ORIGINAL ARTICLES

Descriptors of Breathlessness in Mexican Spanish

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OBJECTIVE: Breathlessness is the most common symptom of cardiovascular or pulmonary disease. The term encompasses a wide range of descriptors used by patients, however. Identifying those descriptors can be useful for analyzing symptoms and understanding how they arise. The aim of this study was to characterize the descriptors of breathlessness used in Mexican Spanish and to consider their association with various states of respiratory distress and cardiovascular or pulmonary disease.

MATERIAL AND METHODS: A questionnaire was based on 21 descriptors of breathlessness, some of which had no equivalents in English. The subjects included 15 healthy individuals during a cardiopulmonary stress test, 13 healthy subjects after a carbon dioxide rebreathing procedure, and 10 healthy women during pregnancy. We also included 16 patients with confirmed heart disease in stable condition, 15 patients during exacerbation of asthma, 20 with stable chronic obstructive pulmonary disease, and 15 with diffuse interstitial lung disease also in stable condition. Descriptors of breathlessness were then grouped based on the results of cluster analysis.

RESULTS: Seven clusters of phrasal descriptors were identified as possibly representative of types of dyspnea. These clusters of descriptors were categorized as follows: agitation, suffocation, smothering, inhalation, exhalation, panting, and rapidity. Associations between types of dyspnea and the groups of participants were identified based on how frequently they used the terms.

CONCLUSIONS: At least 7 clusters or groups of descriptors of breathlessness were identified as equivalent to 7 types of dyspnea; some items have no equivalent in English. Healthy subjects with respiratory distress or certain groups of patients with cardiovascular or pulmonary disease are associated with certain types of dyspnea.

Key words: *Dyspnea. Descriptors of breathlessness. Cluster analysis. Asthma. Chronic obstructive pulmonary disease.*

El lenguaje de la disnea. Una visión desde el español de México

OBJETIVO: La disnea es el síntoma más frecuente en la enfermedad cardiovascular o pulmonar. Sin embargo, el término engloba un número variado de descriptores que suelen usar o identificar los pacientes. Identificar estos descriptores puede ser de utilidad semiológica y para la compresión de su patogenia. El objetivo del presente estudio ha sido caracterizar los descriptores de disnea utilizados en español mexicano y su asociación con diferentes estados de estrés respiratorio o enfermedad cardiovascular o pulmonar.

MATERIAL Y MÉTODOS: Se estructuró un cuestionario de disnea basado en 21 descriptores, algunos sin equivalentes en idioma inglés. Se estudió a 15 sujetos sanos durante una prueba de ejercicio cardiopulmonar, a 13 durante una prueba de hipercapnia y a 10 mujeres embarazadas. Asimismo, se incluyó a 16 pacientes estables con cardiopatía demostrada, a 15 pacientes con crisis asmática, a 20 con enfermedad pulmonar obstructiva crónica estable y a 15 con neumopatía intersticial difusa también estable. La agrupación de los diferentes descriptores de disnea se determinó por análisis de conglomerados.

RESULTADOS: Se encontraron 7 conglomerados o asociaciones de descriptores que pueden interpretarse como tipos de disnea. Estos grupos de frases descriptivas se pueden englobar bajo los siguientes conceptos: agitación, asfixia, sofocación, inhalación exhalación, jadeo y rapidez. Se encontraron algunas asociaciones entre tipos de disnea y los grupos estudiados sobre la base de la frecuencia de uso de los términos.

CONCLUSIONES: Existen al menos 7 conglomerados o asociaciones de descriptores de disnea que equivalen a 7 tipos de disnea; algunos de los descriptores carecen de equivalente en inglés. Los sujetos sanos en estrés respiratorio o algunos grupos de pacientes con enfermedad cardiovascular o pulmonar se asociaron a tipos específicos de disnea.

Palabras clave: *Disnea. Decriptores de disnea. Análisis de conglomerados. Asma. Enfermedad pulmonar obstructiva crónica*

Introduction

Breathlessness, or dyspnea, has been defined as breathing that is difficult, laborious, or uncomfortable;

it has also been described as unpleasant but painless.[1-3] The term denotes a set of subjective sensations of varying degrees of intensity. Shortness of breath is the most common symptom in cardiac or pulmonary diseases,[4,5] and it is often found accompanying a wide range of disorders involving gas exchange, pulmonary circulation, respiratory mechanics, and cardiovascular abnormalities.[6] Pregnant women and healthy persons also find breathing difficult during intense exercise and describe it as shortness of breath.

