Original Article

Perception of asthma control in asthma patients*

Eduardo Vieira Ponte[1], Jaqueline Petroni[2], Daniela Campos Borges Ramos[3], Luciana Pimentel[3], Daise Naiane Freitas[4], Álvaro A Cruz[5]

Abstract

Objective: To determine the proportion of asthma patients with poor perception of asthma control and to evaluate the characteristics of this subgroup. **Methods:** A cross-sectional study in which consecutive outpatients (over the age of 12) with mild, moderate, or severe asthma were selected. The patients underwent clinical examination and pulmonary function tests, as well as being assessed for depression and perception of asthma control. The degree of concordance between patients and physicians regarding the perception of asthma control was determined. Patients with good perception of asthma control were compared, in terms of characteristics, with those presenting poor perception. **Results:** The degree of concordance between patients and physicians regarding the perception of asthma control was low (kappa index = 0.5). Of the 289 patients included, 66 (23%) presented poor perception of asthma control. The preliminary univariate analysis revealed that the patients with poor perception of asthma control were older, had a lower income, and presented a lower degree of asthma severity. Those factors did not change in the multivariate analysis. There were no differences between the groups in terms of gender, frequency of having literate patients, duration of asthma symptoms, having been diagnosed with rhinitis, frequency of depression, pulmonary function, or treatment compliance. **Conclusions:** The incidence of poor perception of asthma control in asthma patients is high, especially in elderly patients with lower income and a lower degree of asthma severity.

Keywords: Asthma; Signs and symptoms; Asthma/therapy.

---

* Study carried out as part of the *Programa de Controle da Asma e da Rinite Alérgica na Bahia* – ProAR, Bahia State Program for the Control of Asthma and Allergic Rhinitis – *Universidade Federal da Bahia* – UFBA, Federal University of Bahia – Salvador (BA) Brazil.

1. PhD Student in the Postgraduate Program in Medicine and Health. *Hospital Universitário Professor Edgard Santos* – HUPES, Professor Edgar Santos University Hospital – *Universidade Federal da Bahia* – UFBA, Federal University of Bahia – Salvador (BA) Brazil.
2. Professor of Physical Therapy. *Universidade Católica de Salvador* – UCSAL, Catholic University of Salvador – Salvador (BA) Brazil.
3. Medical Student. *Universidade Federal da Bahia* – UFBA, Federal University of Bahia – Salvador (BA) Brazil.
4. Nursing Student. *Universidade Católica de Salvador* – UCSAL, Catholic University of Salvador – Salvador (BA) Brazil.
6. General Coordinator of the *Programa de Controle da Asma e da Rinite Alérgica na Bahia* – ProAR, Bahia State Program for the Control of Asthma and Allergic Rhinitis – *Universidade Federal da Bahia* – UFBA, Federal University of Bahia – Salvador (BA) Brazil.
Correspondence to: Eduardo Vieira Ponte. Programa de Controle da Asma e da Rinite Alérgica na Bahia – ProAR, Rua Carlos Gomes, 270, 7º andar, Centro Médico Carlos Gomes, CEP 40060-330, Salvador, BA, Brasil.
Tel 55 71 203-2749. E-mail: evponte@yahoo.com.br
Submitted: 10 September 2006. Accepted, after review: 27 February 2007.

Introduction

The objective of the asthma treatment is to fully control the symptoms. This can be achieved by the combined use of an inhaled corticosteroid and a long-acting beta-2 agonist, even in patients with severe asthma symptoms.[1] However, an epidemiological study conducted in seven European centers demonstrated that a high percentage of asthma patients do not achieve adequate symptom control.[2] Noncompliance with treatment is one of the causes of inadequate asthma control, even when the patient is under the care of a specialist.[3]

Another factor that can contribute to the lack of asthma control is the prescription of insufficient doses of preventive medications. The Detection, Intervention, and Monitoring of COPD and Asthma Program demonstrated that 66% of the asthma patients did not spontaneously report the symptoms to the physician.[4] Consequently, the physician might underestimate the severity of the disease and therefore prescribe an inadequate treatment plan. Nevertheless, some patients with symptoms unrelated to asthma might report that the disease is not fully controlled, which can lead the physician to overestimate the severity of the disease and therefore prescribe excessive treatment plan. Therefore, patient perception of asthma control has direct implications for the management of the disease by the physician, who makes decisions regarding treatment primarily on the basis of the symptoms reported.

