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Original Article

Spanish Asthma Patients' Beliefs About Health and Medicines: Validation of 2 Questionnaires

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ABSTRACT

Objective: We translated 2 health beliefs questionnaires—an instrument based on the health belief model (HBM) containing 19 items in 6 domains and the Beliefs About Medicines Questionnaire (BMQ) containing 18 items divided into a general and a specific section—and then administered and validated them in a group of Spanish patients with asthma.
Patients and Methods: In 2 clinical visits data were collected on 126 patients with stable asthma of different levels of severity. At the first visit, the patients underwent spirometry and were asked questions about sociodemographic factors and clinical history. At the second visit, they completed the State-Trait Anxiety Inventory, the Beck Depression Inventory, and the Spanish versions of the HBM and BMQ, which had been previously translated and backtranslated.
Results: The BMQ had adequate internal consistency and content validity but the HBM replicated just 4 of the 6 domains present in the original questionnaire. The reformulated HBM (measuring 4 domains) accounted for 48% of the variance and had Cronbach α levels ranging from 0.63 to 0.75. The 2 questionnaires showed interactions between *a)* negative beliefs about medicines and asthma and *b)* awareness of the need for medication and trust in physician and pessimism. Correlations were also found between negative beliefs and anxiety and depression and between awareness of the need for medication and disease severity. Finally, low educational level, female sex, and greater duration of asthma were correlated with beliefs that disease control was driven by chance.
Conclusions: The reformulated HBM and the BMQ have satisfactory measurement properties and assess similar but not identical aspects of beliefs and value judgments about health and medicine in individuals with asthma. These beliefs were correlated to different degrees with the clinical, sociodemographic, and psychologic variables studied.

Creencias sobre la salud y los medicamentos en la población asmática española. Validación de 2 instrumentos para su medida

Palabras clave:
Asma
Creencias del paciente sobre la salud
Creencias sobre los medicamentos

RESUMEN

Introducción: Se ha procedido a la traducción, validación y aplicación en población asmática española del Cuestionario de Creencias sobre la Salud (CCS; 19 ítems en 6 dominios) y el Cuestionario de Creencias sobre los Medicamentos (CCM; 18 ítems en 2 subescalas: genérico y específico).
Pacientes y métodos: El trabajo se llevó a cabo, durante 2 sesiones, en 126 pacientes con asma estable y diferentes grados de gravedad. En la primera se practicó una espirometría forzada y se recogieron además características sociodemográficas y datos de historia clínica. En la segunda, los pacientes rellenaron cuestionarios de ansiedad (STAI) y depresión (Beck), así como las versiones españolas del CCS y CCM (previo proceso de traducción y retrotraducción).

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Resultados: El CCM presentó una consistencia interna y una validez de contenido adecuadas. En cambio, el CCS no reprodujo la estructura original de 6 factores, sino que se obtuvieron únicamente 4 (CCS-reformulado: variancia explicada: 48%; alfa de Cronbach: 0,63–0,75). El CCM y el CCS-reformulado presentaron las siguientes interacciones: *a)* creencias negativas sobre los medicamentos y la propia enfermedad, y *b)* conciencia de necesitar medicación, confianza en el médico y pesimismo. Las creencias negativas se asociaron, a su vez, con ansiedad y depresión, mientras que el ser consciente de necesitar medicación se asoció con la gravedad. El bajo nivel de estudios, el sexo (mujer) y una mayor duración del asma se relacionaron con creencias fatalistas sobre el control de la enfermedad.

Conclusiones: El CCS-reformulado y el CCM poseen propiedades métricas satisfactorias y evalúan aspectos similares pero no idénticos sobre las creencias y juicios de valor de los asmáticos sobre su salud y los medicamentos. Estos juicios se asocian de manera diferente con las facetas clínicas, sociodemográficas y psicológicas estudiadas.

