

Validity and Reliability of Turkish Version of Reaction Type Scale Against COPD

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Abstract

OBJECTIVE: The aim of the study is to develop a scale that could assess illness perception and reaction in patients with chronic obstructive pulmonary disease (COPD).

MATERIAL AND METHODS: The study was conducted in patients who were admitted in the pulmonary disease departments of a public and a private hospital. The study included 271 COPD patients. The COPD Perception and Reaction Scale, consisting of 54 items, was prepared as a Likert-type 5-point rating scale. In the validity phase of the study, expert judgments were obtained for content validity, and explanatory and confirmatory factor analyses (EFA and CFA) were then performed. The reliability of the scale in terms of internal consistency was tested with the Cronbach's alpha coefficient.

RESULTS: According to the results of the EFA, the COPD Perception and Reaction Scale consists of 3 subdimensions and 23 items. Factors are termed behavioral reaction, emotional reaction, and spiritual reaction. According to the CFA, the goodness-of-fit indices obtained ($\chi^2/df = (676.47/227) 2.98$ and $RMSEA = 0.056$, $NFI = 0.80$, $CFI = 0.96$, $NFI = 0.91$, and $AGFI = 0.85$) suggest that the recommended model for the scale is acceptable. The Cronbach's alpha coefficient was 0.74; Cronbach's alpha values for the subdimensions were calculated as 0.87 for "emotional reaction," 0.76 for "behavioral reaction," and 0.79 for "spiritual reaction."

CONCLUSION: The 23-item form of the COPD Illness Perception and Reaction Scale was demonstrated to be a valid and reliable scale for determining the perception and the reaction toward illness in COPD patients in Turkey.

KEYWORDS: Chronic obstructive pulmonary disease (COPD), illness perception, reaction

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is an important public health issue characterized by increased rates of morbidity, mortality, and healthcare costs worldwide.¹⁻³ Symptoms of shortness of breath, cough, and fatigue that are common in COPD patients decrease their ability to perform daily activities and consequently, their quality of life (QoL). Health-related quality of life is a wide term with physical, spiritual, emotional, and social aspects. Increased limitations in daily activities and dependency in COPD patients lead to social isolation, inability to perform the expected roles within family and society, decreased self-esteem, change in body image, and a deterioration in QoL.⁴⁻⁶

Repeated hospitalizations due to exacerbations cause patients to move away from their own natural environment, and to suffer loneliness. In addition, change in life style, difficulty in coping with the disease, and decrease or loss of the control on life may negatively affect QoL in COPD patients in the physical, psychological, social, and economical aspects.^{6,7} COPD may affect cerebral functions, leading to neuropsychiatric disorders, and may also lead to psychiatric outcomes because of the patient's illness perception and the effects on their lifestyle and QoL. Emotional stress, adaptation difficulty, anxiety disorder, paranoid reactions, panic, and depression are psychiatric disorders that are often seen in COPD patients and are associated with decreased QoL. Furthermore, studies in the literature have shown that COPD may be accompanied by several problems resulting from physical and social issues, including lifestyle changes, limitations, hopelessness, anger, irritability, aggression, lack of confidence, and occupational, social, and sexual insufficiencies.⁷⁻¹¹ Studies have reported the association of shortness of breath, hypoxia, and emotional disorders in COPD.^{12,13}

Effects of the disease process show individual differences among persons with COPD, which severely and multi-directionally affect life for patients and their families. While some patients adapt to living with the disease, others may be seriously affected.⁷ Dyspnea, which is among the most common symptoms in COPD, leads to panic, anxiety, and fear of death in patients. Dyspnea may occur due to organic or psychogenic reasons. Cognitive and emotional factors may also influence

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dyspnea perception. Therefore, the patients' cognitive and emotional perception about the disease and their reactions to this should be evaluated.¹⁴

As in other patients with chronic disease, illness perception in COPD may have direct positive or negative effects on the treatment process, and their psychological conditions.^{15,16} Illness perception can be defined as the cognitive perspective of the disease condition. Humans create cognitive models in order to explain and predict the events in their external environment. Reactions to illness take shape according to an individual's illness perception, their beliefs, type of treatment, intensity of treatment, and physiological changes occurring in the person. Interpretation and evaluation of persons about their illness is a determining factor in their emotional and behavioral reactions, mechanisms of coping, psychosocial strain, development of psychiatric disorders, and QoL.¹⁶ Various studies conducted on chronic diseases have reported that illness perception is the determinant of psychosocial reaction to treatment.^{6,15,16} These results indicate that knowing the illness perception and disease-related reactions of persons with chronic disease is important for effective treatment.