In the city of Salvador, the *Programa de Controle da Asma e da Rinite Alérgica da Bahia* (ProAR, Bahia State Program for the Control of Asthma and Allergic Rhinitis) began to offer specialized treatment and free medications to patients with severe asthma in 2002. At the time of this writing, 1605 patients were enrolled in the program. Of those, 1070 were receiving follow-up treatment at the ProAR outpatient clinic of the Federal University of Bahia. Among those patients, there was a ten-fold reduction in the number of emergency room visits and hospitalizations for bronchospasm attacks.[5]

The present study, in which patients enrolled in the ProAR and patients treated at the outpatient asthma clinic of the Professor Edgar Santos University Hospital were evaluated, had multiple objectives: to determine the proportion of asthma patients who present poor perception of asthma control; to study the characteristics that differentiate individuals with good perception from those with poor perception of asthma control; and to establish whether perception of asthma control influences treatment compliance.

Methods

In a cross-sectional evaluation, consecutive patients diagnosed with mild or moderate asthma and treated at the outpatient clinic of the Professor Edgar Santos University Hospital (Federal University of Bahia) were evaluated, as were patients with severe asthma and enrolled in the ProAR. This was the only inclusion criterion of the present study. Only those patients who refused to give written informed consent were excluded. The patients underwent clinical examination and pulmonary function tests, as well as being assessed for depression and perception of asthma control. The study was approved by the Ethics in Research Committee of the Institution.

The clinical evaluation was performed by a pulmonologist. Information was collected regarding demographic and socioeconomic characteristics, duration of asthma symptoms, medications used in the past month, and rhinitis symptoms. In addition, asthma severity was classified in accordance with the criteria established in the III Brazilian Consensus on Asthma Management.[6] The patients with uncontrolled symptoms receiving follow-up treatment through the ProAR were asked by the physician whether they had used inhaled corticosteroids daily for the past month. Patients enrolled in the ProAR receive free medication. Treatment compliance was defined as having used inhaled corticosteroids daily in the past month. Treatment compliance was not evaluated in the patients who were not enrolled in the ProAR, since the very low family income of the population studied results in a very low rate of treatment compliance due to the lack of access to medications.

The patient and the physician independently classified asthma symptoms in the last seven days as 'fully controlled', 'well controlled', 'partially controlled', 'poorly controlled', or 'totally uncontrolled'. The asthma was considered controlled when classified as 'fully controlled' or 'well controlled'. If any other classification was selected, the asthma was considered uncontrolled. The physician defined

the control of the asthma symptoms based on the information obtained through the clinical examination and the pulmonary function tests. The presence of persistent symptoms in the last seven days was used by the physician as a criterion for classifying asthma as uncontrolled ('partially controlled', 'poorly controlled', or 'totally uncontrolled'). The presence of intermittent symptoms or the absence of symptoms in the last seven days was the parameter used by the physician to classify asthma as controlled ('fully controlled' or 'well controlled'). Patients were instructed to define asthma control according to their personal impression, based on the history of their disease in the last seven days.

The Beck Depression Inventory, version II, was used to classify the patients as to the presence of depression. Due to the high percentage of patients presenting a low level of education, the questionnaire was administered by an interviewer. The interviewer was instructed not to paraphrase the questions or to influence the responses of the patient. The score on the questionnaire can range from 0 to 63. Patients with a score higher than 19 were considered depressed.[7,8]

Spirometry was performed using a Koko spirometer (PDS Instrumentation, Inc., Louisville, CO, USA),[9] in accordance with the guidelines of the Brazilian Thoracic Society, and using the parameters of normality for Brazilians. Forced expiratory volume in one second (FEV_1) was expressed as the percentage of predicted and was used to quantify the degree of airway obstruction.