Like pain, dyspnea begins with the perception of a stimulus. The subject reacts to it and becomes aware of it. The brain interprets it contextually, cognitively, and behaviorally. That interpretation is described to the physician during history taking and the doctor in turn listens and interprets the reported symptom. The perception of dyspnea has been studied with interest in recent years.[7-10] However, research has focused mainly on assessing the symptom quantitatively in individuals with the same or different respiratory diseases. The study of the language of dyspnea, on the other hand, has tried to evaluate differences or similarities in the way breathlessness is qualified verbally over the course of disease or in respiratory distress.[10-14] It is well known that patients can use many terms or recognize many sensations that they refer to as increased breathing effort or suffocation, among other feelings that can be classified as disagreeable. Descriptors of dyspnea have been reported in English as representing different sensations that suggest the disease that gives rise to the symptom,[11-15] and the study of the language of dyspnea has been shown to provide clinically relevant information.[11] Moy and colleagues[16] have demonstrated that certain terms for dyspnea specific to asthma—such as work or breathing effort—are more strongly related to functional response during the treatment of asthma crises. The way patients describe dyspnea is clearly related to language and its sociocultural features. Terms can differ not only from language to language but also between countries or regions where the same language is spoken. The study of the language of this symptom in Spanish should confirm that there are various sensations or types of dyspnea whose understanding should contribute to our better interpretation of its meaning. This study aimed to characterize the terms used to describe dyspnea in Spanish as spoken in Mexico. Likewise, we sought to determine the association of descriptors with different diseases, such as chronic obstructive pulmonary disease (COPD) or cardiovascular disease, and with certain physiological states in healthy subjects, such as in exercise, hypercapnia due to reinhalation, and pregnancy.

Material and Methods

Breathlessness Questionnaire

A questionnaire containing descriptors of dyspnea was constructed for the study. Four pneumologists and a cardiologist participated in collecting the terms based on their common knowledge of the Spanish language as used in Mexico. The literal translation of most of the main descriptors previously published for the English language were also included.[11-14] An open question about how the patients described their breathing difficulty or breathlessness was added. The structured questionnaire was piloted in a group of patients with lung disease with the single aim of evaluating the clarity and intelligibility of the instruments from the patients' point of view. At the end of the questionnaire the subjects or patients were asked to indicate 3 descriptors ranked in order of importance for representing their dyspnea best.

Healthy Subjects and Patients

We studied healthy nonobese subjects with no respiratory symptoms and normal spirometry and patients with a medical history of dyspnea at the time of the study. The healthy subjects and patients were recruited in relation to 7 situations associated with breathlessness. This allowed them to be grouped as follows:

– Fifteen healthy subjects who agreed to participate in a cardiopulmonary stress test on a cycle ergometer. The group achieved peak oxygen uptake at a mean (SD) workload of 192 (35) W.
– Thirteen healthy subjects in Mexico City who participated in a study to describe the ventilatory response to hypercapnia.[17] The test they performed consisted of rebreathing air in a closed circuit. Carbon dioxide (CO_2) accumulated in the circuit and the test ended when the subject could no longer continue because of dyspnea.
– Ten healthy, nonobese women. These women were in their third trimester of pregnancy.
– Sixteen patients diagnosed with chronic heart disease, all in a stable phase of their disease. Fourteen of them had a left ventricular ejection fraction less than 60% demonstrated by cardiac ultrasound.
– Twenty patients with stable COPD. Airflow obstruction for these patients was defined spirometrically by a forced expiratory volume in 1 second (FEV_1) less than 70% and a ratio of FEV_1 to forced vital capacity (FVC) less than 70%.
– Fifteen patients diagnosed with asthma. These patients were recruited during an acute crisis that led to hospitalization.
– Fifteen patients with diffuse interstitial lung disease (DILD). The diagnosis for these patients was demonstrated by symptoms, chest x-rays or computed tomography, lung function tests, and pulmonary biopsy whenever possible. The protocol was reviewed by the ethics committee of our institution and all the subjects and patients gave their written informed consent.

