

Perception of the role of inhaled corticosteroids and factors affecting compliance among asthmatic adult patients

Hamdan H. Al-Jabdali, MD, FRCPC, Adel I. Al-Zabrani, MBBS, Salihah T. Al-Otaibi, Imad S. Hassan, MRCP (UK), Mohamad S. Al-Moamary, MRCP (UK), Ahmad S. Al-Dubaim, MD, FRCPC, Abdullah A. Al-Shimemeri, MD, FRCPC, Abdulaziz S. Al-Dawood, MD, FRCPC.

ABSTRACT

Objective: To examine the patient characteristics linked with reduced adherence to inhaled corticosteroids (ICS) use.

Methods: A prospective study of adult asthmatic patients who were prescribed with ICS and are under regular follow-up at the pulmonary outpatient clinics between June 1st, and December 31st, 2001, at King Fahad National Guard Hospital in Riyadh. All patients underwent structured interviews with an investigator.

Results: Included in the study were 334 patients. Thirty eight percent (38%) of the patients reported irregular use of ICS. Factors associated with irregular ICS use were a negative perception of the role of ICS ($p=0.03$) and less than high school education ($p=0.03$). Almost 50% (169/334) of all patients had concerns regarding ICS safety resulting in reduced willingness to use them. These concerns were again significantly related to the level of education and the patient's attitude to ICS. Among the most common fears hindering regular ICS use were "their potential to lead to addiction" (60%) and worry from steroid side effects (41%).

Conclusions: The result of this study raises the importance of patient's education and the importance of treatment of those involved in asthma care to educate the patient and discuss with them the role of asthma medications, particularly ICS, and to correct common fears and misconceptions.

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From the Division of Pulmonary (Al-Jabdali, Al-Otaibi, Al-Moamary, Al-Dubaim, Al-Shimemeri, Al-Dawood), Department of Medicine (Hassan), Department of Family Medicine (Al-Zabrani), King Fahad National Guard Hospital, King Abdul-Aziz Medical City, Riyadh, Kingdom of Saudi Arabia.

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Address correspondence and reprint request to: Dr. Hamdan H. Al-Jabdali, Head of Pulmonary Division, Department of Medicine - 1443, King Abdul-Aziz Medical City, King Fahad National Guard Hospital, PO Box 22490, Riyadh 11426, Kingdom of Saudi Arabia. Tel. +966 (1) 2520088 Ext. 14221/14209. Fax. +966 (1) 2520088 Ext. 14683. E-mail: Jabdali@yahoo.com

Asthma is a chronic inflammatory disease of the airways associated with bronchial hyper-responsiveness and reversible airflow obstruction.¹⁻⁴ It is a common condition that affects 5-10% of the population worldwide, the incidence and prevalence of which have increased during the past 20 years.⁵⁻⁸ The prevalence of asthma in the general population is 6.4% in the United States,⁹ and 4-23% in Saudi Arabia.¹⁰⁻¹¹

In addition to the health impact of asthma, there are also substantial economic costs. These include costs related to health services expenditure, loss of school and work time leading to poor scholastic performance and decreased productivity and disease-related morbidity and premature mortality. Asthma mortality and morbidity are still unacceptably high. More recent increases in asthma mortality reported from Britain, France and the United States may be related to the increased prevalence or severity of asthma or inadequate health care.^{6,7} Saudi Arabia is no exception.⁴ The high morbidity and mortality have been attributed in part to an over reliance on bronchodilators, and under use of inhaled and oral anti-inflammatory treatment.^{12,13}

Inhaled corticosteroids (ICS) are proven to have the greatest efficacy in the management of persistent asthma and remain the cornerstone of the current anti-inflammatory therapeutic regimens.¹⁴ Inhaled corticosteroids are shown to reduce the need for emergency care, hospitalization, and death from asthma.¹⁵ Trials with low to medium doses of ICS could not detect differences in growth rates in pre-pubertal children, documented no effect on bone mineral density and bone metabolism, and did not result in more cataract or glaucoma cases.¹⁶ For all of the above, contemporary treatment guidelines emphasize an aggressive approach, with the prompt and liberal use of anti-inflammatory medication to achieve long-term control of this inflammatory disease.¹⁷ Long-term adherence with prescribed ICS therapy is hard to obtain.¹⁸⁻¹⁹ Studies have reported that 50% of patients with chronic asthma do not use their medication at all or do not use them as prescribed.^{19,20}

Misconceptions of the role of ICS and fear of untoward side effects may reduce compliance to therapy, potentially resulting in poor asthma control and increased risk of severe asthma events.²¹⁻³⁰ To better understand how to provide effective counseling to asthmatic patients, we sought to determine their perception of the role of ICS and understand their fears and concerns regarding these agents.

