Cross-cultural Adaptation and Validation of Beliefs about Medicines Questionnaire on Asthma and Chronic Obstructive Pulmonary Disease Patients

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Abstract

OBJECTIVES: Inadequate adaptation to long-term treatment of chronic illnesses is the most common reason for the inability to obtain the benefits medications can provide. Treatment compliance is influenced by several factors. Beliefs about Medicines Questionnaire (BMQ) developed by Horne et al. in 1999 to evaluate the cognitive representation of medicines have many validation studies, which resulted in good psychometric properties. The aim of the present study was to evaluate the reliability and validity of the BMQ Turkish translation in patients with asthma and chronic obstructive pulmonary disease (COPD).

MATERIAL AND METHODS: Fifty asthma and 50 COPD patients participated in this methodological study. The scale was adapted to Turkish through translation, comparison with other language versions, back translation, and a pre-test. The structural validity was assessed using factor analysis.

RESULTS: Similar to the original scale, factor analysis confirmed that BMQ had a four-factor structure that accounts for 58.23% of the total variance. The BMQ showed an acceptable internal consistency (Cronbach's alpha coefficient: specific-necessity, 0.832: specific-concerns, 0.722; general-harm, 0.792; and general-overuse, 0.682). The factor analysis revealed the same patterns for all questions between the Turkish and original scales.

CONCLUSION: The psychometric properties of the BMQ were consistent with those reported in the original study. We found that the Turkish translation of BMQ is a valid and reliable tool for assessing medicine-related beliefs in patients with asthma and COPD.

KEYWORDS: Attitudes, beliefs, medication adherence, validation

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is characterized by persistent airflow limitation; chronic inflammation; progressive worsening of symptoms, including cough, sputum production and dyspnea [1]. Although the decline in lung function cannot be reversed, medicines that help to prevent and alleviate symptoms and improve health status are available. However, unlike other chronic diseases, medication adherence in COPD has found to be quite low [2-4]. For instance, in a previous study Neugaard et al. [5] showed that among US military veterans, COPD medication adherence was 30%, whereas for coronary artery diseases, diabetes, heart failure, and hyperlipidemia treatments, the adherence was 40%-63%. Multiple factors, including patient beliefs, knowledge, and attitude, regarding to both illness and therapy have shown to be equally important in medication adherence as with social, demographic, and clinical factors in patients with COPD [6].

Asthma is a chronic inflammatory airway disease with a prevalence approximately 10% in children and 5% in adults in developed countries [7]. Asthma treatment consists of a controller drug, which is used daily, and a short-acting beta agonist to stimulate bronchodilation for quick symptom relief when needed. Adherence to treatment is the key to maintain asthma symptoms well controlled. Poor adherence is found to be associated with worse outcomes, such as uncontrolled asthma symptoms, poor quality of life, and mortality [8,9]. In asthma, adherence to treatment tends to be poor, with rates <50% in children and 30%-70% in adults, depending on the country, age, sex, and ethnicity [10-12]. The poor adherence rates were not only attributed to mainly steroid phobia but also other sociodemographic and behavioral factors [13].

According to some studies, non-adherence has not necessarily been associated with the severity of illness or sociodemographic factors [14,15]. Moreover, Horne identified two categories of reasons for non-adherence: intentional (the patient's preferences, motivations, and beliefs) or unintentional (the patient's capabilities and capacity) [16]. To further evaluate and score the intentional factor, Horne et al. [17] introduced "Beliefs about Medicines Questionnaire (BMQ). The BMQ includes two parts that are further divided into two domains. The Specific part (Specific BMQ) is divided into Specific-Necessity and Specific-Concern to understand a patient's personal beliefs and concerns. The General part (General BMQ) is also divided into General-Harm and General-Overuse to assess the patient's beliefs and perceptions on medicines in general. BMQ has been adapted and validated in many other languages [18-21].

The primary outcomes of this study were to adapt BMQ into the Turkish language and to validate it in patients with asthma and COPD in Turkey.

MATERIAL AND METHODS

Measure
BMQ is a scale to assess cognitive representation of medicines. It consists of two parts: BMQ-Specific and BMQ-General. BMQ-Specific is an 11-item questionnaire, which includes two domains assessing necessity "Specific-Necessity" and concerns "Specific-Concern". These two subscales address the patient's beliefs about the necessity of prescribed medicine and concerns regarding the potential side effects from its use. BMQ-General is an 8-item questionnaire that additionally consists of two domains: "General-Harm" and "General-Overuse". These two subscales address the patient's beliefs about the potential danger of medications and the patient's considerations regarding certain aspects of medication overuse.

Each item is scored on a scale of 5 (1=strongly disagree, 2=disagree, 3=uncertain, 4=agree, and 5=strongly agree). Higher scores indicate higher perception of the concept represented by the domain. The maximum score available is 55 for BMQ-Specific and 40 for BMQ-General.