Statistical Analysis

To describe the study population of healthy individuals and patients we calculated means (SD) and percentages. The main results were obtained using cluster analysis, which explores and identifies classes, or natural groupings.[12-15,18]

For example, if there are sensations of dyspnea that resemble each other, they should group themselves into natural categories or clusters of descriptors. As a measure of distance or rating of similarity (or dissimilarity) between descriptors we used the percentage of disagreement, which is obtained by considering the number of times a descriptor is different from another one and dividing that by the total number of patients. This measure of distance is particularly useful for categorical variables.[18] Cluster analysis minimizes the variance between items in a grouping and maximizes the variance between groups. Clusters are displayed graphically in a dendrogram, where descriptors are ranked hierarchically to reflect similarity. To determine the stopping point for the number of clusters, we set a value that was half the maximum difference in the similarity between descriptors. We studied the association between clusters and groups of healthy individuals or patients based on the frequency with which the descriptors were used by each group.

TABLE 1
**Close Translations* to English of Mexican Spanish
Descriptors of Breathlessness**

1. I feel pressure on my chest.
   (Siento opresión en el pecho.)
2. I need air.
   (Me falta el aire.)
3. I feel I'm suffocating.
   (Siento que me asfixio.)
4. My chest feels tight.
   (Siento mi pecho apretado.)
5. I feel stifled, smothered.
   (Siento que me sofoco.)
6. I have to pant to breathe.
   (Tengo que jadear para respirar.)
7. My breathing feels heavy.
   (Siento que mi respiración es pesada.)
8. I have to concentrate more to breathe.
   (Tengo que concentrarme más para respirar.)
9. I feel I'm breathing fast.
   (Siento que mi respiración es rápida.)
10. I feel I can't get enough air.
    (Siento que no puedo tomar suficiente aire.)
11. I feel I can't get all the air in.
    (Siento que no puedo meter todo el aire.)
12. I have to take deep breaths more.
    (Tengo que suspirar más.)
13. Breathing is harder work.
    (Me cuesta más trabajo respirar.)
14. I feel my breathing stops.
    (Siento que mi respiración se detiene.)
15. I feel I can't get a deep breath.
    (Siento que no puedo respirar profundo.)
16. I feel I'm drowning.
    (Siento que me ahogo.)
17. I feel I'm breathing more.
    (Siento que estoy respirando más.)
18. I feel I can't get all the air out.
    (Siento que no puedo sacar todo el aire.)
19. I have an urgent craving for more air.
    (Me da ansia de más aire.)
20. I get nervous, agitated breathing.
    (Me agito cuando respiro.)
21. I have to make an effort to get a breath.
    (Tengo que esforzarme para respirar.)

*The translations given are meant to express the Mexican Spanish manner of expression closely.
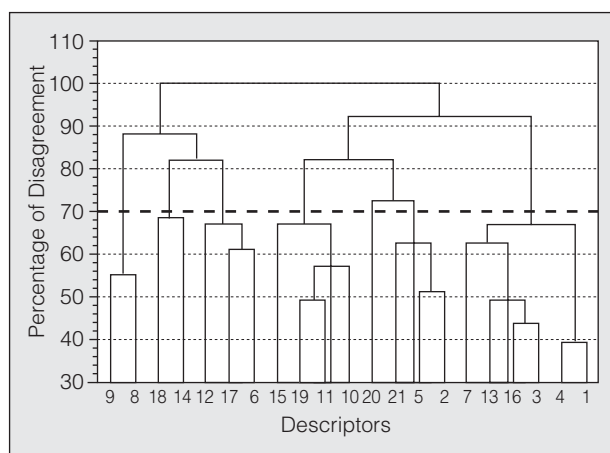

Figure 1. The graph shows the 21 dyspnea descriptors along the horizontal axis and similarity along the vertical axis (percentage of disagreement: cluster distance/maximum distance ×100) according to the cluster analysis. The height of the vertical lines for each descriptor or cluster represents the distance in similarity that that unites or separates it from others. The dashed line indicates the cutoff point used to generate the number of clusters. (See text for further explanation.)