Methods. Consecutive patients who visited the Adult Pulmonary Clinic at King Fahad National Guard Hospital in Riyadh, between June 1st, and December 31st, 2001 were eligible if they satisfied the following criteria: 1) Had at least 2 visits to the pulmonary clinic in the past year. 2) Physician's recorded diagnosis of bronchial asthma based on clinical criteria (wheezing, cough and shortness of breath) and spirometric criteria of (FEV₁/FVC ratio <80% plus increase of 12% and 200 ml of either FEV₁ or FVC). 3) Prescribed ICS in the past one-year by their physicians. The pulmonary consultants reviewed the chart for satisfaction of inclusion criteria and explained the rationale of the study to the patient. As per our hospital policy, Institutional Review Board (IRB) approval is not required for anonymous questioner. Patient who agreed to be enrolled in the study, were referred to the asthma educator for interview. The data collection was carried out by personal interview (asthma educator) using a structured questionnaire adapted from earlier relevant published studies.²¹⁻²⁸ This questionnaire was translated into Arabic, and pre-tested in 2 ways. First we reviewed the content with family medicine and pulmonary consultants, and then the revised questionnaire was pre-tested with 30 patients. This process allowed the questionnaire to be checked for proper flow or any potential problem regarding possible misinterpretation or patients misunderstanding. Based on pretest results, necessary adjustments were made to produce the finalized version of the questionnaire to be used in this study. The questionnaire items included: the socio-demographics including age, gender of the participant, marital status, educational level, job status and morbidity related to asthma. The questionnaire also included, items related to the pattern of use, perceived modes of action and side effects of inhaled corticosteroid therapy. We categorized patients as having completed high school (12 years or more of formal education) or not.²⁵ Patients were considered having a positive perception of inhaled steroid if he/she answered correctly 3 of the following 5 questions. 1) ICS prevent asthma attack. 2) ICS control asthma symptoms. 3) ICS reduce airway inflammation. 4) ICS is not used as bronchodilator (to open the airway). 5) ICS should not be used only during acute asthma attack.

The data collected was computer-analyzed using EPI INFO 6.04 statistical package. Descriptive statistics such as means and standard deviation were used to summarize the quantitative variables. Proportion and percentages were used to summarize category variables. Chi-square test was used to test statistical significance of differences between categorical variables, and differences were considered significant if the *p*-value is <0.05.

Results. A total of 334 patients satisfied the inclusion criteria and were interviewed in this study. Demographic characteristics of the patients and reported asthma severity are summarized in **Table 1**. The majority of the patients 257 (77%) had less than 12 years of formal education and 241 (72%) were unemployed. Mean age of study subjects was 47 ± 18 years, and the mean duration of asthma was 13 ± 10 years (±SD). At the time of interview the majority of the patients had mild asthma (83%). As shown in **Table 1**, 70% had a history of hospitalization for asthma, including 18% with previous intensive care unit admission, and 70% had been treated in an emergency

Table 1 - Patient socio-demographic characteristics and reported asthma severity.

Characteristics	n	(%)
Age (mean ± SD)	47.2 ± 17.9	
Gender		
Male	122	(36.5)
Female	212	(63.5)
Marital status		
Married	286	(85.6)
Single	48	(14.4)
Educational		
High School or more of education	77	(23.1)
Male	34	(79.0)
Female	43	(21.0)
Less than High School of education	257	(76.9)
Male	88	(34.0)
Female	169	(66.0)
Job		
Employed	93	(27.8)
Non-employed	241	(72.2)
Reported asthma severity		
Ever hospitalized for asthma	232	(69.5)
Ever hospitalized in ICU for asthma	60	(18.0)
Treated in emergency room for asthma in past 12 mos.	232	(69.5)
Hospitalized for asthma in past 12 mos.	117	(35.0)
Missed work or school because of asthma	56	(16.8)
*Asthma Severity in the past 4 weeks		
Mild	297	(88.9)
Moderate	30	(9.0)
Severe	7	(2.1)

*As defined by the National Heart, Lung and Blood Institute
ICU - intensive care unit.