Cultural Adaptation
The permission to adapt BMQ into Turkish was obtained from the original author Rob Horne. The translation process was carried out according to the Principles of Good Practice for Translation and Cultural Adaptation [22]. Firstly, two native Turkish speakers also fluent in English translated the original version independently in a blinded manner. Translations were reconciled by the investigators. The translated final version was then back-translated to English by a native English speaker also fluent in Turkish. As a pilot, the cognitive assessment was conducted by two independent interviewers in five asthma and five COPD patients to control the comprehensibility of the translations. All participants in this pilot were asked regarding what they understood from the phrases. Interviewers have

Table 1. Assessment of participants' interpretation of answered items

	Asthma (n: 5)		COPD (n: 5)	
	Correct	**Incorrect**	**Correct**	**Incorrect**
S1	5	-	5	-
S2	5	-	5	-
S3	5	-	5	-
S4	5	-	5	-
S5	5	-	5	-
S6	5	-	5	-
S7	5	-	5	-
S8	4	1	5	-
S9	4	1	5	-
S10	5	-	5	-
S11	5	-	5	-
G1	5	-	5	-
G2	5	-	5	-
G3	5	-	5	-
G4	5	-	5	-
G5	5	-	5	-
G6	5	-	5	-
G7	5	-	5	-
G8	4	1	5	-

S: specific; G: general

a codebook for rating participants' understanding. In the asthma group, one participant misunderstood one question and one participant misunderstood two questions but different from the prior in their first interview. However, in the second interview all participants performed well in both asthma and COPD groups. This pilot study indicated that all items performed well, and there was no need for modifying any question (Table 1).

Participants and Recruitment
Fifty asthma and 50 COPD patients admitted to the outpatient clinics of Marmara University Hospital were included in the study for 3 months. Inclusion criteria for participants were patients with asthma or COPD and receiving long-term medication. Exclusion criteria were patients who cannot understand Turkish and who are not taking any medication. All participants completed a questionnaire including demographic characteristics and BMQ. Each questionnaire was anonymous and all participants provided informed consent. The institutional review board of Marmara University provided ethical approval.

Statistical Analysis
Statistical analyses were performed using the PSPP version 0.10.2 (GNU Project Development; San Carlos, CA, USA). Data were presented as mean ± standard deviation (SD) or n (%), as appropriate.

The principal component analysis and varimax rotation were used to evaluate the construct validity. The Kaiser-Meyer-

Table 2. Factor loadings from confirmatory factor analysis applied in both specific and general parts of the BMQ-Turkish

	Specific Questions	
	Factor 1	Factor 2
	Necessity	Concern
Without my medicines, I would be very ill	0.899	
My life would be impossible without my medicines	0.854	
My health, at present, depends on my medicines	0.828	
My health in the future will depend on my medicines	0.667	
My medicines protect me from becoming worse	0.639	
I sometimes worry about becoming too dependent on my medicines		0.768
My medicines disrupt my life		0.762
My medicines are a mystery to me		0.694
Having to take medicines worries me		0.688
I sometimes worry about long-term effects of my medicines		0.640
These medicines give me unpleasant side effects		0.416

	General Questions	
	Factor 1	Factor 2
	Harm	Overuse
Medicines do more harm than good	0.809	
All medicines are poisons	0.808	
Most medicines are addictive	0.728	
People who take medicines should stop their treatment for a while every now and again	0.720	
Natural remedies are safer than medicines	0.490	
Doctors use too many medicines		0.836
If doctors had more time with patients they would prescribe fewer medicines		0.801
Doctors place too much trust on medicines		0.623

Table 3. Internal validity of the BMQ subscales and Pearson's correlation coefficient between scales

	Specific		General	
	Necessity	Concerns	Overuse	Harm
Scale statistics Mean (SD)	19.9 (2.8)	17.7 (3.9)	10.1 (2.4)	13.6 (3.8)
Internal validity Cronbach's α	0.832	0.722	0.792	0.682
Concerns Pearson's r	0.280*	-	-	-
Overuse Pearson's r	-0.237*	0.178*	-	-
Harm Pearson's r	-0.052	0.441*	0.364*	-

*p value <0.05

Table 4. Correlation of each question with total correlation

Item number	Total correlation	α, if item is deleted
S1	0.51	0.60
S2	0.49	0.75
S3	0.42	0.62
S4	0.43	0.73
S5	0.41	0.75
S6	0.58	0.75
S7	0.49	0.78
S8	0.50	0.70
S9	0.52	0.68
S10	0.46	0.69
S11	0.59	0.78
G1	0.51	0.77
G2	0.48	0.69
G3	0.53	0.71
G4	0.39	0.78
G5	0,48	0.71
G6	0.43	0.72
G7	0.43	0.77
G8	0.45	0.72

S: specific, G: general

Olkin (KMO) test was used to evaluate the correlation of variables. The cut-off point of 0.4 was taken as the minimum of the factor load during the analysis. A confirmatory factor analysis was conducted to further evaluate the structure validity. Comparative fit index (CFI), normed fit index (NFI), and root mean square error of approximation (RMSEA) were used for model assessment.