Previous studies have shown that QoL was better in patients who experienced less symptoms, understood the disease better, experienced lower impact of COPD in daily life, had better treatment control, had more positive beliefs about the treatment, and patients who showed lower emotional reactions, compared to patients with more negative beliefs.^{6,15-18} These results present an evidence that illness perception or reaction in COPD patients is an important factor of disease management.

There are studies in the literature showing an association between QoL and illness perception of patients with many different diseases.^{19,20} Although there are studies evaluating coping with the disease, QoL, and illness perception in COPD patients, the number of these studies are limited. One of the most important reasons for this is lack of a tool evaluating COPD-specific reactions and perceptions.²¹⁻²⁵ This leads

to insufficient patient evaluation, and application of general treatment methods that are not person-specific.

Because illness perception and significance of the existing symptoms for the patient differ among individuals, evaluation of disease-specific illness perception is important.^{15,16,19,20} The most important factors determining the quality of a measurement tool include validity, reliability, sensitivity, acceptability, conformability, and responsiveness. Therefore, the measurement tool should be disease-specific and should meet specific responsiveness criteria.¹⁹ An examination of the literature reveals that there is no measurement tool that evaluates valid and reliable disease perception or reaction specific to COPD. This scale can be useful for evaluating how patients with COPD understand their illness and how they cope, and also to plan their treatment processes accordingly.

Therefore, this study was conducted to determine the validity and reliability of the Turkish version of the COPD Illness Perception and Reaction Scale, which will be helpful in the evaluation of COPD patients by healthcare personnel, in increasing compliance to treatment.

MATERIAL AND METHODS

Samples

The study population consisted of 275 stable patients who presented to the Pulmonary Diseases outpatient clinic, were diagnosed with COPD, and hospitalized in the Pulmonary Diseases clinic between May 1, 2018 and September 3, 2018. COPD was diagnosed based on the pulmonary function studies, as defined by the GOLD criteria.²⁶

The study population must be at least 5-fold higher than the number of items that are subjected to factor analysis.²⁷ The sample size was sufficiently powered for the data analyses. Patients aged at least 40 years old, who were literate and had no communication barrier, and no diagnosis or treatment of psychiatric disorders, were included in the study. Additionally, patients had to be clinically stable (no history of exacerbation or hospital admission) and with no chronic severe disabling non-pulmonary disease that would confound results (e.g., end stage renal disease, cancer, or heart failure).

Four participants were excluded from the study due to insufficient data. Data analysis was performed with 271 persons. In order to collect data, necessary approval was obtained from the Gazi University Ethics Committee (Research Code No: 2018-137), and a written permission was received from the institution where the study was to be done. The written approval declared that there was no ethical drawback in conducting this study. Written informed consent was also obtained from the participants of the study. The participants were informed about the study and a questionnaire was given in those who accepted to participate. The questions were read by the researchers one by one and the participants were allowed to answer.

Development Stage of the Scale

The literature was reviewed in order to determine illness perception and reaction of COPD patients, and a draft form of 54 items was prepared.¹⁵⁻²⁰ Some statements were created

MAIN POINTS

- It is important to use measurement tools evaluating illness-specific perception or reaction of the COPD patients.
- There are studies evaluating the COPD patients' ability to cope with the disease, their QoL, and illness perception. However, the number of these studies is limited. One of the most important reasons for this is lack of a tool evaluating COPD-specific reaction and perception. Therefore, this study was conducted to determine validity and reliability of the Turkish version of the COPD Illness Perception and Reaction Scale.
- This study found that the 23-item form of the COPD Illness Perception and Reaction Scale is a valid and reliable scale.
- It is believed that the use of this scale will provide helpful guidance in increasing QoL and in coping with the disease.

utilizing the studies on this issue, and the final version of 54-item COPD Illness Perception and Reaction Scale was also prepared with a 5-item Likert form (1 = Strongly disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Strongly agree).

The 54 items prepared as draft were then sent to 6 specialists working in this field in order to analyze content validity and obtain expert opinions. The items that lacked clarity were reworked to enable easier comprehension. The prepared 54-item COPD Illness Perception and Reaction Scale was applied to 271 COPD patients, and the construct and content validity were evaluated. The item and total correlations of the scale and Cronbach's alpha values were calculated for internal consistency and reliability; factor analysis was also used to test construct validity.