Introduction

Nonadherence to treatment is one of the most common problems clinicians must deal with in routine daily practice. Indeed, it has been estimated that approximately 50% of patients with chronic disease do not take their medication as prescribed.[1] Nonadherence is of particular concern in patients with asthma as poor adherence to antiinflammatory drugs—the mainstay of treatment in asthma—is particularly prevalent. It has been reported that just 40% of patients with persistent asthma use inhaled corticosteroids at least twice a day most days.[2-4] Treatment adherence is influenced by many factors, among them: *a)* route of administration, *b)* psychosocial factors, *c)* fear of side effects, *d)* lack of an immediate feeling of benefit, and *e)* patient attitudes to health and disease and beliefs about medicines.[4-8] We believe that patient attitudes and beliefs play a key role in treatment adherence. By determining the profile of patients who do not adhere to corticosteroid therapy and learning more about their beliefs, fears, and attitudes, we aimed to provide a rational basis for designing educational interventions that are pertinent to patients and that will help to improve treatment adherence. Two instruments designed to facilitate the study of these aspects have been described. One is a questionnaire based on the Health Beliefs Model[3] (HBM). The other is the Beliefs About Medicines Questionnaire[9] (BMQ). The aims of the present study were *a)* to translate and validate the HBM questionnaire and the BMQ for use in Spanish patients with asthma, *b)* to study the relationships between the subscales in the 2 questionnaires (concurrent validity), and *c)* to analyze associations between the questionnaires and sociodemographic characteristics, clinical severity, and emotional state (anxiety and depression).

Patients and Methods

Instruments

The HBM-based questionnaire is self-administered. It contains 19 items grouped into 6 subscales: belief in active participation in clinical decision-making (4 items), barriers (4 items), frustration (3 items), motivation (3 items), benefits (2 items), and belief that asthma is a serious health problem (3 items). Responses are given on a 5-point Likert scale. The design of the questionnaire is based on that of similar scales that assess health beliefs of patients with hypertension, diabetes, and asthma.[10-12]

The BMQ,[9] also a self-administered questionnaire, comprises 2 subscales: the BMQ-General, designed to broadly evaluate patient beliefs about medicines, and the BMQ-Specific, designed to evaluate beliefs about the particular drugs being taken to treat a disease (asthma in our case). The BMQ-General has 8 items in 2 subscales (overuse and harm), each containing 4 items, and the BMQ-Specific has 10 items in 2 subscales of 5 items each (necessity and concern). The answers are rated using a 5-point Likert scale ranging from strongly agree to strongly disagree.

The original English versions of the 2 questionnaires were translated into Spanish by 2 of the authors of this study (M.P. and A.B.) and then translated back into English by a native English speaker to check whether or not the Spanish translations conveyed the original meaning intended by the authors. The preliminary versions of the Spanish questionnaires were administered to a group of 25 men and women with stable asthma to test their comprehension of the items. Following discussion of the feedback from this group, the researchers produced the definitive Spanish versions of the HBM questionnaire and the BMQ.

Patients

The definitive Spanish versions of the 2 instruments were administered to 126 patients (74 women and 52 men; mean age, 43 years). They were all regular outpatients and met the following inclusion criteria: *a)* diagnosis of asthma according to the criteria established by the Spanish Guidelines for the Management of Asthma (GEMA)[13]; *b)* a stable clinical situation, defined as no changes in symptoms or treatment for at least 4 weeks; *c)* disease duration of more than 2 years; and *d)* absence of other chronic diseases, including disabling mental disorders.

The study was performed prospectively during 2 visits separated by an interval of 2 to 3 days. At the first visit, information was collected on the patients' sociodemographic characteristics (age, sex, and educational level) and history of asthma (duration, symptoms, and medication taken in the last month), and spirometry was performed in accordance with the recommendations of the Spanish Society of Pulmonology and Thoracic Surgery (SEPAR).[14] At the second visit, the patients completed the Spanish versions of the HBM, the BMQ, the Beck Depression Inventory,[15] and the State-Trait Anxiety Questionnaire.[16]

Based on the GEMA criteria, 65 patients had mild persistent asthma, 45 had moderate persistent asthma, and 16 had severe persistent asthma. The patients were informed about the aims of the study and they all gave their voluntary consent to participation.

A member of the research team met with the patients before they completed the questionnaire to explain how to answer the questions and to urge them to complete the questionnaires independently and honestly.

Statistical Analysis

The internal consistency of each instrument was evaluated by calculating the Cronbach α value[17] for each subscale. These calculations were performed first for the subscales as a whole (containing all the items) and then by repeating the calculation as items were progressively removed. According to Nunnally,[18] a Cronbach α value over 0.70 indicates excellent internal consistency. Content validity was evaluated by Pearson correlation analysis. The resulting correlation matrices were subjected to exploratory principal component factor analysis with varimax rotation once factor independence had been confirmed.[19] The scree test was used to extract factors[20] and the cutoff for the inclusion of an item was a factor loading of 0.40.

