

# Recurrent visits and admissions of children with asthma in central Saudi Arabia

*Sami M. Al-Yami, BPharma, MBBS, Khaled A. Mohajer, BSC, MBBS, Majed I. Al-Jeraisy, Pharm D, Ahmed M. Batarfi, BPharma, MS, Mostafa A. Abolfotouh, MD, FASHA.*

## ABSTRACT

**الأهداف:** تحديد فئات الأطفال الأكثر عرضة للإصابة بنوبات الربو الشعبي من حيث العمر والجنس. ومعرفة أهم المؤشرات التي تحدد مدى شدة النوبات، وكذلك تقييم صحة الطرق المستخدمة في علاج نوبات الربو الشعبي.

**الطريقة:** تم عمل دراسة مقطعية في قسم الطوارئ بمدينة الملك فهد الطبية، الرياض، المملكة العربية السعودية خلال الفترة من يناير إلى مارس 2009م. حيث تم إجراء مقابلات شخصية مع آباء الأطفال المصابين والبالغ عددهم 185 طفلاً ممن أتوا للمستشفى نتيجة تعرضهم لنوبات الربو الشديدة لأكثر من مرة خلال الستة أشهر السابقة وبذلك تم جمع البيانات الخاصة بالعوامل المحتملة التي تزيد من خطر الإصابة والطرق الصحيحة لاستخدام العلاج.

**النتائج:** كانت غالبية المرضى من الذكور (71.9%)، وبلغت نسبة الفئة العمرية (1-6 أعوام) (58.9%) في حين بلغت (8.1%) ممن حضروا إلى قسم الطوارئ بسبب تعرضهم لنوبات الربو الشديدة لأكثر من مرة خلال الستة أشهر السابقة. تمكن قرابة ثلثي الآباء (65.9%) من شرح الطريقة الصحيحة لاستخدام أجهزة الاستنشاق. وكان الرضع أقل الفئات العمرية تعرضاً للمرض ( $p=0.02$ )، في حين كانت الإصابة أشد خطورة بين المرضى الذين يستخدمون العلاج بطريقة صحيحة ( $p=0.046$ ).

**خاتمة:** استخدم أكثر الآباء العلاج بطريقة صحيحة وقد ارتبط ذلك كثيراً بمدى شدة المرض، غير أن هذا لا يعد مؤشراً يدلنا على مدى شدة المرض حيث أن آباء الأطفال الذين يُصابون بنوبات ربو متكررة تكون لديهم فرصة أكبر من غيرهم في ممارسة الطريقة الصحيحة لاستخدام العلاج.

**Objectives:** To identify the pediatric age group and most affected gender by asthma, and to determine the significant predictors of severity of asthma, and assess the appropriateness of asthma medication administration.

**Methods:** This cross-sectional study was carried out at Emergency Department (ED) of children's Hospital at

King Fahad Medical City, Riyadh, Kingdom of Saudi Arabia from January to March 2009. Interviews were carried out with the parents of 185 children, who presented to the Hospital with asthma exacerbation more than once over the last 6 months, to collect data of possible risk factors, and appropriateness of medication administration technique.

**Results:** Most patients were males 71.9%, aged 1-6 years (58.9%), and 8.1% of them presented to the ED because of asthma exacerbation more than once over the last 6 months. Approximately two-thirds (65.9%) of the parents explained the way of meter dose inhaler administration correctly. Infants were significantly the least affected group ( $p=0.02$ ). Severity was significantly higher among appropriate users of medications ( $p=0.046$ ).

**Conclusion:** Appropriateness of medications administration was significantly associated with severity. However, this may not be considered a valid predictor of severity, as parents of children with recurrent attacks may have a better chance of being taught how to use medications.

*Saudi Med J 2010; Vol. 31 (8): 921-924*

*From the Department of Internal Medicine (Al-Yami, Mohajer), King Abdulaziz Medical City, King Abdullah International Medical Research Center (Al-Jeraisy, Abolfotouh), King Saud Bin-Abdulaziz University for Health Sciences, and King Fahad Medical City (Batarfi), Riyadh, Kingdom of Saudi Arabia.*

*Received 26th April 2010. Accepted 30th June 2010.*

*Address correspondence and reprint request to: Prof. Mostafa A. Abolfotouh, Biobanking Section, King Abdullah International Medical Research Center, King Saud Bin-Abdulaziz University for Health Sciences, PO Box 22490, Riyadh 11426, Kingdom of Saudi Arabia. Tel. +966 (1) 2520088. Ext. 14469. Fax. +966 (1) 2520772. E-mail: mabolfotouh@gmail.com*