The data were analyzed using the Statistical Package for the Social Sciences for Windows, version 13.0. Initially, the degree of patient-physician concordance regarding the perception of asthma control was determined using the kappa index. Subsequently, the frequency of patients with poor perception of asthma control was determined. In a comparative analysis, the patients were divided into two groups, according to the perception of asthma control. Therefore, there was a group that agreed with the physician regarding the perception of asthma control (patients with good perception) and a group that did not agree with the physician (patients with poor perception). The chi-square test was used to compare the categorical variables between the two groups, and the Mann-Whitney test was used to compare the continuous variables. Logistic regression analysis was performed including, as independent variables, those variables that related to the perception of asthma symptom control with a $p < 0.1$. All tests were two-tailed, and a p value of 0.05 was considered statistically significant.

Results

In this study, 289 patients, 214 (74%) of whom were female, were evaluated. The median age was 45 years (range, 31-56 years). The frequency of literate patients was 93%, although only 29% had an income equal to or greater than two times the national minimum wage. The evaluation of asthma severity revealed that 80 (28%) of the patients had mild intermittent asthma, 41 (14%) had mild persistent asthma, 43 (15%) had moderate asthma, and 125 (43%) had severe asthma. The median duration of asthma symptoms was 22 years (range, 8-34 years). The median FEV_1 % of predicted was 66% (range, 52-80%). A total of 181 (62%) of the patients used inhaled corticosteroids regularly.

Table 1 shows that there was a low degree of patient-physician concordance regarding the perception of asthma control (kappa index = 0.5) ($p < 0.01$), with 66 (23%) of the patients presenting poor perception of asthma control when compared to physicians. Table 2 shows the characteristics of the patients grouped according to their capacity to perceive asthma control correctly or not. There was no difference between the groups in terms of the following parameters: frequency of male individuals (24 *vs.* 32%) ($p = 0.22$); frequency of literate patients (94 *vs.* 88%) ($p = 0.46$); frequency of having been diagnosed with rhinitis (70 *vs.* 68%) ($p = 0.75$); frequency of having been diagnosed with depression (40 *vs.* 34%) ($p = 0.61$); duration of asthma symptoms ($p = 0.82$); the Beck Depression Inventory score ($p = 0.6$); and the degree of airway obstruction (FEV_1) ($p = 0.66$). However, the patients with poor

Table 1 - Frequency of patients with poor perception of asthma control.

		Physician perception of asthma	
		Uncontrolled n (%)	Controlled n (%)
Patient perception of asthma	Uncontrolled	153 (53)	39 (14)
	Controlled	27 (9)	70 (24)

Table 2 - Characteristics of the patients divided according to their capacity to accurately perceive asthma control.

Variables[a]	Patients with good perception (n = 223)	Patients with poor perception (n = 66)	p	p[b]
Males (%)[c]	54 (24)	21 (32)	0.22	
Age[d]	44 (32-54)	49 (39-59)	<0.01	0.02
Duration of asthma symptoms (years)[d]	24 (9-36)	22 (9-39)	0.82	
Level of education (%)[c]			0.08	0.46
Illiterate	13 (6)	8 (12)		
Literate	210 (94)	57 (88)		
Family income (%)[c]			0.03	0.02
<2 times the national minimum wage	148 (68)	53 (82)		
≥2 times the national minimum wage	71 (32)	12 (18)		
Diagnóstico de rinite (%)[b]	152 (70)	44 (68)	0.75	
BDI score[d]	18 (11-28)	15 (9-24)	0.60	
Diagnosis of depression (%)[c]	51 (40)	12 (34)	0.61	
Asthma severity (%)[c]			<0.01	<0.01
Mild intermittent	58 (26)	22 (33)		
Mild persistent	20 (9)	21 (32)		
Moderate	37 (17)	6 (9)		
Severe	108 (48)	17 (26)		
FEV_1 % of predicted[e]	62 (47-75)	68 (54-79)	0.66	
FVC % of predicted[e]	85 (73-96)	88 (78-102)	0.43	