Statistical Analysis

Statistical analysis of data was performed with SPSS (SPSS Version 22.0) and LISREL (Version 8.71) software. Age and gender of patients were assessed through descriptive statistical methods (mean, SD). The construct validity of the developed scale was analyzed with exploratory factor analysis (EFA) using SPSS software. First, principal components analysis was used to determine factorial structure of the scale, and the varimax technique was used to determine the factors involving the items. Confirmatory factor analysis (CFA) was performed in order to create an evidence for construct validity. The Lisrel 8.71 package software was used for CFA. CFA was used to examine whether the factorial structure of the scale was confirmed or not, and several goodness-of-fit indices were used to determine sufficiency of the tested structure. The commonly used goodness-of-fit indices were analyzed, including the Chi-square Goodness (χ^2), Goodness of Fit Index, Comparative Fit Index (CFI), Normed Fit Index (NFI), Non-Normed Fit Index (NNFI), and Root Mean Square Error of Approximation (RMSEA). Internal consistency of the structure was tested with Cronbach's alpha coefficient.

RESULTS

The mean age of the participants in the study was 64.57 ± 8.56 ; 76.5% were men, and 23% were women.

Results of the Validity of the Scale

EFA was performed to determine factor structure of the scale. The Kaiser–Meyer–Olkin (KMO) coefficient and Bartlett's sphericity test values were found in order to determine confirmation of the data to principal content analysis. As the result of analysis, the KMO value was calculated as 0.829, and the chi-square test statistic obtained from Bartlett's test was found significant ($KMO = 0.829$; $\chi^2(1431) = 5916.723$; $P < .001$). There were 15 contents with eigenvalue higher than 1 in the EFA. The total contributions of factors to the variance was 65.841%. When the items were evaluated to test for overlapping and to check whether they meet the acceptance level of factor load, it was found that 31 items that were overlapping and had a low factor load (<0.40) (DeVellis, 2003) were removed from the scale. The relationship of items with factors is explained by the factor load value. Although there is no strict limit on the minimum value that an item should reach in order to enter any factor, 0.30 or 0.40 is

generally recommended. It is more appropriate to determine the acceptable factor load according to the sample size in each study.^{28,35} In this study, the lowest acceptable factor load for the sample size of 271 was calculated as 0.40. Moreover, in the process of item extraction, when an item gives a high load value for 2 factors, it has been noticed that the difference between load values should be at least 0.10 in order to avoid overlapping.³⁵ Therefore, items with a factor load of less than 0.40, or with the difference between the factor load values of the items in the 2 factors less than 0.10, were excluded from the scale, and a 23-item scale was obtained (Table 1).

The items on the COPD Illness Perception and Reaction Scale were grouped under 3 factors. The first factor consisted of 12 items, the second factor of 7 items, and the third factor of 4 items. Items forming the factors were examined, and accordingly, the first factor was named as "emotional reaction," the second factor as "behavioral reaction," and the third factor as "spiritual reaction." According to the EFA results, load values differed between .754 and .523 for the first factor, between 0.775 and 0.494 for the second factor, and between 0.816 and 0.595 for the third factor. While the first factor explained 22.484% of the total variance, the second factor explained 13.691%, and the third factor 11.863% of the structure. The total contribution of this 23-item structure to the total variance was calculated as 48.038% ($KMO = 0.825$; $\chi^2(253) = 2269.593$; $P = .001$).

CFA was performed in order to confirm this 3-factor, 23-item structure. The χ^2/SD (676.47/227) value of the created structure was found to be 2.98, and the RMSEA value was 0.087. As the result of this analysis, we can say that the goodness-of-fit index of RMSEA was weak. In light of these data, we decided to revise the structure of the scale. Considering the modification suggestions, error covariances of the items were linked to each other as (items 8 and 9), (items 10 and 14), (items 25 and 26), (items 27 and 28), and (items 36 and 54). According to the newly obtained analysis, χ^2/SD (400.35/222) was found to be 1.80, while RMSEA was calculated as 0.056, CFI as 0.96, NFI as 91, and AGFI as 0.85 (Figure 1). Based on these results, it can be said that the 3-factor structure provided an acceptable goodness-of-fit.

Results of the Reliability of the Scale

Cronbach's alpha internal consistency coefficients were calculated for the reliability of the COPD Illness Perception and Reaction Scale. Cronbach's alpha coefficient was found to be 0.74 for the total scale, 0.87 for the first factor, "emotional reaction"; 0.76 for the second factor, "behavioral reaction"; and 0.79 for the third factor, "spiritual reaction".