Asthma is the most common chronic illness of childhood with a very high socioeconomic cost.<sup>1</sup> It is the single most prevalent cause of childhood disability, and has accounted for much of the recent rise in disability among children.<sup>2</sup> Childhood bronchial asthma is a chronic disease with an increasing prevalence as well as a number of preventable hospital emergency visits and admissions.<sup>3,4</sup> Increasing hospital admissions and visits to the emergency room are well-recognized outcomes, reflecting the degree of severity of bronchial asthma.<sup>2</sup> In children <15 years old, asthma is the most common cause of hospitalization other than infections.<sup>5</sup> In Saudi Arabia, a number of studies have been conducted to investigate hospital admission and readmission in bronchial asthma.<sup>6-11</sup> In Al-Khobar, Kingdom of Saudi Arabia (KSA), the rate of hospital admissions due to asthma among asthmatic school boys was found to be 12% in 1995.<sup>6</sup> This study aims to identify the most affected pediatric age group and gender by asthma presenting to the Emergency Department (ED) of the Children's Hospital at King Fahad Medical City (KFMC) in Riyadh, and to determine the significant predictors of severity of asthma. In addition to assess the appropriateness of asthma medication administration. These information are expected to help in preventing the most preventable factors associated with the disease exacerbation, and the study is expected to help better in provision of appropriate services for the concerned children, and their families.

**Methods.** The KFMC in Riyadh, Kingdom of Saudi Arabia, is a tertiary Medical Care Center that contains 5 specialized hospitals. We conducted our study in the ED of one of these hospitals (Children's Hospital). Our population of interest here are children who presented to the ED of the Children's Hospital of KFMC and were diagnosed with asthma exacerbations, or hyperactive airway disease in scattered times through the period from January to March 2009. In the present cross sectional study, we have formulated a questionnaire that contains demographic data including; medical record number (to make sure there is no duplication), gender and age, as well as questions related to the research objectives that include the number of ED presentation(s) due to asthma in the last 6 months, number of admissions to the general wards if any, number of intensive care unit (ICU) admissions and whether the child was intubated or not, asthma medication(s) used, and possible risk factors known to be involved in the pathophysiology of asthma. Finally, the parent(s) was/were asked to demonstrate how he/she usually administers the asthma medication to their child and assessed according to the 5 steps of MDI administration: Remove the cap and hold upright, shake the inhaler, use of spacers, apply spacer

for 10 seconds, give 5-10 seconds between puffs. Results were interpreted as follows; no steps missed = explained correctly, <2 steps missed = needed correction, and >2 steps missed = failure to explain correctly. Using the same meter dose inhaler (MDI) brands throughout the last 6 months by all patients was assured.

**Ethical issues.** We completed all questionnaires personally through a direct interview with the parent/s after we informed them on the objectives of the study, and the privacy of all information to be given. Only those who were willing to participate in the study were included. Interview was carried out in a private area. The study proposal was approved by the research committee, and institutional review board of the KFMC (Application # 08-028).

**Data Analysis.** Data were entered, reviewed, and analyzed in an IBM personal computer and analyzed by the Statistical Package for Social Science version 13 (SPSS Inc, Chicago, IL, USA) software using the necessary tests. Odds ratios (OR) with the corresponding 95% confidence interval (CI) were calculated for predictors of ED presentation. Statistical significance was considered at *p*-value of <0.05.

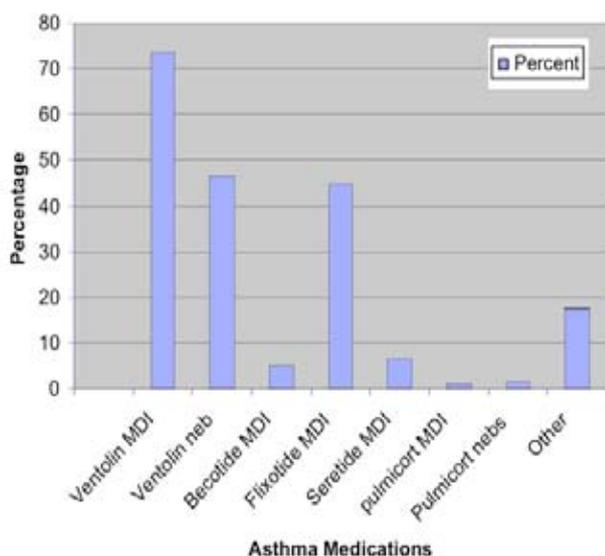
**Results.** Table 1 shows the results of 185 completed questionnaires, most patients were male. We found also that 88.1% of them presented to the ED because of asthma exacerbation more than once, and 60% of the patients presented to the ED more than 3 times over the last 6 months. The family history of asthma was reported for 77.8% of cases. More than one-third (40%) of the patients were admitted to the hospital at