[a]Continuous variables expressed as median and interquartile range (25-75 percentiles), and categorical variables expressed by their frequency (number and percentage); [b]Logistic regression analysis: p adjusted for age, level of education, income, and asthma severity; [c]Chi-square test; [d]A total of 166 patients were evaluated using the Beck Depression Inventory (BDI); and [e]Mann-Whitney test.

perception of asthma control were older (p = 0.02), had a lower family income (p = 0.02), and presented a lower degree of asthma severity (p < 0.01) than did the patients with good perception. In a multivariate analysis, it was possible to observe that the adjusted p values remained statistically significant. The study of the 78 patients with persistent asthma symptoms enrolled in the ProAR revealed that treatment compliance was 78% among those with good perception of asthma control and 73% among those with poor perception (p > 0.05), indicating that perception of asthma control did not influence treatment compliance in this sample.

Discussion

The results of the present study indicate that, in a referral outpatient clinic, the percentage of asthma patients who do not accurately perceive asthma control is significant. Higher age was one of the factors associated with poor perception of asthma control. Some authors, studying elderly patients, also observed a low degree of patient-physician concordance regarding the importance of the symptoms reported, especially when the symptoms were chronic.[10] In the present study, we did not evaluate children with asthma, although that would also be a population at high risk of presenting poor perception of asthma control. An interesting finding of our study is that patients with more severe symptoms have better perception of asthma control. Previous studies suggest that the reduction in the diameter of the airways is not accurately perceived through symptoms in patients with more severe asthma.[11,12] However, our results lead to the assumption that once a symptom is perceived, it is correctly understood as a sign that the disease is uncontrolled. Nevertheless, patients with mild asthma more frequently underestimate or overestimate the asthma symptoms, perhaps because they have less experience in managing the disease, since the symptoms are less frequent in this population. This result is also consistent with the finding that 66% of the patients with asthma symptoms treated in the primary health system (in which the frequency

of mild asthma is higher) do not report the symptoms during the medical appointment.[4]

In the present study, it was not possible to find any statistically significant correlations between level of education and perception of asthma control. Since illiteracy indicates lower cognitive performance, the results of our study contradict those of a study conducted in Italy, in which it was found that elderly patients with lower cognitive performance have poor perception of symptoms.[13] It is not likely that the size of our sample can explain the absence of difference in this outcome, since the post-hoc analysis indicates a power near 100% in the evaluation of this aspect. The most likely hypothesis is that level of education has no influence on perception of asthma or that the literate patients of the population studied have low cognitive performance.

Although it is common sense that patients with depression have a tendency to omit or to exaggerate symptoms, no correlation was found between depression and poor perception of asthma control in the present study. Previous studies that have evaluated the influence of mood on the perception of asthma symptoms have obtained controversial results. Some authors have demonstrated that a situation of negative affectivity could influence the perception of dyspnea,[14] whereas others have found that patients with severe asthma and depression, despite presenting a higher degree of airway obstruction, report fewer symptoms, suggesting that depression affects the perception of asthma control.[15] Nevertheless, the findings of another group of researchers have demonstrated that mood does not influence the perception of asthma symptoms.[16]

In the present study, the results also indicated that poor perception of asthma control in patients with persistent symptoms did not influence treatment compliance, possibly because patients understand that the use of medications that prevent symptoms should not be discontinued, even when they believe that the symptoms are absent.

Our results are important for the daily management of the patient with asthma, since they call attention to the need for a more careful evaluation of elderly patients with a lower family income and a lower degree of asthma severity. In such patients, the risk of underestimating or overestimating asthma severity is higher. Problems of under- or over-medication can be avoided if the physician actively inquires about symptoms and is alert to differentiate symptoms that mimic asthma but are related to other conditions. One example is the differentiation between dyspnea induced by bronchospasm and the sensation of weariness related to muscle fatigue and physical deconditioning.

The principal limitation of the present study is the character of the population studied. Nearly half of the patients had severe asthma, and this reflects the profile of the patients treated in tertiary-care facilities within the public health care system. Most patients treated in primary-care facilities have mild or moderate persistent asthma. Since our results indicate that the patient with mild asthma presents poorer perception of the meaning of the symptoms, the physician who provides primary-care services in the public health care system should pay even greater attention to the problem of poor perception of symptom control in the asthma patient. The use of spirometry in the initial evaluation of all asthma patients can provide relevant data for the identification of individuals who do not accurately perceive the severity of their disease.