Internal consistency check was conducted to test the reliability of the questionnaire. Cronbach's alpha was used to evaluate the internal consistency using a cut-off point 0.7.

RESULTS

Demographic Characteristics

In total, 100 patients (50 asthma and 50 COPD) participated in this methodological study. Overall, 32 patients were females in the asthma group, whereas 40 patients were males in the COPD group. Participants' average age was 62.5±13.5 years. Most participants were retired and were of lower education level.

The mean scores of the Turkish BMQ-Specific for the Necessity and Concerns domains were 19.9±2.8 and 17.7±3.9, re-

Table 5. Comparisons of internal consistency (alpha values) obtained in the Turkish study with the original and others published in different languages

	Specific-necessity	Specific-concerns	General-harm	General-overuse
Developer of BMQ (17)	0.86	0.65	0.60	0.51
German (20)	0.83	0.83	0.79	0.80
Italian (21)	-	-	0.78	0.72
Spanish (19)	0.83	0.72	0.68	0.70
Turkish version of BMQ	0.83	0.72	0.79	0.68

BMQ: beliefs about medications questionnaire

spectively. The mean scores for Overuse and Harm domains of the Turkish BMQ-General were 10.1±2.4 and 13.6±3.8, respectively.

Item Analysis and Factor Solution
The KMO measure for BMQ-Specific was 0.81 and for BMQ-General was 0.78. Two factors were found to have eigen values >1 for each of the two parts, explaining 58.3% of the total variability, which confirms the original BMQ. Factor loadings are shown in Table 2.

The confirmatory factor analysis revealed CFI as 0.958 and NFI as 0.962, thereby confirming the proposed model. RMSEA was 0.073 that showed moderate fitness.

Correlations between the subdomains of the instrument are shown in Table 3. In general, factor interpretation showed similar results for all questions between the Turkish and original scales.

Reliability
The internal consistency of specific-necessity, specific-concerns, general-harm, and general-overuse were 0.832, 0.722, 0.792, and 0.682, respectively. The correlation of each question with the total correlation is reported in Table 4.

DISCUSSION

The primary outcome of this study was to present the Turkish physicians a questionnaire that is culturally adapted and validated into the Turkish language, evaluating the patients' psychological processes involved in medication adherence. According to the findings of our study, the Turkish BMQ can be used as a reliable tool for this purpose in asthma and COPD patients in Turkey. Also, to our knowledge, it is the only study to describe the cross-cultural adaptation of the Turkish version of BMQ.

In the present study, the Turkish BMQ was administered in asthma and COPD. Considering the vast sociodemographic diversity of Istanbul, asthma and COPD patients are thought to represent multiple Turkish cultural and social trends, giving a sufficient sample size in accordance with the objectives and requirements of our study.

The original BMQ study by Horne et al. [17] showed two-factor solutions explaining 51% of variances. Also, Cronbach's α values obtained for specific-necessity, specific-concerns, general-harm, and general-overuse were 0.86, 0.65, 0.60, and 0.51, respectively. Good internal consistency values have been demonstrated for the Spanish [19], German [20], and Italian studies [21]. The results were consistent with those of the present study and confirm the reliability of the Turkish BMQ (Table 5).

The original scale used the criterion validity to assess each part of the BMQ. However, we used the construct validity and our results showed good fitness. Similarly, a French study and a recent Iranian study have shown construct validity results comparable to those of the present study. In the French study, they have shown that four-factor model similar to the original study revealed CFI as 0.89 and RMSEA as 0.08 [23]. Also, a Persian study revealed CFI as 0.96, NFI as 0.96, and RMSEA as 0.07 [24]. All these results are consistent with those of ours and show the validity of the Turkish version of BMQ.

Item G4 (natural remedies are safer than medicines) had a low factor loading of 0.49 on the general-harm subscale when compared to the other items. A similar problem was also present in the German study. Authors concluded that natural remedies have been in the German tradition for a long time and are regarded as a substitute for conventional medicine [20]. We think that this conclusion also holds true for the Turkish population.

The mean scores of the Turkish BMQ-Specific for Necessity and Concerns domains (19.9 and 17.7, respectively) were similar to those of the German version, with mean scores of 22.27 and 13.55 for the Necessity and Concerns domains [20]. The results of BMQ-Turkish were comparable to the English and German findings.

In conclusion, the Turkish version of BMQ presented satisfactory psychometric measurement features demonstrating the safety of its use in patients with asthma and COPD. For this reason, BMQ has been suggested for physicians as a useful tool in chest diseases to provide important information about the general perceptions of the patient and the medicines prescribed. In terms of clinical management, this information can play an important role in individual therapeutic interventions in asthma and COPD patients.

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