹⁾.

In our hospital, our research revealed that fever is a common problem in admitted asthmatic infants (86%) and most likely is secondary to viral infection. One study, in which fever was assessed as a potential risk factor for developing asthma, showed that there was a strong correlation between the frequency of fever and the prevalence of asthma in non-atopic children. However, these children were less likely to be symptomatic at school age⁽²²⁾. These study support our result that our childhood asthma are not common, probably because of increase the frequency of febrile infant secondary to viral URTI in infancy. These infant with viral infection were less likely to be symptomatic at school age (above 6 year), indicating that a subset of the population who experienced frequent early childhood infections have a better prognosis and are less related to the atopic persistent asthmatic phenotype. In addition, Erika von Mutius reported in his study that asthmatic children who develop and continue to have atopic sensitization have a worse prognosis than wheezers with virus induced illness⁽¹⁵⁾.

Our data shows that 86% of children above 6 year are persistent asthmatic where their asthma symptoms were started below 3 years (Figure 2). Martinez and colleagues suggested that children may have become sensitized below the age of 1 year, thus contributing to persistent asthma, as IgE concentrations at the age 9 months correlated with persistent wheezing⁽²³⁾. Many studies have revealed that when asthmatic children reach adolescence, symptoms may disappear in up to 75% of patients who wheeze before the age of 6

year but the patients of persistent asthmatic are less likely to be symptoms free as adults⁽²⁴⁻²⁶⁾.

Atopy, and male sex appeared to predispose for both late onset and persistent wheezing⁽¹⁵⁾. The results of our study showed that, personal atopic diseases were more prevalent among persistent asthmatic (83%), than other asthmatic children (35% in children \leq 6 year). Concerning family history of atopic diseases in persistent asthmatic, the differences were found for all diseases, but appeared more prominent for asthma than dermatitis. The influence of family history of asthma was particularly strong. Thus more than 33% of the parent of the persistent group children reported bronchial asthma compared with 8% of those children \leq 6 year (Table 1).

In many studies residential exposure to environmental tobacco smoke has been found to be related to development of asthmatic symptoms in children during the first two years of life and considered as a significant risk factor for asthma⁽²⁷⁻²⁹⁾. Ronchetti R and colleagues show in their study that, enhancement of the risk for atopic sensitization could be one of the consequences of exposure to environmental tobacco smoke⁽³⁰⁾. In our study, paternal tobacco smoke was found more in persistent asthmatic children (67% of persistent asthmatic compared to only 40% of children \leq 6 year).

Duration of breast feeding and the age for introduction of common allergenic foods (e.g. cow's milk, cereals) in the children's diet not differ markedly between persistent and other groups. Recent increases in the prevalence of asthma and allergic diseases have been attributed

to environmental changes including diet to lifestyle. Although we did not collect information about dietary lifestyle of the families in our study, the dietary changes in western societies such as the decreased the consumption of fresh fruits and vegetables and increased consumption of polyunsaturated fatty acids may affect the immune response is possible explanation of increase asthma prevalence in developed countries^(31, 32).

Exposure to cat and/or dog is not commonly seen in different age groups. There was no a combined effect between environmental tobacco smoke, and animal contacts to increase the level of asthma. The other aspect of environmental factors ,(residential area, damage due to dampness, visible mould, fitted carpets, allergen avoidance measures, and the use of vacuum cleaning), not included in our study because of the difficulty in assessing these factors in our community.

Conclusion and Recommendation

Paediatric asthma is a major clinical concern worldwide and represents a huge burden on family and society. Our data show that, our hospital admission rate of asthma in children is low compared to other countries.

Viral infection considered to be an important risk factor in exacerbation of asthma in young children and impacts on the risk of hospital admission.

Important risk factors appear to predispose children to developing persistent asthma including atopy in the family and paternal smoking. Duration of breast feeding and the age for introduction of cow's milk not differ markedly between different asthmatic groups.

Our research finding recommends efforts should be made to help father to refrain from smoking. This appears to apply in particular for families with persistent asthmatic children and when there is family history of atopic diseases particularly asthma.

References

1. Taylor WR, Newacheck PW. Impact of childhood asthma on health. *Pediatrics* 1992;90:657-62.
2. The International Study of Asthma and Allergies in Childhood (ISAAC) Steering Committee. Worldwide variation in prevalence of symptoms of asthma, allergic rhino conjunctivitis, and atopic eczema: ISAAC. *Lancet* 1998;351:1225-32.
3. Bodner C, Godden D, Seaton A, on behalf of the Aberdeen WHEASE group. Family size, childhood infections and atopic diseases. *Thorax* 1998;53:28-32.
4. Von Mutius E. Asthma and infection: risk or prevention? *Schweiz Med Wochenschr* 1998;128:1833-9.
5. Sporik R, Holgate ST, Platts-Mills TAE, Cogswell JJ. Exposure to house dust mite allergen (Der p I) and the development of asthma in childhood. *N Engl J Med* 1990;323:502-7.
6. Black PN, Sharpe S. Dietary fat and asthma: is there a connection? *Eur Respir J* 1997;10:6-12.
7. Von Mutius E, Weiland SK, Fritsch C, Duhme H, Keil U. Increasing prevalence of hayfever and atopy among children in