In conclusion, the frequency of patients with asthma who present poor perception of disease control is significant. Special attention should be given to elderly patients with a lower family income and milder asthma. Such patients are at a higher risk of inaccurately perceiving disease control, and a more careful clinical evaluation is necessary. Further studies should be conducted to determine whether a program of asthma education could reverse this situation.

References

1. Bateman ED, Boushey HA, Bousquet J, Busse WW, Clark TJ, Pauwels RA, et al. Can guideline-defined asthma control be achieved? The Gaining Optimal Asthma ControL study. Am J Respir Crit Care Med. 2004;170(8):836-44.
2. Rabe KF, Vermeire PA, Soriano JB, Maier WC. Clinical management of asthma in 1999: the Asthma Insights and Reality in Europe (AIRE) study. Eur Respir J. 2000;16(5):802-7.
3. Gaga M, Papageorgiou N, Zervas E, Gioulekas D, Konstantopoulos S. Control of asthma under specialist care: is it achieved? Chest. 2005;128(1):78-84.
4. van Schayck CP, van Der Heijden FM, van Den Boom G, Tirimanna PR, van Herwaarden CL. Underdiagnosis of asthma: is the doctor or the patient to blame? The DIMCA project. Thorax. 2000;55(7):562-5.
5. Ponte E, Franco RA, Souza-Machado A, Souza-Machado C, Cruz AA. Impacto de um programa para o controle da asma

grave na utilização de recursos do Sistema Único de Saúde. J Bras Pneumol. 2007;33(1):15-9.
6. Sociedade Brasileira de Pneumologia e Tisiologia. III Consenso Brasileiro no Manejo da Asma 2002. J Pneumol. 2002;28(Supl 1):S1-S151.
7. Gorenstein C, Andrade L. Validation of a Portuguese version of the Beck Depression Inventory and the State-Trait Anxiety Inventory in Brazilian subjects. Braz J Med Biol Res. 1996;29(4):453-7.
8. Gorestein C, Andrade L. Inventário de depressão de Beck: propriedades psicométricas da versão em português. Rev Psiq Clin. 1998;25(5):245-50.
9. Pereira CAC, Viegas CAA, Alves RR. Capacidade de difusão do monóxido de carbono. J Pneumol. 2002;28(Supl 3):S122-S38.
10. Scheuer E, Steurer J, Buddeberg C. Predictors of differences in symptom perception of older patients and their doctors. Fam Pract. 2002;19(4):357-61.
11. Bijl-Hofland ID, Cloosterman SG, Folgering HT, Akkermans RP, van Schayck CP. Relation of the perception of airway obstruction to the severity of asthma. Thorax. 1999;54(1):15-9.
12. Chen E, Hermann C, Rodgers D, Oliver-Welker T, Strunk RC. Symptom perception in childhood asthma: the role of anxiety and asthma severity. Health Psychol. 2006;25(3):389-95.
13. Frisoni GB, Fedi V, Geroldi C, Trabucchi M. Cognition and the perception of physical symptoms in the community-dwelling elderly. Behav Med. 1999;25(1):5-12.
14. Bogaerts K, Notebaert K, Van Diest I, Devriese S, De Peuter S, Van den Bergh O. Accuracy of respiratory symptom perception in different affective contexts. J Psychosom Res. 2005;58(6):537-43.
15. Souza-Machado A, Tonheiro-Machado D, Portela PG, Fontanelle-Neto C, Cruz AA. Freqüência de depressão em pacientes ambulatoriais com asma moderada a grave. Rev Bras Alerg Imunopatol. 2001;24(4):90-7.
16. Apter AJ, Affleck G, Reisine ST, Tennen HA, Barrows E, Wells M, et al. Perception of airway obstruction in asthma: sequential daily analyses of symptoms, peak expiratory flow rate, and mood. J Allergy Clin Immunol. 1997;99(5):605-12.