room in the past 12 months. Sixty-two percent (208) had used ICS regularly in the past year as prescribed by their physician while 38% (126) reported irregular use of ICS. Fifty one percent (169) had concerns using ICS, the 2 most common concerns were: believe that ICS cause addiction (60%) and fear of side effects (41%). **Table 2** outlines the 5 most frequently quoted reasons for irregular steroid use. The number of patients who were categorized as having a positive perception on ICS use were 173 (52%) while 161 (48%) were categorized as having a negative perception. There was a significant positive correlation between regular user of prescribed ICS and patient's age, positive perception of ICS use and level of education (p -value 0.013, 0.0002 and 0.03 respectively) but there was no significant difference between regular ICS use and severity and duration of asthma (p =0.7 and 0.45 respectively) these correlations are outlined in **Table 3**. There is also a clear association between a positive perception of ICS and education of the patients, 83% (64/77) of patients with high school education or more, had positive perceptions, compared to 42% (109/257) of less educated have negative perception (p =0.0001). **Table 4** outlines the correlation between reason of irregular ICS use and patients' perception of inhaled steroid and level of education. The relation between patient's concerns using ICS, severity and duration of bronchial asthma, and adherence to ICS in relation to patient perception using inhaled steroid and level of education outlined **Table 5**.

Discussion. This study demonstrates that knowledge of asthma medicine by asthmatic patients is often poor with many false beliefs and misconceptions. Furthermore, these fears and misconceptions are related to the level of education and attitude towards ICS use. The advantage of this study is that all our patients has a confirmed diagnosis of bronchial asthma, and

all receive asthma education by a qualified asthma educator at tertiary care center and are followed up by pulmonologists. Furthermore, most of our patients have a history of significant asthma as outlined in **Table 2**. Interestingly, 89% of patients had mild asthma according to National Asthma Education and Prevention Program (NAEPP) classification of asthma severity (in the month preceding the enrollment in the study).¹ This could be explained by the nature of asthma, which tends to wax and wane over time, seasonal variation of symptoms, or as the patients' compliance tends to improve just before clinic visits. Compliance with asthma treatment is reported to vary between 20-70%.¹⁸⁻²⁷ In our study, compliance with ICS was reasonably high (62%), which may be a reflection of the fact that most of our patients had significant asthma and are followed up at tertiary care rather than at a primary care setting. The limitation of the study could be that compliance or noncompliance was self reported. However, even studies where tablets were counted or medication was weighted the compliance were only 50%.³¹ Seventy percent of our patients were not educated; this may be due to over presentation of women but it is clear from this study and other studies that education was also contributory to patient's false belief, about ICS side effects, concerns and negative perception on ICS role in management of bronchial asthma. Economic factor is a known contributing factor for non-compliance.^{33,34} All patients at our institute enjoy free dispensing of medication and free access to health care. Therefore, economic factors are non-contributory to non-compliance in our patients. There is a clear association between the perception of ICS use and severity of asthma (p =0.0004). Thirty eight percent (126/334) of the patients did not take ICS regularly as they thought that they ought to use

Table 2 - Six most common reason for irregular use of inhaled steroid.

Reason	n	(%)
I use it only when I need it	74	(59)
Sometimes I forget to use it	48	(38)
I'm too lazy	43	(34)
I feel fine	32	(25)
I feel better with bronchodilator	26	(21)
It doesn't help me feel better	20	(16)
Total number of patients who have irregular use 126.		

Table 3 - Factors affecting compliance with inhaled corticosteroid.

Characteristics	Regular use n=208	Irregular use n=126	P value
Age (mean ± SD)	45 ± 18	50 ± 18	0.013
<i>Severity of asthma in the past 4 weeks</i>			
Moderate to Severe	22 (11)	15 (12)	0.7
Mild	186 (89)	111 (88)	
<i>Perception</i>			
Positive	124 (60)	49 (39)	0.0002
Negative	84 (40)	77 (61)	
<i>Education of patients</i>			
High school or more	56 (27)	21 (17)	0.03
Less than high school	152 (73)	105 (83)	
<i>Duration of asthma</i>			
≤1 year	18 (9)	8 (6)	0.45
>1 year	190 (91)	118 (94)	

Table 4 - Correlation between reasons of irregular ICS use and level of education and perception of ICS.

†Reason for not using ICS regularly	*Positive perception	*Negative perception	<i>P</i> -value	*High school education or more	*Less than high school education	<i>P</i> -value
I use it only when I need it	28	46	0.003	11	63	0.018
Sometimes I forgot to use it	17	31	0.01	3	45	0.0009
I am too lazy	12	31	0.0005	3	40	0.003
I feel fine	10	22	0.012	5	27	0.201
I feel better with bronchodilator	13	13	0.83	6	20	0.84
It doesn't help me feel better	3	17	0.0005	2	18	0.11

†Total number of patient who have irregular use (126), *Indicates number of the patients, ICS - inhaled corticosteroids

Table 5 - Correlation between patients concerns using ICS, asthma severity, duration, level of education and perception of ICS.