Results

During development of the questionnaire, 21 descriptors were obtained (Table 1). The reproducibility of the questionnaire was assessed in 10 patients with chronic lung disease who reported breathlessness. The patients, none of whom were enrolled in the study, completed the questionnaire on 2 different occasions that were either 1 or 2 days apart. The average reproducibility for all 21 descriptors was 78%. Descriptors with the lowest reproducibility were "urgent craving for more air" (33%), "I can't get all the air out" and "suffocation" (60%), and "agitation" (70%). The remaining descriptors had reproducibility scores of 80% or more. The mean κ value for the questionnaire as a whole was 0.54.

Table 2 shows the anthropometric and lung function characteristics of the study population, organized by type of participant. While men predominated in the

TABLE 2
Anthropometric and Lung Function Characteristics of the Study Population*

Parameter	Healthy, During Exercise	Healthy, With Hypercapnia	Pregnant Women	Heart Disease	COPD	Asthma	DILD
No. of patients	15	13	10	16	20	15	15
Women/Men	1/14	9/4	10/–	11/5	10/10	10/5	14/1
Age, years	29.3 (4.4)	39.3 (14.3)	24.4 (8.2)	48.4 (4)	69.1 (10)	36.9 (14.2)	52.3 (13.5)
Weight, kg	69 (11.6)	57 (7)	64.5 (7.2)	59 (3.4)	64.9 (12.6)	64 (8.9)	61.3 (12.0)
Height, m	167.3 (7.5)	160 (7)	153 (5)	155 (6)	157 (8)	160 (8)	150 (6)
BMI, kg/m^2	24.9 (3.3)	22.4 (2.5)	27.6 (3.3)	24.1 (5.6)	26.5 (4.9)	25 (4.5)	30.7 (10.8)
FEV$_1$%	105 (16)	103 (18)			58 (25)	49 (10)	66 (17)
FVC%	111 (12)	109 (18)			84 (30)	74 (10)	62 (15)
FEV$_1$/FVC, %	80 (3)	87 (10)			59 (15)	56 (9)	91 (5.3)
PaO$_2$, mm Hg					60.8 (7.7)	52.3 (6.5)	53.3 (5.7)
PaCO$_2$, mm Hg					32.2 (5.5)	29.5 (2.2)	33.9 (3.8)

*All results except sex are presented as means (SD). COPD indicates chronic obstructive pulmonary disease; DILD, diffuse interstitial lung disease; BMI, body mass index; FEV$_1$, forced expiratory volume in the first second; FVC, forced vital capacity.

group of healthy subjects undergoing the exercise test (14 of the 15 participants were men), women were more numerous in the group of healthy individuals in the hypercapnia experiment (9 out of 13). The same table shows anthropometric characteristics of the pregnant women and patients with heart and lung diseases. With the exception of patients with DILD, all had a body mass index less than 28 kg/m^2. The patients with asthma and COPD had, on the average, spirometric patterns indicating severe and moderate obstruction, respectively. The patients with DILD had moderately restrictive patterns with a mean FVC of 62%. The mean PaO$_2$ values in the patients with COPD indicated mild hypoxemia; in patients with asthma and DILD, hypoxemia was moderate.

Figure 1 shows the dendrogram ranking the descriptors, shown along the horizontal axis. The vertical axis indicates the percentage of disagreement,