- Leipzig, East Germany. *Lancet* 1998;351:862-6.
8. Lewis SA, Britton JR. Consistent effects of high socioeconomic status and low birth order, and the modifying effect of maternal smoking on the risk of allergic disease during childhood. *Respir Med* 1998;92:1237-44.
 9. Negro Alvarez JM, Hernandez Garcia J, Pagan Aleman JA, *et al.* The role of rhinovirus in allergic airway inflammation. *Allergol immunopathol (madr)* 1997;25:302-9.
 10. Nicholson KG, Kent J, Ireland DC. Respiratory viruses and exacerbations of asthma in adults. *BMJ* 1993;307:982-6.
 11. Horn ME, Reed SE, Taylor P. Role of viruses and bacteria in acute wheezy bronchitis in childhood: a study of sputum. *Arch Dis Child* 1979;54:587-92.
 12. Minor TE, Dick EC, DeMeo AN, Ouellette JJ, Cohen M, Reed CE. Viruses as precipitants of asthmatic attacks in children. *JAMA* 1974;227:292-8.
 13. Roldaan AC, Masural N. Viral respiratory infections in asthmatic children staying in a mountain resort. *Eur J Respir Dis* 1982; 63:140-50.
 14. Chavasse RJ, Bastian-lee Y, Richter H, Hilliard T, Seddon P. Inhaler salbutamol for wheezy infants: a randomized controlled trial. *Arch Dis child* 2000; 82: 370-375
 15. Erika von Mutius. The burden of childhood asthma. *Arch Dis Child* 2000;82(suppl II):ii2-ii5.
 16. Meurer J.R., George V., Subuchin S., *et al.* Asthma severity among children hospitalized in 1990 and 1995. *Arch Pediatrics Adolescent Medicine* 2000;154: 143 - 49.
 17. Meurer J.R. Centers for disease control and prevention surveillance for asthma: United States. 1960 - 1995. *MMWR Morb Mortal Wkly Rep* 1998; 47: 1 - 27.
 18. Stromberg L. Hospital admission rates for asthma in Dept. of Pediatrics, country hospital, Norrkoping Sweden. *Acta Pediatric* 1996; 85: 173 - 6.
 19. Wright AL, Holberg CJ, Martinez FD, Morgan WJ, Taussig LM. Breast feeding and lower respiratory tract illness in the first year of life. *BMJ* 1989;299:946-9.
 20. Duff AL, Pomeranz ES, Gelber LE, *et al.* Risk factors for acute wheezing in infants and children: viruses, passive smoke and IgE antibodies to inhalant allergens. *Pediatrics* 1993;92:535-40.
 21. Stein RT, Sherrndill D, Morgan WJ, *et al.* Respiratory syncytial virus in early life and risk of wheeze and allergy by age 13 years. *Lancet* 1999;354:541-5.
 22. Von Mutius e, Illi S, Hirsch T, Leupold W, Keil U, Weiland SK. Frequency of infection and risk of asthma, atopy and airway hyperresponsiveness in children. *Eur Respir J* 1999;14:4-11.
 23. Martinez FD, Wright AL, Taussig LM, Holberg CJ, Halonen M, Morgan WJ. Asthma and wheezing in the first six years of life. The Group Health Medical Associates. *N Engl J Med* 1995; 332:133-8.

24. Martin AJ, McLennan LA, Landau LI, Phelan PD. The nature history of childhood asthma to adult life. *BMJ* 1980;280:1397-400.
25. Sears MR. Evolution of asthma through childhood. *Clin Exp Allergy* 1998;28:82-9
26. Strachan D, Gerritsen J. Long-term outcome of early childhood wheezing: population data. *Eur Respir J* 1996;9(suppl 21):42-7S.
27. Duff AL, Pomeranz ES, Gelber LE, *et al.* Risk factors for acute wheezing in infants and children: viruses, passive smoking, and IgE antibodies to inhalant allergens. *Pediatrics* 1993;142:535-40.
28. Cockcroft D. cigarette smoking, airway hyperresponsiveness, and asthma. *Chest* 1988;94:675-6.
29. Rylander E, Pershagen G, Eriksson M, Nordvall L. Parental smoking and other risk factors for wheezing bronchitis in children. *Eur J Epidemiol* 1993;9:517-26.
30. Ronchetti R, Bonci E, Cutrera R, *et al.* Enhanced allergic sensitization related to parental smoking. *Arch Dis Child* 1992;67:496-500.
31. Howarth PH. Is allergy increasing? Early life influence. *Clin Exp Allergy* 1998;28(suppl 6):2-6.
32. Steerenberg PA, Van Amsterdam JGC, Vandebriel RJ, Vos JG, Van Bree L, Van Loveren H. Environmental and lifestyle factors may act on concert to increase the prevalence of respiratory allergy including asthma. *Clin Exp Allergy* 1999;29:1304-8.