†Patients concerns using ICS	*Regular	*Irregular	<i>P</i> -value	*High school education or more	*Less than high school education	<i>P</i> -value	*Positive perception	*Negative perception	<i>P</i> value
Cause addiction	56	45	0.11	11	90	0.003	38	63	<0.0001
Fear of side effects (in general)	30	39	0.0003	9	60	0.028	25	44	0.001
It cause sore throat and hoarseness of voice	20	25	0.0098	6	39	0.107	24	21	0.94
Causing weight gain	22	9	0.24	14	17	0.001	22	9	0.03
Causing diabetes mellitus	20	10	0.526	5	25	0.42	11	19	0.058

†Total number of patient who have concern using ICS was 169, *Indicate number of the patients. ICS - inhaled corticosteroids

it only when needed (59%), are feeling well (25%), or as bronchodilators quickly relieved their symptoms (21%). This again reflects poor knowledge in the part of the patients, regarding the role of steroid in prevention of asthma and the need of prolonged use of anti-inflammatory medications even after the relieve of symptoms. There were good correlation between the perception of the role of ICS and pattern of use. In our study, 72% (124/173) of the patients who had a positive perception of the role of ICS actually were using it regularly, while 61% (77/126) of patients who were using ICS irregularly had a negative perception ($p=0.0387$). Our study clearly showed that the 44% (148/334) of our patients and despite having chronic symptoms as reflected by their long asthma history; have significant fears and misconceptions regarding asthma therapy. This is probably because most of the

patients are not educated; asthma education they received did not address these concerns specifically or because of their own interpretation of the drug effect. The misconception that the ICS cause addiction or dependence has been reported.³⁴ This misconception is quite common in our patients 60%; this may be related to the level of education, 66% (67/101) who responded positively to this question were non-educated ($p=0.007$). Other understandable concerns about ICS expressed by our patients are diabetes mellitus [18% (30/169)], weight gain [18% (31/169)] and osteoporosis [12% (10/87)]. These concerns were more common in the educated group, weight gain concern was 77% (24/31) in the educated patients ($p=0.0161$). Such concern is uncommon with low dose of ICS.¹⁶ Patient's regular use of ICS will definitely improve if the health care provider explained to the patients the relation between

ICS dose and the above side effects, the morbidity, and long-term consequences of untreated asthma.^{5,17}

In conclusion, this study reveals that a large proportion of asthmatic patients do not understand the role of their medications and have many fears and misconceptions on ICS treatment reducing their willingness to use these agents. This study stresses the need for asthma caregivers to break down those barriers to effective therapy and ensure proper patient education and counseling in order to optimize compliance with therapy and, it is hoped, to reduce the untoward consequences of asthma.