TABLE 3
Comparison of Descriptor Clusters in Mexican Spanish and English*

Mexican Spanish		English	
Cluster	Descriptor, With Literal Translation	Cluster	Descriptor
Agitation† (Agitación)	I feel edgy, agitated breathing. (Me agito cuando respiro.)		
Suffocation (Asfixia)	I feel pressure on my chest. (Siento opresión en el pecho.) I feel I'm suffocating. (Siento que me asfixio.) My chest feels tight. (Siento mi pecho apretado.) My breathing feels heavy. (Siento que mi respiración es pesada.) Breathing is harder work. (Me cuesta más trabajo respirar.) I feel I'm drowning. (Siento que me ahogo.)	Tight Effort Heavy Gasping	My chest feels tight. My chest is constricted. My breathing requires effort. My breathing is heavy. I feel out of breath. My breathing requires more work. I am gasping for breath.
Smothering (Sofocación)	I need air. (Me falta el aire.) I feel stifled, smothered. (Siento que me sofoco.) I have to make an effort to get a breath. (Tengo que esforzarme para respirar.)	Suffocating	I feel that I am suffocating. I feel that I am smothering.
Panting (Jadeo)	I have to pant to breathe.† (Tengo que jadear para respirar.) I have to take deep breaths more.† (Tengo que suspirar más.) I feel I'm breathing more. (Siento que estoy respirando más.)	More	I feel that I am breathing more.
Inhalation (Inhalación)	I feel I can't get enough air in. (Siento que no puedo tomar suficiente aire.) I feel I can't get all the air in. (Siento que no puedo meter todo el aire.) I'm not getting a deep breath. (Siento que no respirar profundo.) I have an urgent craving for more air.† (Me da ansia de más aire.)	In deep hunger	My breath does not go in all the way. I cannot take a deep breath. I cannot get enough air. I feel out of breath. I feel hunger for more air.†
Exhalation (Exhalación)	I feel my breathing stops. (Siento que mi respiración se detiene.) I feel I can't get all the air out. (Siento que no puedo sacar todo el aire.)	Exhalation Stops	My breath does not go out all the way. I feel that my breath stops.
Rapidity (Rapidez)	I feel I'm breathing fast. (Siento que mi respiración es rápida.) I have to concentrate more to breathe. (Tengo que concentrarme más para respirar.)	Rapid Concentration	I feel that my breathing is rapid. My breathing requires more concentration.

*English clusters are those of Simon et al.[12] The English clusters are matched to the Mexican Spanish clusters based on descriptor similarities.
†Descriptors and clusters that do not have direct equivalents in the other language.
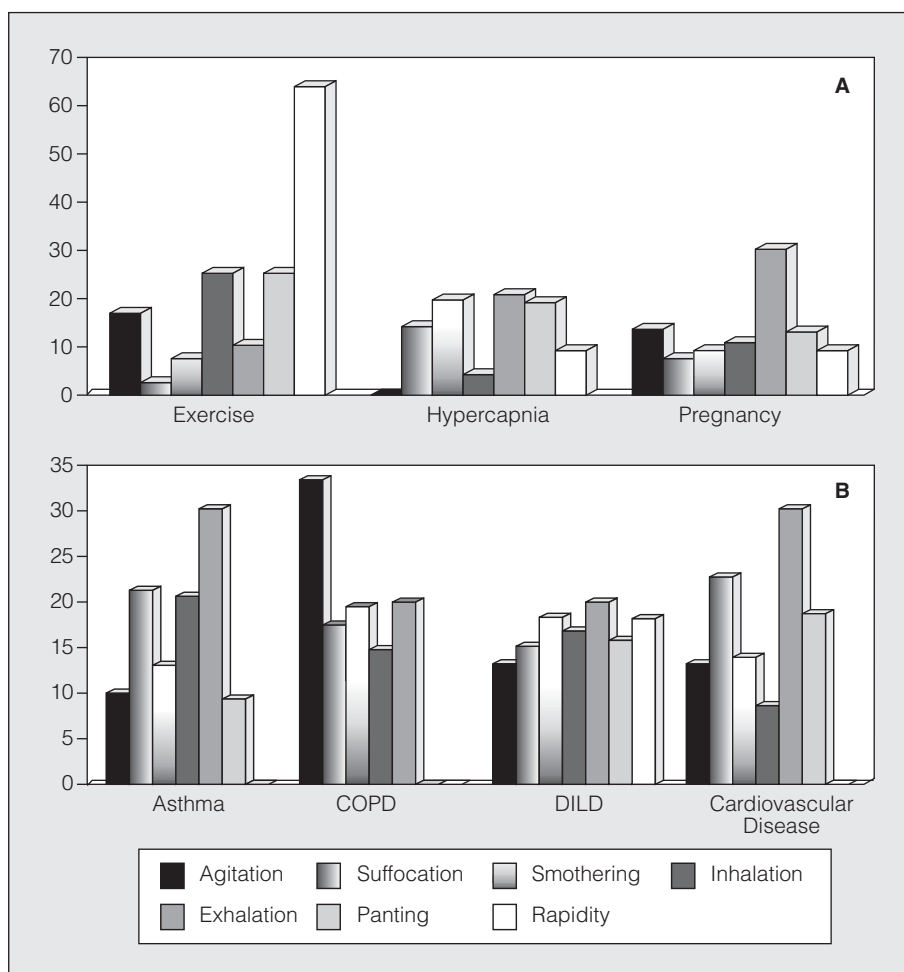
Figure 2. The frequency with which each group of healthy subjects (A) or patients with lung or cardiovascular disease (B) associated the various dyspnea descriptor clusters with their symptoms of breathlessness. COPD indicates chronic obstructive pulmonary disease; DILD, diffuse interstitial lung disease.