Concurrent validity was assessed using bivariate Pearson correlations between the HBM questionnaire and the BMQ. Finally, the associations between the 2 questionnaires and age, sex, clinical severity, and emotional state (anxiety and depression) were evaluated using factor analysis as described in the previous paragraph.

Data were expressed as means (SD) and statistical significance was set at a *P* value of less than .05. All analyses were performed using version 12.0 of the SPSS software package (SPSS, Illinois, Chicago, USA).

Results

The HBM Questionnaire

The mean score for the HBM-based instrument was 59.9 (7.7). The scores were normally distributed and internal consistency was acceptable (α = 0.68) overall, although the corresponding internal consistency scores for the subscales ranged from 0.04 (benefits) to 0.69 (barriers). The subscale correlation matrix showed significant associations between most of the subscales, except in the case of the benefits scale, which was not related to any of the other scales. The correlation coefficients ranged from 0.02 (motivation and benefits) to 0.41 (frustration and perceived seriousness of the health problem).

The content validity study revealed that the Spanish version did not replicate the 6-factor structure of the original questionnaire as the results of the scree test suggested that just 4 factors (explained variance, 48%) should be extracted (Table 1). The first factor (explained variance, 15%; α = 0.75) grouped 5 items related to lack of self-confidence in ability to control disease as well as items from the barriers, perceived seriousness, and frustration subscales. The second factor (explained variance, 11.6%; α = 0.70) grouped 6 items related to trust in physician and concern about health from the active participation and motivation subscales. Factor 3 (explained variance, 11.2%; Cronbach α = 0.74) contained 5 items related to pessimistic attitudes about disease (7 items; explained variance, 20.5%). These items were part of the belief in active participation and perceived seriousness subscales in the original questionnaire. The last factor (explained variance, 10.2%; Cronbach α = 0.63) grouped 3 items related to beliefs about destiny and chance and they came from the barriers subscale.

The BMQ

The mean scores for the BMQ-General and the BMQ-Specific were 21.4 (4.4) and 34.4 (5.8), respectively. In both cases, the score distribution was normal.

Analysis of the 2 components of the questionnaire revealed excellent internal consistency for 3 of the subscales (general overuse, α = 0.70; specific necessity, α = 0.83; and specific concern, α = 0.72) and moderate consistency (α = 0.68) for the general harm subscale. The internal consistency values did not increase as items were eliminated from the subscales, indicating that all the items had an important place in the final questionnaire. All the subscales, except the specific necessity and general harm scales, were significantly correlated with each other. The correlation between the specific necessity and general overuse subscales was negative.

Factor analysis revealed that the original structure of the questionnaire (2 independent factors for both the BMQ-General and

Table 1
Factor Analysis of Items in the Spanish Version of the Health Beliefs Model Questionnaire

Items[a]	Factor 1	Factor 2	Factor 3	Factor 4
8. More training on how to use medicines	0.73			
15. I find it very difficult to look after my asthma	0.69			
3. Taking medicines interferes with activities	0.66			
7. I don't understand everything that's explained to me	0.55			
19. No matter what I do, I can't control it	0.55			
11. My health is what concerns me most in life		0.75		
10. I feel better if I follow the doctor's advice		0.65		
18. I think a lot about my health		0.63		
9. I am worried about becoming ill		0.54		
13. Satisfied with treatment		0.45		
4. I choose my treatment with my doctor		0.40		
2. Asthma isn't a problem for me if I feel well			−0.64	
12. It is possible to be free of symptoms			−0.60	
17. My asthma will make me very ill			0.58	
6. I will always need medicines			0.52	
5. Medicines help but they do not cure			0.46	
14. I have asthma because God wishes this to be so				0.76
1. Being healthy, a question of luck				0.68
16. If I have to get ill, I will get ill				0.62
Explained variance, %	14.95	11.64	11.18	10.21
Score[b]	13.4 (3.9)	22.7 (3.3)	12 (2.3)	8.3 (2.9)

[a] Brief summary of the items. (The English translation is provided only for purposes of understanding the present study.)
[b] Expressed as mean (SD).

