

Agreement in Asthmatics' Perception of Dyspnea During Acute and Chronic Obstruction

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OBJECTIVE: Three types of asthmatic patients can be identified during periods of clinical stability: "poor perceivers," "normal perceivers," and "over perceivers." When asthmatics undergo bronchial challenge in the laboratory, the same distinctions in type of perception can be observed. The aim of the present study was to determine the level of agreement between the 2 situations.

PATIENTS AND METHODS: A total of 93 patients with persistent moderate asthma (36 men and 57 women; mean age 40 years) were studied. We asked them to assess their dyspnea on a modified Borg scale when stable and after each histamine dose in a bronchial provocation test. When a patient's Borg scale assessment in stable situation was below the 25th percentile, that patient was classified as a poor perceiver. Patients were considered over perceivers if their score in stable situation was in the 75th percentile. Others were labeled normal perceivers. Type of perception during acute bronchoconstriction was defined in function of the change in Borg assessment once forced expiratory volume in the first second had decreased 20%: poor perceivers were those whose change in Borg assessment was in the 25th percentile, over perceivers were in the 75th percentile, and normal perceivers in the middle percentiles.

RESULTS: In stable situation, 23 patients were poor perceivers, 58 were normal perceivers, and 12 were over perceivers. During bronchoconstriction, there were 23 poor perceivers, 47 normal perceivers, and 23 over perceivers. Agreement was estimated by a kappa index of 0.0574 for poor perception, 0.1521 for over perception, and 0.3980 for normal perception.

CONCLUSIONS: Asthmatics' perception of dyspnea during periods of stability and during acute bronchoconstriction are independent phenomena. It is therefore not possible to infer how a patient will perceive an asthmatic attack by evaluating only how he or she perceives breathlessness during stable periods.

Key words: *Dyspnea. Asthma. Perception. Borg scale.*

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Concordancia entre la percepción de disnea del asmático durante la obstrucción aguda y crónica

OBJETIVO: Durante la estabilidad clínica se pueden distinguir 3 tipos de asmáticos: hipoperceptores, normoperceptores e hiperperceptores. Cuando a esos mismos pacientes se les provoca una broncoconstricción aguda, también existen hipo, normo e hiperperceptores de disnea. El objetivo del presente trabajo ha sido comprobar la concordancia entre ambas situaciones.

PACIENTES Y MÉTODOS: Se ha estudiado a 93 pacientes con asma persistente moderada (36 varones y 57 mujeres; edad media de 40 años). Se les pidió que estimaran su disnea (escala modificada de Borg) en situación de estabilidad y después de cada dosis de histamina en una prueba de broncoprovocación. Cuando la puntuación de Borg en situación estable era menor del percentil 25, se consideró hipoperceptor; si era superior al percentil 75, hiperperceptor, y normoperceptor al grupo restante. En función del cambio de disnea al descender un 20% el volumen espiratorio forzado en el primer segundo se distinguieron los perceptores agudos: hipoperceptores (cambio en Borg inferior al percentil 25), hiperperceptores (cambio superior al percentil 75) y normoperceptores (cambio entre los percentiles 25 y 75).

RESULTADOS: En situación estable 23 pacientes fueron hipoperceptores, 58 normoperceptores y 12 hiperperceptores, mientras que durante la broncoconstricción hubo 23 hipoperceptores, 47 normoperceptores y 23 hiperperceptores. El análisis de concordancia mostró un índice kappa de 0,0574 para la hipopercepción, de 0,1521 para la hiperpercepción y de 0,3980 para la normopercepción.

CONCLUSIONES: Las percepciones de disnea de los asmáticos en situación estable y durante una broncoconstricción aguda son fenómenos independientes. Por ello, no es posible inferir cómo un paciente va a percibir una crisis de asma valorando únicamente cómo percibe su enfermedad durante la estabilidad clínica.

Palabras clave: *Disnea. Asma. Percepción. Escala de Borg.*

Introduction

Individual difference between the way asthmatics perceive dyspnea has been known for some time to be a factor to take into consideration.¹ Most studies have demonstrated the existence of at least 2 forms of anomalous perception of dyspnea in relation to bronchial obstruction: hypo- or "poor" perception and hyper- or "over" perception.²⁻⁴ These dyspnea perception patterns are detected both in stable situation and after provocation of acute bronchial obstruction.⁵ The pioneering study by Rubinfeld and Pain⁵ clearly revealed 2 components: inability to recognize acute bronchoconstriction and failure to perceive chronic bronchial obstruction.

However, even though various studies have been designed to clarify the problem of anomalous perception of dyspnea by asthmatics, much is disputed.^{6,7} One issue is our lack of information about whether a patient with asthma perceives dyspnea the same way in both situations (stable condition and under induced bronchoconstriction) or if each is independent of the other.