Cronbach's alpha is the most widely used method for estimating internal consistency and reliability. Cronbach's alpha values in the range of 0.60-0.80 are considered moderate, but acceptable, while Cronbach's alpha values in the range of 0.8-1.00 are considered very good. The findings of this study show that the reliability of the instrument is moderate, with the value of Cronbach's alpha between $0.7 \leq \alpha < 0.8$.^{29,30}

As seen in Table 2, it was determined that the item–total score correlation coefficients of the COPD Perception and Reaction Scale ranged from 0.837 to 0.854. Hence, when the

Table 1. EFA Results of the COPD Illness Perception and Reaction Scale

	Items	Rotated Component Matrix Component		
		1	2	3
I am worried about the illness getting worse.	Item 25	0.754		
I am worried about exacerbation of the disease.	Item 26	0.740		
I get angry when thinking why this disease happened to me.	Item 14	0.681		
I have great concerns about my illness.	Item 47	0.655		
I can't believe how this happened to me.	Item 35	0.644		
I don't think I'm going to live in peace with my disease.	Item 32	0.638		
I am very angry with what has happened to me.	Item 10	0.627		
If I thought of myself more than others, I wouldn't have this disease.	Item 28	0.621		
I wouldn't have this disease if my life was a little easier.	Item 27	0.601		
I can't do anything to cheer myself up.	Item 21	0.567		
I am afraid of being hospitalized again.	Item 34	0.548		
I am out of hope for the future.	Item 33	0.523		
I am trying to do what I've been asked to get my old health back.	Item 9		0.775	
I am trying to do things that I believe will improve my health (smoking cessation, exercises, etc.).	Item 8		0.762	
I am trying to fight the disease.	Item 4		0.676	
I am trying to think as positively as possible.	Item 44		0.598	
I am trying to maintain my life as usual.	Item 30		0.574	
I can make jokes about my illness.	Item 41		0.528	
I see my illness as a situation that needs to be tackled.	Item 52		0.494	
I have entrusted myself to Allah, It's what he says.	Item 36			0.816
It is what fate is.	Item 54			0.809
There is nothing I can do.	Item 37			0.760
I have no control over my life.	Item 53			0.595

Cronbach's alpha reliability coefficients (α) obtained from the analyses were examined in the light of the literature, it was seen that reasonable values were obtained.

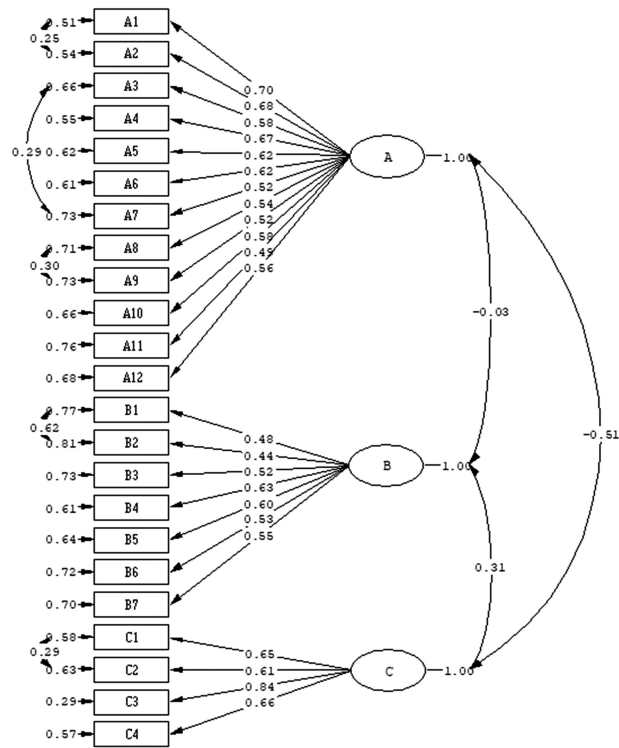
DISCUSSION

During the development stage of the scale, the literature was screened and a 54-item draft form was prepared. EFA was used to determine construct validity and CFA was performed to test the precision of the COPD Illness Perception and Reaction Scale. At the end of EFA, a 23-item structure was obtained under 3 factors as "emotional reaction," "behavioral reaction," and "spiritual reaction," and was analyzed with CFA. First, the χ^2/SD value was evaluated. An χ^2/SD value ≤ 2 indicated a good fitness, and an χ^2/SD value ≤ 3 showed an acceptable value.^{31,32} In this study, the χ^2/SD value < 2.98 showed that the structure provided an acceptable fitness. However, the structure should be interpreted with the other evaluation criteria. Another goodness-of-fit index is the RMSEA value, and an RMSEA < 0.05 indicates good fitness, and values between 0.05 and 0.08 as acceptable fitness.^{31,32} In the present study the RMSEA value was 0.087, showing weak fitness. Modification suggestions may be helpful in case the fitness indices do not meet the acceptance value in a CFA model.³³