**Table 1 -** Distribution of study sample according to characteristics N=185.

Characteristics	N (%)
<i>Gender</i>	
Male	133 (71.9)
Female	52 (28.1)
<i>Age group (year)</i>	
<1year	36 (19.5)
1-6	109 (58.9)
>6-12	40 (21.6)
<i>Family history of asthma</i>	
Negative	41 (22.2)
1 <sup>st</sup> degree relative	111 (60.0)
2 <sup>nd</sup> degree relative	33 (17.8)
<i>ED presentation</i>	
Once	22 (11.9)
2-3 times	52 (28.1)
>3 times	111 (60.0)
ED - emergency department	

**Table 2** - Association between emergency department, presentation, and the use of metered dose inhaler (MDI) and age groups.

Characteristics	Emergency department presentation			Total n (%)	P-value
	Once n (%)	2-3 times n (%)	>3 times n (%)		
<b>Age group</b>					
<1year	7 (19.4)	17 (47.2)	12 (33.3)	<b>36 (100)</b>	0.02
1-6	12 (11.0)	24 (22.0)	73 (67.0)	<b>109 (100)</b>	
7-12	3 (7.5)	11 (27.5)	26 (65.0)	<b>40 (100)</b>	
<b>Total</b>	<b>22 (11.9)</b>	<b>52 (28.1)</b>	<b>111 (60.0)</b>	<b>185 (100)</b>	
<b>Use of MDI</b>					
No use	11 (34.4)	14 (43.7)	7 (21.9)	<b>32 (100)</b>	0.046
Explained well	6 (4.9)	31 (25.4)	85 (69.7)	<b>122 (100)</b>	
Partially explained	2 (18.2)	3 (27.3)	6 (54.5)	<b>11 (100)</b>	
Fail to explain	3 (15.0)	4 (20.0)	13 (65.0)	<b>20 (100)</b>	
<b>Total</b>	<b>22 (11.9)</b>	<b>52 (28.1)</b>	<b>111 (60.0)</b>	<b>185 (100)</b>	


**Figure 1** - Pattern of asthma medication use among children. MDI - metered dose inhaler, nebs - nebulization solution.

least 3 times in the last 6 months, of whom 20.3% were admitted to the pediatric intensive care unit (PICU), and one third of them were intubated. There was no significant difference between males, and females in term of ED presentation ( $p=0.171$ ), ward admissions ( $p=0.580$ ), and PICU admissions ( $p=0.150$ ). Children over 6 years of age experienced significantly more than one exacerbations than younger children did (Table 2). Unexpectedly, 65.9% of the parents explained correct MDI administration correctly. However, a significantly higher proportion of those experienced 3 or more ED visits. Around one third (34%) of the patients had a smoker at home, however, association of the presence of a smoker at home with the number of visits to the ED was not significant (OR=0.655, 95% CI:0.26-1.65,  $p=0.70$ ).

The pattern of asthma medication use is shown in Figure 1.

**Discussion.** Asthma exacerbation was higher in boys. This finding was similar to what has been found in another local study.<sup>6</sup> Most of cases were between age of one and 6 years. This finding was in agreement with the finding of another study of risk factors of ER visits for asthma studied among Saudi children, where the highest prevalence of ER visits was among younger children.<sup>7</sup> This might be due to the vigorous activity, and unsafe exposure to allergens, and source of infections in this age group. Most of the patients (88.1%) had recurrent visits to the ED in the last 6 months, and two fifth's of those had an admission to the hospital, and one fifth of those admitted to the hospital had an ICU admission. This again could be due to severe exacerbations secondary to infections. Though most parents of children with asthma (66%) demonstrated correct MDI administration, yet there was a significant increase in the number of admissions in their children. This could be explained by the fact that with increased presentation to the ED and admissions, there is a parallel increase in the parent's awareness of their children's medications and appropriate method of administration.

A good number of the patients had a smoker at home (34%). This figure is high when compared with the recent figure of 16.9% among Saudi adults.<sup>12</sup> However, we failed to correlate this to the number of ED presentation. This is similar to what has been found in another large study conducted in Abha city by Al-Shehri and colleagues,<sup>10</sup> where smoking in the family was not a significant predictor of asthma in children, after adjusting for possible confounding factors.