The present study was designed to determine exactly that. After evaluating how a series of stable asthmatics perceive their airway status in stable condition, we determined the perception of those same patients during acute bronchoconstriction. The aim of the study was to determine whether dyspnea perception in the 2 situations were or were not the same.

Patients and Methods

Ninety-three patients with persistent moderate asthma were studied in the outpatient pneumology department of our hospital. The inclusion criteria were that *a*) the patient was diagnosed with asthma according to the guidelines of the American Thoracic Society⁸; *b*) the patient was in clinically stable condition defined as absence of change in symptoms or treatment for at least the last 4 weeks; *c*) disease had been in course at least 1 year; *d*) the patient was older than 15 years of age and younger than 70; *e*) no other disease able to cause dyspnea was present (heart, neuromuscular, or other pulmonary diseases); and *f*) the level of asthma severity was "persistent moderate" according to the Spanish guidelines for the management of asthma (GEMA),⁹ which are the Spanish version of the Global Initiative for Asthma (GINA) guidelines.¹⁰ Lack of cooperation or inability to perform test maneuvers was considered an exclusion criterion.

The study was carried out prospectively in 2 sessions separated by an interval of 2 to 3 days, after informed consent of the patient had been obtained. In the first visit we recorded the patient's personal characteristics (age, sex, educational level on a scale of 1 to 5, where 1 represented "no formal education" and 5 indicated "higher education"). We also gathered information related to the history of asthma: age of onset of disease, use of health care services in the last year (visits to the emergency department and hospitalizations), and symptoms in the last month (cough, wheezing, chest tightness, and nighttime symptoms) on a scale in which 1 represented absence of the symptom and 4 the most severe level of the symptom. After dyspnea was assessed in stable situation on a modified Borg scale,¹¹ health-related quality of life (Asthma Quality of Life questionnaire of Marks^{12,13}), anxiety (State-

Trait Anxiety Inventory¹⁴), and depression (Beck Depression Inventory¹⁵) were also evaluated. In the same visit we then carried out a stable-situation lung function test that included recording of forced spirometry and a flow-volume curve as well as determination of lung volumes by the helium dilution technique, following recommendations of the Spanish Society of Pulmonology and Thoracic Surgery (SEPAR).¹⁶ Based on information collected, we confirmed that the patient had persistent moderate disease according to the GEMA criteria.⁹

Perception of dyspnea was studied during acute bronchoconstriction in a second visit. Histamine phosphate was chosen as the provocation agent and the technique used was that described by Cockcroft et al.¹⁷ At the start of the test and after each administration of the agent the patient was asked to grade his or her level of dyspnea on a modified Borg scale. Patients were free to choose any score on the scale but had been carefully instructed beforehand to ignore any other type of sensation such as nasal irritation, unpleasant taste, cough, or throat irritation. The test ended when forced expiratory volume in the first second (FEV₁) decreased at least 20% below the level obtained when placebo was inhaled. Then, 600 µg of salbutamol was administered to reverse bronchoconstriction. Reversal was verified by spirometry 20 minutes later.

To analyze individual perception of acute bronchoconstriction we calculated the change in Borg (CB) rating: the difference between the perception score of dyspnea on the Borg scale when FEV₁ had fallen 20% and the Borg score after administration of placebo. CB was a parameter we had found to be useful for distinguishing types of dyspnea perception in a previous study, in which the method was described in detail.¹⁸ Thus, in function of CB, patients were classified in acute situation as poor perceivers (CB below the 25th percentile), normal perceivers (CB in the middle quartiles) or over perceivers (CB above the 75th percentile).

The Borg scale was also used to assess chronic dyspnea, given that we had previously confirmed that it gave information similar in quality to that provided by other dyspnea scales.¹⁹ Three levels of dyspnea perception were defined by cut points at the 25th and 75th percentiles of scores for the patient population: *a*) level 1, chronic poor perceivers (Borg rating below the 25th percentile); *b*) level 2, chronic normal perceivers (Borg score within the middle quartiles); and *c*) level 3, chronic over perceivers (Borg score over the 75th percentile). It should be remembered that all patients enrolled had the same level of disease severity. Thus, we were distinguishing between dyspnea reported by a group of patients who, based on symptoms and lung function, had been classified by the same physician to have a similar level of asthma: persistent moderate.

Once patients had been classified according to their manner of perceiving dyspnea in acute and chronic situations, we used the kappa statistic to study agreement between the 2 situations. Then, using analysis of variance, we determined whether there was a difference between patients whose manner of perception coincided and those whose perception was discrepant.

Results

We enrolled 93 patients with asthma (57 women and 36 men) with a mean (SD) age of 40 (18) years (range, 16-69). Mean age of onset was 24 (16) years and mean time since onset was 13 (11) years.

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