References

- National Asthma Education and Prevention Program. Expert Panel Report 2: Guidelines for the Diagnosis and Management of Asthma. Bethesda (MD): National Heart, Lung, and Blood Institute. April 1997, (NIH Publication No. 97-4051).
- The British Guidelines on Asthma Management. British Thoracic Society. *Thorax* 1997; 52 (Suppl 1): S2-S8.
- Barbee RA, Murphy S. The natural history of asthma. *J Allergy Clin Immunol* 1998; 102: S65-S72.
- The National Protocol for the Management of Asthma. 3rd ed. Ministry of Health Publication 2000, Riyadh, Saudi Arabia.
- Reed CE. The natural history of asthma in adults: The problem of irreversibility. *J Allergy Clin Immunol* 1999; 103: 539-547.
- Mannino D, Homa D, Pertowski C, Ashizawa A, Nixon L, Johnson C, et al. Surveillance for Asthma-United States, 1960-1995. *MMWR* 1998; 47: 1-10.
- Jarvis D, Bumey P. The epidemiology of allergic disease. *BMJ* 1998; 316: 607-610.
- Upton M, McConnachie A, Mcsharry C, Hart C, Smith G, Gillis C, et al. Intergenerational 20 year trends in the prevalence of asthma and hay fever in adults: Midspan family study surveys of parents and offspring. *BMJ* 2000; 321: 88-92.
- Mitka M. Why the Rise in Asthma? New Insight, Few Answers. *JAMA* 1999; 281: 24-25.
- Khoja TA, Farid SM. Saudi Arabia Family Health Survey 1996. Ministry of Health Publication 2000, Riyadh, Saudi Arabia.
- Al Frahy AR, Shakoor Z, Gad El Rab MO, Hasnain SM. Increased Prevalence of Asthma in Saudi Arabia. *Ann Allergy Asthma Immunol* 2001; 86: 292-296.
- Legerreta AP, Christian-Herman J, O'Connor RD, Hasan MM, Evans R, Leung K. Compliance with national asthma management guidelines and specialty care. *Arch Intern Med* 1998; 158: 457-464.
- Bousquet J, Knani J, Henry C, Liard R, Richard A, Michel F, et al. Undertreatment in a nonselected population of adult patients with asthma. *J Allergy Clin Immunol* 1996; 98: 514-521.
- Busse WW. Inflammation in asthma: The cornerstone of the disease and target of therapy. *J Allergy Clin Immunol* 1998; 102: S17-S22.
- Boushey HA. Effects of inhaled corticosteroids on the consequences of asthma. *J Allergy Clin Immunol* 1998; 102: S5-S16.
- Sorkness CA. Establishing a therapeutic index for the inhaled corticosteroids: Part 2. *J Allergy Clin Immunol* 1998; 102: S52-S64.
- Gross KM, Ponte CD. New strategies in the medical management of asthma. *Am Fam Physician* 1998; 58: 89-100.
- Cochrane GM. Compliance and outcome in patients with asthma. *Drugs* 1996; 52: S12-S19.
- Lindberg M, Ekstrom T, Moller M, Ahlner J. Asthma care and factors affecting medication compliance: the patient's point of view. *Int J Qual Health Care* 2001; 13: 375-383.
- Deenen T, Klip EC. Coping with asthma. *Respir Med* 1993; 87: S67-S70.
- Chambers CV, Markson L, Diamond JJ, Lasch L, Berger M. Health beliefs and compliance with inhaled corticosteroids by asthmatic patients in primary care practices. *Respir Med* 1999; 93: 88-94.
- Boulet L. Perception of the role and potential side effects of inhaled corticosteroids among asthmatic patients. *Chest* 1998; 113: 587-592.
- Hand CH, Bradley C. Health beliefs of adults with asthma: toward an understanding of the difference between symptomatic and preventive use of inhaler treatment. *J Asthma* 1996; 33: 331-338.
- Lim SH, Goh DY, Tan AY, Lee BW. Parents' perceptions towards their child's use of inhaled medications for asthma therapy. *J Paediatr Child Health* 1996; 32: 306-309.
- Apter AJ, Reisine ST, Affleck G, Barrows E, ZuWallack RL. Adherence with twice-daily dosing of inhaled steroids. Socioeconomic and health-belief differences. *Am J Respir Crit Care Med* 1998; 157: 1810-1817.
- Osman LM, Russell IT, Friend JAR, Legge JS, Douglas JG. Predicting patient attitudes to asthma medication. *Thorax* 1993; 48: 827-830.
- Lacasse Y, Archibald H, Ernst P, Boulet LP. Patterns and determinants of compliance with inhaled steroids in adults with asthma. *Can Respir J* 2005; 12: 211-217.
- Diette GB, Wu AW, Skinner EA, Markson L, Clark RD, McDonald RC, et al. Treatment patterns among adult patients with asthma: factors associated with overuse of inhaled beta-agonists and underuse of inhaled corticosteroids. *Arch Intern Med* 1999; 159: 2697-2704.
- Farber HJ, Capra AM, Finkelstein JA, Lozano P, Quesenberry CP, et al. Misunderstanding of asthma controller medications: association with nonadherence. *J Asthma* 2003; 40: 17-25.
- Jones KG, Bell J, Fehrenbach C, Pearce L, Grimley D, McCarthy TP. Understanding patient perceptions of asthma: results of the Asthma Control and Expectations (ACE) survey. *Int J Clin Pract* 2002; 56: 89-93.
- Mushlin AI, Appel FA. Diagnosing potential noncompliance. Physicians' ability in a behavioural dimension of medical care. *Arch Intern Med* 1977; 137: 318-321.
- Chen Y, Dales R, Krewski D. Asthma and the risk of hospitalization in Canada: the role of socioeconomic and demographic factors. *Chest* 2001; 119: 708-713.
- Bender BG, Bender SE. Patient-identified barriers to asthma treatment adherence: responses to interviews, focus groups, and questionnaires. *Immunol Allergy Clin North Am* 2005; 25: 107-130.
- Apter AJ, Boston RC, George M, Norfleet AL, Tenhave T, Coyne JC, et al. Modifiable barriers to adherence to inhaled steroids among adults with asthma: it's not just black and white. *J Allergy Clin Immunol* 2003; 111: 1219-1226.