such that the height of the vertical lines ranks similarity (or rather, dissimilar) between descriptors or clusters. Shorter vertical lines or those that are closer to the horizontal axis are those that are more similar. The cutoff point used to determine the number of clusters was 30%, which is half the maximum difference observed (60%). Thus, 7 clusters were generated. Table 3 presents the list of 7 clusters and the descriptors for each. That table also shows, for comparison, the clusters and descriptors previously observed for English by Simon and colleagues.[13] The Spanish cluster "agitation" included only a single descriptor ("I feel edgy, agitated breathing") and it had no equivalent in English. The remaining 6 clusters grouped 2 or more descriptors and they were given a name representative of the sensation. The clusters were "suffocation," "smothering," "inhalation," "exhalation," "panting," and "rapidity."

Figure 2 summarizes the frequency with which each group of subjects used the descriptors for the various clusters. For this analysis, only the descriptors named as the 3 best ones by each patient at the end of the questionnaire were used. Figure 2A corresponds to healthy subjects during exercise or hypercapnia and to pregnant women; Figure 2B refers to patients with heart

or lung disease. The healthy subjects exercising most often mentioned descriptors from the cluster "rapidity," followed by "panting" and "inhalation." The healthy subjects who were hyperventilating due to hypercapnia most often used the descriptors "exhalation," "smothering," and "panting." The pregnant women usually described their breathlessness with descriptors from the "exhalation" cluster, followed by "agitation" and "panting." Asthmatics most often used descriptors from "exhalation," "suffocation," and "inhalation," while COPD patients referred to "agitation," exhalation," and "smothering." Patients with DILD used descriptors from 3 clusters with similar frequencies: "exhalation," "suffocation," and "rapidity." Finally, patients with heart disease chose descriptors from the following clusters: "exhalation," "suffocation," and "panting."

Discussion

Twenty-one descriptors were identified at the time of structuring the questionnaire. They were classified by cluster analysis into 7 groups that may reflect different sensations or types of dyspnea. We also found that the groups of healthy subjects in respiratory distress and

patients with cardiovascular or pulmonary disease and a history of dyspnea used terms from certain clusters more often.

The list of terms for dyspnea in the Spanish language included in this study were compiled by reviewing the literature and consulting patients and specialists. However, it is possible that more can be generated by more exhaustive searching and looking for new descriptors or similar ones. Simon and coworkers[12] initially listed 17 descriptors and they later extended the list to 45 in a study that included many more patients with heart and lung disease.[13] in the present study we confirmed that the 21 descriptors of dyspnea were sufficiently reproducible (78% average reproducibility) in patients with stable respiratory disease and a test of agreement (κ test) was satisfactory.[19] However, this does not necessarily represent the reproducibility of the acute conditions studied in healthy subjects. Unfortunately, it was not possible to carry out the exercise or ventilatory response tests twice or administer the questionnaires again. Simon and colleagues[12] reported an average reproducibility of 77% for 19 descriptors in 30 healthy subjects undergoing a series of 8 repeated stimuli to generate dyspnea. Exercise testing and CO_2 rebreathing were included among their tests.

It is important to mention that the cluster analysis used in this study allows terms to be grouped by minimizing intragroup variance and maximizing intergroup variance. However, the boundaries between clusters are established arbitrarily and the number of groupings can change. Like other authors,[13] we established the stopping point using a similarity index of at least half the maximum difference observed between groups—for a cutoff of 30% in this case. A close inspection of the dendrogram (Figure 1) shows that there are certain closely related descriptors, between which the distance (disagreement) is minimal. For example, "I feel pressure on my chest" and "my chest feels tight" are quite similar and cluster with the terms "drowning" and "breathing is harder work." Similarly, terms that describe inhaling and exhaling difficulty also cluster naturally (Table 3). The term "agitation," on the other hand, is set apart as a single-element cluster as it has a very high level of disagreement with any other descriptor. It also has no equivalent among the English language descriptors of dyspnea.