Table 2
Factor Analysis of Spanish Version of the Beliefs About Medicines (BMQ) Questionnaire

Subscales	Items[a]	Factor 1	Factor 2
BMQ-General			
Harm	2. Stop medicines every now and then	0.63	
	3. Medicines create addiction	0.82	
	5. Medicines do more harm than good		0.63
	6. Medicines are poisons	0.54	
Overuse	1. Doctors prescribe too many medicines		0.64
	4. Natural remedies are safer		0.69
	7. Doctors trust medicines too much	0.61	
	8. If doctors spent more time with patients, they would prescribe less		0.70
Explained variance, %		24.9	24.3
BMQ-Specific			
Necessity	4. Without my medicines for asthma, I would become ill	0.84	
	1. My health depends on asthma medicines	0.83	
	3. I couldn't live without my asthma medicines	0.82	
	7. My future health depends on medicines	0.76	
	10. Medicines prevent asthma from getting worse	0.50	
Concern	2. I'm worried about taking asthma medicines		0.75
	5. I'm worried about the long-term effects of medicines		0.75
	6. I don't understand what medicines are for		0.74
	8. Medicines interfere with my life		0.59
	9. I am worried about depending on medicines		0.56
Explained variance, %		29.4	24.3

[a] Brief summary of the items. (The English translation is provided only for purposes of understanding the present study.)

Table 3
Correlations[a] Between Subscales from the Reformulated Health Beliefs Model (HBM) and the Beliefs About Medicines Questionnaire (BMQ)

Reformulated HBM Subscales	BMQ Subcales			
	Specific Necessity	Specific Concern	General Overuse	General Harm
Lack of self-confidence	0.11	0.50[b]	0.27[c]	0.39[b]
Trust in physician and concern	0.37[b]	0.16	0.01	0.06
Pessimism	0.28[c]	0.12	0.02	0.12
Beliefs in chance	0.12	0.22[c]	0.14	0.29[c]

[a] Assessed using Pearson correlation coefficients.
[b] $P < .001$.
[c] $P < .01$.

Table 4
Factor Analysis of All Study Variables

Variables	Factor 1	Factor 2	Factor 3
General harm (BMQ)	0.75		
General concern (BMQ)	0.71		
Lack of confidence (reformulated HBM)	0.69		
General overuse (BMQ)	0.68		
Anxiety	0.58		
Depression	0.58		
Specific necessity (BMQ)		0.71	
Pessimism (reformulated HBM)		0.51	
Disease severity[a]		0.47	
Trust in physician (reformulated HQM)		0.42	
Age			0.76
Educational level			−0.64
Duration of asthma			0.57
Beliefs in chance (reformulated HBM)			0.49
Sex			0.41
Explained variance, %	20.1	14.3	12.9

Abbreviations: BMQ, Beliefs About Medicines Questionnaire; HBM, health beliefs model.
[a] Assessed according to Global Initiative for Asthma guidelines.

the BMQ-Specific) was the best possible structure. The 2 factors in the BMQ-General accounted for practically identical percentages of variance (overuse, 24.3%; harm, 24.9%). The grouping of the items was quite similar to that of the original questionnaire, although item 5 from the harm scale shifted to the overuse scale while item 7 from the overuse scale moved to the harm scale. In the BMQ-Specific, the necessity factor accounted for a greater percentage of the variance than the concern factor did (29.4% vs 24.3%, respectively). The grouping of the items in each of these factors was identical to that of the original questionnaire, demonstrating that the structure was remarkably stable (Table 2).

Concurrent Validity of the Questionnaires

Because the results obtained for the original structure of the HBM questionnaire were not satisfactory, we decided to examine the associations between the HBM and the BMQ using the 4-factor structure identified in our analysis of the Spanish HBM instrument. Table 3 shows the correlations between the 4 subscales of the reformulated HBM and the subscales of the BMQ. The specific necessity subscale (BMQ) was significantly correlated with the trust in physician and pessimism subscales of the reformulated HBM, while the specific concern subscale (BMQ) was correlated with the lack of self-confidence and beliefs in chance subscales. The general overuse subscale (BMQ) was correlated with the lack of self-confidence subscale (reformulated HBM), and the general harm subscale (BMQ) was correlated with the lack of self-confidence and the beliefs in chance subscales (reformulated HBM).