The strength of our study arises from number of things. First, the method of data gathering; where

we completed the questionnaires through direct communication with the parents, which assured better understanding of the parents of the the questions, and improved our understanding of their answers. Second, the place where we conducted our interview provided them with the privacy they needed, which made them volunteer some answers even before asking them. However, one of the limitations of our study was the relatively small sample size (n=185). Being a single center-based study may be another limitation. One more limitation is that the present study did not include all possible confounders of severity such as; the presence of pets and animals, home environment, in addition to seasonal variations among others. Meanwhile, the use of different modes of inhalation like Symbicort Turbuhaler, or Flixotide discus may act as another confounder.

Most of the patients were males, and the most affected pediatric age group was 1-6 years. Most of the parents demonstrated correct asthma medication administration. Appropriateness of medications administration was significantly associated with frequency of severe exacerbations. However, this cannot be considered a valid predictor of severe exacerbations, as parents of children with recurrent attacks may have a better chance of being taught how to use the medications. Further large-scale studies to confirm our findings are recommended.

**Acknowledgment.** *We would like to acknowledge the staff of King Abdullah International Medical Research Center for their outstanding support throughout the study, and special thanks to the Emergency Department of the Children's Hospital at King Fahad Medical City, Riyadh, Kingdom of Saudi Arabia.*

## References

1. Wang LY, Zhong Y, Wheeler L. Direct and indirect costs of asthma in school-age children. *Prev Chronic Dis* 2005; 2: A11.
2. Newacheck PW, Halfon N. Prevalence, impact, and trends in childhood disability due to asthma. *Arch Pediatr Adolesc Med* 2000; 154: 287-293.
3. Lougheed MD, Olajos-Clow JG. Asthma care pathways in the emergency department. *Curr Opin Allergy Clin Immunol* 2010; 10: 181-187.
4. Gürkan F, Ece A, Haspolat K, Derman O, Bosnak M. Predictors for multiple hospital admissions in children with asthma. *Can Respir J* 2000; 7: 163-166.
5. McCormick MC, Kass B, Elixhauser A, Thompson J, Simpson L. Annual report on access to and utilization of health care for children and youth in the United States--1999. *Pediatrics* 2000; 105: 219-230.
6. Al-Dawood KM. Pattern and risk factors associated with hospital emergency visits among schoolboys with bronchial asthma in Al-Khobar. *Ann Saudi Med* 2002; 22: 29-33.
7. Al-Dawood K. Epidemiology of bronchial asthma among schoolboys in Al-Khobar city, Saudi Arabia: cross-sectional study. *Croat Med J* 2000; 41: 437-441.
8. Al-Dawood K. Parental smoking and the risk of respiratory symptoms among schoolboys in Al-Khobar City, Saudi Arabia. *J Asthma* 2001; 38: 149-154.
9. Al-Dawood K. Pattern of smoking among parents of schoolboys. *Saudi Med J* 2000; 21: 735-799.
10. Alshehri MA, Abolfotouh MA, Sadeg A, Al Najjar YM, Asindi AA, Al Harthi AM, et al. Screening for asthma and associated risk factors among urban school boys in Abha city. *Saudi Med J* 2000; 21: 1048-1053.
11. Al Frayh AR, Shakoor Z, Gad El Rab MO, Hasnain SM. Increased prevalence of asthma in Saudi Arabia. *Ann Allergy Asthma Immunol* 2001; 86: 292-296.
12. Al-Turki KA, Al-Baghli NA, Al-Ghamdi AJ, El-Zubaier AG, Al-Ghamdi R, Alameer MM. Prevalence of current smoking in Eastern Province, Saudi Arabia. *East Mediterranean Health Journal* 2010; 16: 671-676.

### Related topics

Liu QQ, Chen SH, Liang MB, Feng LY. Induced sputum eosinophil count for the diagnosis of bronchial asthma. *Saudi Med J* 2010; 31: 710-712.

Al-Badr AH, Kamil AG, Wabbah EF, Zimmerman VA, Al-Tannir MA. Characteristics of women attending a urogynecology clinic in Riyadh. *Saudi Med J* 2010; 31: 86-87.

Alanezi M, Al-Jahdali HH, Al-Hajjaj MS, Zeitoni MO, Al-Tasan TH. Levels of acceptance of Asthma Control Test questionnaire among Saudi patients attending 5 tertiary care hospitals in Saudi Arabia. *Saudi Med J* 2009; 30: 546-549.