The 7 clusters may indicate sensations or types of dyspnea that can be described in different terms. As with other symptoms, such as pain, dyspnea can be difficult for the physician to assess. Just as all pain is not the same, breathlessness sensations also vary. A healthy subject experiences breathlessness when performing marked physical exercise, but the main difference between that sensation and the dyspnea of ill persons lies in the healthy person's knowledge that the sensation will disappear as soon as the physical exercise stops and have no major consequences. In this study we found that the descriptors of healthy subjects associated particularly with the cluster "rapidity," to which the

concept of "concentration" was closely linked. When healthy subjects are subjected to hyperventilation due to hypercapnia, on the other hand, their descriptors cluster with those of "exhalation," "smothering," and "panting." Similarly, patients with asthma or COPD, who share pathogenic mechanisms such as airway obstruction, come together to use the descriptors of "exhalation." However, COPD patients also often use the single-descriptor cluster "agitation." The cluster "exhalation" was also often used by patients with heart disease or DILD, although the latter group used terms from the "rapidity" cluster as well. It is well known that the breathing of these patients is commonly described as rapid and shallow.[20,21]

The "suffocation" cluster was used with a certain degree of frequency by nearly all the groups of patients studied, but most often by asthmatics and those with heart disease. This cluster brings together descriptors like "work" and "drowning." Recently, Binks and coworkers[22] assessed experimentally whether the sensations of effort and tightness in asthmatic patients were a consequence of a perception of working the respiratory muscles harder. After studying a group of 15 patients during a bronchial challenge test, the authors concluded that the sense of tightness and effort were unrelated to increased respiratory muscle work, given that the symptoms persisted after eliminating muscular effort by means of mechanical ventilation.

There is no peripheral receptor charged with detecting dyspnea. Rather, many airway, diaphragm, and intercostal muscle receptors participate. The centers of respiratory drive lie within the respiratory muscles, which make gas exchange possible by moving air in and out of the chest cavity.[4,5] The changes in thoracic positions, in breathing, and in the balance between PaO_2 and $PaCO_2$ come about because of feedback from the central nervous system that has its origin in impulses from the lungs and chest wall and chemoreceptors for respiratory function.[1] Dyspnea seems to derive more from respiratory effort than from PaO_2 and $PaCO_2$ values. Nevertheless, how all this information is processed by the nervous system in order to be perceived as shortness of breath is still under discussion.[4] One current theory of the origin of dyspnea considers it to be the result of an imbalance between respiratory motor activity in the nervous system and afferent information coming from mechanoreceptors. In other words, when the respiratory system is overloaded and airway resistance and/or the elastic properties of the lung become affected, or when overload occurs in the context of respiratory muscle abnormalities, afferent and efferent information becomes dissociated and the situation is perceived as breathlessness, whose intensity will vary according to the overloading conditions.

If the terms within each cluster represent similar dyspneic sensations, there should be equivalents between languages. Table 3 compares the Spanish language clusters with those described for English. Although there are equivalents for most clusters, there are certain

Spanish terms whose literal translation has not been used in English or that do not have an equivalent. Terms for the concepts "agitation," and "urgent craving," and "panting" are present in Spanish, but they seem to lack equivalent terms among descriptors in English. Another example is the English term "air hunger," which is not used in its simple equivalence translation in our context. During development of the questionnaire, it made no sense to patients or their doctors as the literal "*hambre de aire*" and it was therefore not included as an item in the questionnaire. These differences may reflect the importance of the patient's mental integration of the symptom, and particularly of his or her description of the sensation—a process in which language is a fundamental factor. Recently, significant differences have been described in the use of English descriptors by individuals of different races.[23]

In summary, Spanish offers various descriptors of dyspnea. Those descriptors have formed 7 clusters that represent different sensations or types of breathlessness. Some patient groups with lung or cardiovascular disease and healthy subjects subjected to respiratory stress are associated with certain sensations or types of dyspnea. In addition, we have found sensations that are described in Spanish that have not been described previously in English.

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