THE IMPACT OF SOME DEMOGRAPHIC FACTORS ON THE SEVERITY OF ASTHMA IN CHILDREN

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Objective: To investigate the association between some demographic factors and the levels of severity among asthmatic children.

Method: One hundred and twenty five asthmatic children aged between 6 months and 15 years were studied in pediatric and asthma clinics at King AbdulAziz University Hospital (KAUH). The assessment of clinical severity was based on the global strategy guidelines for asthma assessment and management. Subjects were grouped by age: infants (<1 year), toddlers (1-3 years), preschool or kindergarten (3-6 years), school (6-12 years), and adolescents (12-15 years). Demographic data (age and sex) were analyzed for any statistical significance.

Results: Boys were 80 (64%) and predominated in all age groups except in infants. 10(8%) were infants, 22(17.6%) toddlers, 26 (20.8%) preschool or kindergarten, 26 (20.8%) school, and adolescents 26(20.8%).

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The levels of severity of asthma were intermittent 11 (8.8%), mild persistent 74 (59.2%), moderate persistent 33 (26.4%), and severe persistent 7 (5.6%). Frequency and severity of asthma were significantly higher in boys than girls (P<0.05) and at school age compared to other age groups (P<0.05).

Conclusion & recommendation: This study demonstrated an increase in the frequency and severity of bronchial asthma in boys, particularly, those at school age. As stated in the literature, correlating demographic factors and clinical status can help in the prediction of the severity of asthma and possibly its outcome. This demands greater vigilance in the care of this group of asthmatics more than any others.

Key Words: Asthma, asthma severity, asthma guidelines, gender, bronchial asthma, demographic data.

INTRODUCTION
Asthma is considered the commonest chronic inflammatory condition of the respiratory system.1,3 Currently, asthma is one of the illnesses with the highest rate of increase in mortality and morbidity.2,4 Although, there may be a spontaneous recovery without therapeutic intervention, health researchers are still working hard on the epidemiology, diagnosis, assessment and management of this troublesome condition.1,3,5

Several factors have been documented as the cause of the aggravating symptoms. Demography, such as age and sex, are among the factors that may influence the symptoms and clinical severity of asthma.5,8 Internationally, work by several authors has revealed that in some age groups boys are more severely and frequently affected than girls.4,5 With increasing age, the prevalence of asthma continues to be higher in boys than girls, reaching a peak by mid-childhood.5,8 The risk of developing asthma in boys younger than 10 years-old is almost double that in girls. By the age of 14, boys are four times more likely to develop chronic asthma and as likely to be hospitalized.5,10,11 However, during and after adolescence, the predominance begins to decline. Indeed, post-puberty females are at slightly greater risk of developing asthma and up to three times more likely to be hospitalized.

Therefore, it is of paramount importance that the impact of different age groups and gender on the levels of severity of asthma be explained. Additionally, the predominant age/sex in each severity group needs to be taken into account. Recently, some of these findings have been suggested by local reports in Saudi Arabia.6,12 The study of these factors will help in predicting the prognosis and possibly the overall management of this common illness. The recently revised global strategy for asthma management guideline report came out with a classification of the clinical severity according to the different age groups.13 Hence, the conduct of this study was to investigate the association between some demographic factors and the level of asthma severity among asthmatic children seen at King Abdulaziz University Hospital (KAUH).

METHODS
All children presenting to pediatric and asthma clinic in (KAUH) during 1998-1999 with symptoms of chronic and/or recurrent
cough, recurrent shortness of breath and/or wheezy chest were sequentially selected. They were assessed clinically to establish the diagnosis of bronchial asthma based on the revised global strategy guidelines for asthma assessment and management.13 Any doubtful cases or not confirmed asthma were excluded from the study.

Patients were divided into five age groups according to the recognized classification.1,14 These groups were: infants (≤ year), toddlers (1-3 years), pre-school (3+-6 years), school age (6+-12 years) and adolescent group (12+-15 years). The Global Strategy for asthma assessment and management report was used to classify the clinical severity into intermittent, mild persistent, moderate persistent and severe persistent groups.13

To exclude diagnosis other than bronchial asthma, all subjects had stool analysis, complete blood count; some subjects had plain radiography of the chest. Few had other specific investigations such as barium studies, echocardiogram and sweat test.

Data was entered in a personal computer. Statistical analysis including frequency tables, correlation analysis and analysis of variance were performed using SPSS statistical package (version 7.5).