We again applied factor analysis to examine the correlations between the subscales from the 2 questionnaires and the following study variables: age, sex, educational level, duration of disease, clinical severity, and emotional state. The scree test identified 3 extractable factors that accounted for a variance of 47.3% (Table 4). The first factor (explained variance, 20.1%) grouped emotional state (anxiety and depression), the 3 subscales from the BMQ that assess negative beliefs (general harm, specific concern, and general overuse), and the lack of self-confidence subscale from the reformulated HBM. The second factor (explained variance, 14.3%) grouped asthma severity, the specific necessity subscale from the BMQ, and the trust in physician and pessimism subscales from the reformulated HBM. Finally, the third factor (explained variance,

12.9%) grouped 3 sociodemographic variables (age, low educational level, and female sex), duration of disease, and beliefs in chance from the reformulated HBM.

Discussion

The decision whether or not to take a drug is influenced by at least 3 factors which, though different, are closely interrelated. These are trust in significant others (physicians, carers, and family), previous experience with medicines (including the risk-benefits balance), and patient beliefs about a wide range of topics such as self-confidence, causes and duration of disease, chance of healing, and control.[21] It is particularly important to study the impact of these factors in chronic diseases such as asthma,[22,23] where patients must follow treatment regimens for long periods of time. To perform such a study, however, it is necessary to have adequate assessment tools.

We investigated the measurement properties of 2 questionnaires designed to assess beliefs about health (the HBM) and medicines (the BMQ) in patients with asthma. We chose these questionnaires because they are easy to use (being short and clearly worded) and applicable to asthma and its treatment. Our findings indicate that both questionnaires can be used with reasonable confidence for their intended purposes, although we did find that there were considerable differences between the 2 instruments.

The full Spanish version of the HBM questionnaire showed moderate reliability and the fact that its benefits subscale scored poorly in the internal consistency analysis and was not correlated with any of the other scales cast doubts about the homogeneity of the construct that the questionnaire was theoretically measuring (beliefs about health). In our analysis, we reproduced the construct of just 4 of the 6 subscales from the original questionnaire, based on a finding of satisfactory Cronbach α values. Because the questionnaire contains just 19 items, we think that it is more reasonable to expect 4 subscales than 6. Furthermore, in our opinion, the factors identified seem to us to be more appropriate than those of the original instrument and to correspond better to the aspects mentioned at the beginning of our discussion (self-confidence, trust in physician, pessimism, and beliefs that disease control is driven by chance). We therefore decided to base the remaining analyses on this 4-factor design, which we have called the reformulated HBM.

The Spanish version of the BMQ exhibited good to excellent internal consistency and its structure and content provided a perfect fit to those of the original questionnaire. Our findings underscore the usefulness of the BMQ for assessing beliefs that patients with asthma hold about the medicines they use.

As was to be expected, the reformulated HBM and the BMQ instruments showed several interactions. Negative beliefs about medicines and disease were significantly related and associations were also found between awareness of the need for medication to control one's disease and trust in physician and pessimistic thoughts about disease course.

Factor analysis revealed the same associations when the other study variables (sociodemographic characteristics, emotional state, and disease severity) were introduced. Negative beliefs about medicines and asthma grouped with anxiety and depression, while awareness of the need for medication grouped with disease severity, trust in physician, and pessimistic thoughts about the course of asthma. Finally, female sex, low level of education, and long disease duration were associated with beliefs that disease control was driven by chance. Future studies should analyze the extent to which the profiles identified in our study remain stable in different situations (worsening of disease, changes in medication, comorbidities, life events, etc) and how they influence treatment adherence. The findings of several studies indicate that treatment adherence depends primarily on patient beliefs about treatment benefits and to a much lesser extent on sociodemographic and clinical factors.[23,24] Other studies, however, have suggested that adherence is influenced not only by beliefs about medicines but also by age, sex, and disease duration.[25]

In conclusion, we believe that *a)* the reformulated HBM measures with reasonable accuracy important attitudes and beliefs about disease held by patients with asthma; *b)* the BMQ has satisfactory measurement properties; *c)* both questionnaires evaluate similar but not identical aspects about patients' beliefs and values regarding health and medicines; and *d)* these values and beliefs are associated, to varying degrees, with the clinical, demographic, and psychological factors studied. We therefore believe that the reformulated HBM and the BMQ could be useful for examining such important questions as how patients who adhere to treatment differ from those who do not in terms of their models of disease (eg, beliefs about health and medicines) and to what the extent these beliefs are influenced by educational interventions.

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