## RESULTS

One hundred and twenty five asthmatic children, 80 of whom were males accounting for 64% of the study group as shown in Table 1, were included in the study. Except in the infants group, boys were significantly predominant in all age groups (P<0.05) (Figure 1).

The school age group showed the highest frequency of asthma, comprising 49 cases, which formed 39.2% of all cases. Out of all severity levels, mild-persistent type was the highest 74(59.2%). The frequencies of other severity types are shown in Table 2.

Asthma frequency and severity were significantly higher in the school age group compared to the other groups (P<0.05) as shown in Figure 2.

### Table 1: Demographic data and asthma severity levels of the studied group

| Category               | Frequency (%) |
|------------------------|---------------|
| Age groups (years):    | N=125         |
| Infancy (< 1)          | 10 (8.0)      |
| Toddlers (1-3)         | 22 (17.6)     |
| Pre-school (3+-6)      | 26 (20.8)     |
| School (6+-12)         | 49 (39.2)     |
| Adolescence (12+-15)   | 18 (14.4)     |
| Sex:                   |               |
| Boys                   | 77 (61.6)     |
| Girls                  | 48 (38.4)     |

### Table 2: Asthma severity levels among the group

| Severity levels       | Frequency | Boys | Girls | Percent |
|-----------------------|-----------|------|-------|---------|
| Mild-Intermittent     | 8         | 3    | 5     | 8.8     |
| Mild-Persistent       | 51        | 23   | 28    | 59.2    |
| Moderate-Persistent   | 16        | 17   | 6     | 26.4    |
| Severe Persistent     | 5         | 2    | 4     | 5.6     |

### DISCUSSION

In most developed countries and in some developing countries, it has been found that bronchial asthma is the commonest chronic inflammatory condition affecting the respiratory system.13,15,16 It has been noticed that asthma has relatively different clinical severity levels in childhood and needs special additional control measures.3,4,13
Nevertheless, this disease can be effectively controlled by clinicians if the severity of the symptoms are recognized, the appropriate therapy is initiated, and with proper education the aggravating factors are avoided.\textsuperscript{16,17} In this work, we tried to find the correlation between the different severity levels of asthma and the patients' age and gender factors. In other words, it was to discover which age/gender groups of asthmatics had the mildest, severest or other levels of severity.

This study revealed male predominance in all ages except in the age group of infants. Several authors have also reported this male predominance in age subgroups before the age of puberty.\textsuperscript{5,6,18} The second important finding in this study was that boys had more severe degrees of asthma than girls. The exact mechanisms for this sex difference in asthma prevalence and severity cannot be fully explained by the anatomical difference.\textsuperscript{19} Most epidemiological studies of bronchial responsiveness in children have found no significant difference in prevalence of bronchial hyperresponsive-ness with gender.\textsuperscript{20} However, in some studies, boys have been found to have a higher prevalence of skin test reactivity to aeroallergen and higher total serum IgE, but other studies have not confirmed this finding.\textsuperscript{21,22} Other factors include: exercise, activity difference, passive or non-passive smoking and exposure to different outdoor environmental allergens.

The equal prevalence of asthma at infancy is probably due to the equal chances of environmental exposure and to similar physiologic and anatomic characteristics of this age. However, hyper-reactive airway disease as a result of medical or surgical causes other than bronchial asthma made the establishment of the diagnosis of asthma in this age group a difficult task for most health practitioners.\textsuperscript{1,23,24}

In this study, the highest number of severe cases in both sexes, belonged to the school age group 6-12 years though the males predominated. Previous reports in several countries have also documented this important finding.\textsuperscript{1,5,6,25} These gender shifts may be related to undefined hormonal or

\begin{figure}[h]
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\caption{Asthma frequency and severity level}
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biochemical alterations that affect immunological or biological pathways relevant to asthma pathogenesis. Several hypotheses have been postulated for this. These include additional sensitization to new allergenic antigens abundant in the school environment, stress associated with the learning process, exposure to viral infections, food supply and the increase physical exercise at this age. Additional preventive measures in the school environment and an increase in public awareness of the problem are therefore necessary.

In summary, the frequency of asthma has increased, being more severe among boys, particularly, of school age. This finding is compatible with what has been previously reported in other countries. Consequently, greater attention should be paid to the care of this subgroup of asthmatic children than the other groups. It is recommended that factors affecting the prevalence of asthma in school children be assessed and active preventive measures taken. The study of demographic factors will not only help in the management of this common illness but also in the prediction and prognosis of its eventual outcome.

REFERENCES

1. Sly M. Nelson Textbook of Pediatrics. In: Behrman R, Kliegman R, Arvin A, editors. Asthma. 16th ed. Philadelphia: Saunders; 2000. p. 664-80.
2. Kemper KJ. Chronic asthma: An update. Pediatr Rev 1996;17(4):111-7.
3. Ellis E. Asthma in infancy and childhood. In: Middleton EJ, Reed CE, Ellis EF, Adkinson NF, Yunginger JW, Busse WW, editors. Allergy Principles and Practice, 4th ed. St. Louis: Mosby; 1993. p. 1225-62.
4. National Heart, Lung and Blood Institute/World Health Organization: Global Strategy for Asthma Management and Prevention. NHLBI/WHO Workshop Report. Publication No. 95-3659. National Institutes of Health, Bethesda, MD, (revised) 1998.
5. Goldenhersh MJ, Rachelefsky GS. Childhood Asthma: Overview. Pediatrics in review 1989;10(8):227-33.
6. Al-Frayh AR, Nahdi M, Benar ER, Jawadi TQ. Epidemiology of asthma and allergic rhinitis in two coastal regions of Saudi Arabia. Euro Ann Allergy Clin Immunol 1990; 21(10):389-93.
7. Al-Frayh AR. Asthma patterns in Saudi Arabian children. J R Soc. Health 1990;110(3):98-100.
8. Redline S, Gold D. Challenges in interpreting gender differences in asthma. Am J Respir Crit Care Med 1994;150:1219-21
9. Schachter EN, Doyle CA, Beck GJ. A prospective study of asthma in a rural community. Chest 1984; 85:623-37.
10. Siegel SC, Katz RM, Rachelefsky GS. Asthma in infancy and childhood. In: Middleton C, Reed C, Ellis, editors. Allergy: Principles and Practice. Philadelphia: WB Saunders Co; 1983. p. 863-900.
11. Skobeloff EM, Spivey WH, St. Clair SS, et al. The influence of age and sex on asthma admission. JAMA 1992; 268:3437-40
12. Al-Frayh A, Mohareek K, Shimenneri A, Koshak E. The National protocol for the diagnosis and management of Asthma. 2nd ed. Ministry of Health publication (Riyadh): Saudi Arabia, 2000.
13. National Heart, Lung and Blood Institute/World Health Organization: Global Strategy for Asthma Management and Prevention. NHLBI/WHO Workshop Report. Publication No. 95-3659. National Institutes of Health, Bethesda, MD, (revised) 1998.
14. Colson ER. Toddler development. PER 1997;18(8):255-9
15. Dodge RR, Burrows B. The prevalence and incidence of asthma and asthma-like symptoms in a general population sample. Am Rev Resp Dis 1980; 122:567-75.
16. Busse WW. Inflammation in asthma: the cornerstone of the disease and target of therapy. J Allergy Clin Immunol 1998; 102:S17-S22
17. Kenny YCK, Craig AJ. Chronic Asthma Therapy. Pediatrics in Review 1999;10:327-34
18. Blair H. Natural History of childhood asthma. Arch Dis Chil 1977; 52:613-9.
19. Haranahan J, Tager I, Castile R, et al. Pulmonary function measures in healthy infants variability and size correction. Am Rev Resp Dis 1990; 141:1127-35.
20. Sears M, Burrows B, Flannery E, et al. Relation between airway responsiveness and serum IgE in children with asthma and in apparently normal children. N Engl Med 1991; 325:1067.
21. Friedhoff L, Meyers D, Marsh D. A genetic epidemiologic study of human immune responsiveness to allergens in an industrial population. II. The association among skin test sensitivity, total serum IgE, age, sex, and the
reporting of allergies in a stratified random sample. J Allergy Cline Immune 1984; 73:490-6.

22. Barbee R, Lebowitz M, Thomson, et al. Immediate skin test reactivity in a general population sample. Arch Intern Med 1976; 82:129-34.

23. Strachen DP. The prevalence and natural history of wheezing in early childhood. J R Coll Gen Prac 1985;35:182-4.

24. Martinez FD, Wright AL, Taussig LM, et al. Asthma and wheezing in the first six years of life. N Engl J Med 1995; 332:133-8.

25. De Benedictis FM, Canny GJ, Levison H. The progressive nature of childhood asthma. Lung 1990;168 Suppl:278-85

26. Dhivert H, Hide D, Weinberg E. Allergies at school. The UCB Institute of Allergy- a division of UCB s.a. 1999.