The modification indices suggest the addition of an error covariance. Error covariances were studied, and the chi-square value was significantly decreased when modifications were made between items 8 and 9, items 10 and 14, items 25 and 26, items 27 and 28, and items 36 and 54. Considering the modification suggestions, χ^2/SD degree (400.35/222) was found as 1.80, and the RMSEA value as 0.056 for the 23-item, 3-factor structure.³¹

When the other indices were examined; CFI was found as 0.96. A CFI index value between .95 and .97 indicates an acceptable goodness-of-fit.^{32,33} An NFI index ≥ 90 and an AGFI index $\geq .85$ shows acceptable goodness-of-fit.^{30,31} In the present study, NFI was found as 91 and AGFI as .85. In line with the results obtained, it can be said that the scale provided an acceptable fitness.

Cronbach's alpha coefficients for internal consistency were evaluated for the reliability of the scale. The coefficients were > 0.70 for all dimensions, showing reliability of the scale measurement results.^{27,35} Thus, data obtained showed the reliability of the scale. When the literature was examined, it was seen that illness perception in COPD patients was assessed with the Brief Illness Perception Questionnaire (B-IPQ),^{36,37} or the Illness Perception Questionnaire



Chi-Square=400.25, df=222, P-value=0.00000, RMSEA=0.056

Figure 1. DAF analysis of the COPD Illness Perception and Reaction Scale.

Table 2. Test-Retest and Item-Total Score Correlations of the COPD Illness Perception and Reaction Scale

Items	Squared Multiple Correlation (Coefficients)	Corrected Item-Total Correlation (Coefficients)	Cronbach's Alpha if Item Deleted
Item 25	0.630	0.572	0.838
Item 26	0.609	0.562	0.838
Item 14	0.489	0.550	0.839
Item 47	0.469	0.509	0.841
Item 35	0.431	0.574	0.837
Item 32	0.361	0.532	0.839
Item10	0.447	0.502	0.841
Item 28	0.471	0.557	0.838
Item 27	0.430	0.504	0.841
Item 21	0.395	0.436	0.843
Item 33	0.401	0.394	0.845
Item 34	0.286	0.405	0.845
Item 9	0.742	0.129	0.853
Item 8	0.728	0.086	0.854
Item 4	0.418	0.261	0.849
Item 55	0.342	0.149	0.852
Item 30	0.346	0.149	0.852
Item 41	0.324	0.154	0.854
Item 52	0.308	0.365	0.846
Item 54	0.507	0.360	0.846
Item 36	0.550	0.387	0.846
Item 37	0.506	0.510	0.841
Item 53	0.448	0.537	0.839

(IPQ).^{38,39} In these studies, it was stated that the scale reliability (Cronbach's alpha) was 0.70 and above, similar to our study.^{36,37,38,39}

The B-IPQ assess cognitive and emotional representations of illness,³⁶ while the Revised Illness Perception Questionnaire IPQ-R consists of 9 subscales: timeline, timeline cyclical, consequences, personal control, treatment control, illness coherence, emotional representations, identity, and cause.³⁸ Unlike these scales, the "COPD Perception and Reaction Scale" has been developed specific to the disease, and has emotional, spiritual and behavioral dimensions.

CONCLUSION

As in many other chronic diseases, patients' perception and evaluation about the illness may affect their emotional and behavioral reaction, QoL, and compliance to treatment in COPD. Therefore, it is important to use measurement tools evaluating the illness-specific perception or reaction of the patients. However, there is still no tool to evaluate COPD-specific illness perception or reaction to disease. We believe that the COPD Illness Perception and Reaction Scale, which we developed for this purpose, will meet the need of health-care personnel in this field. This study indicated that the 23-item form of the COPD Illness Perception and Reaction Scale is a valid and reliable scale. We believe that this scale can be used as a helpful guide in increasing QoL and coping with the disease, and also in increasing compliance to treatment in these patients.

Ethics Committee Approval: This study was approved by Gazi University Ethics Committee (Research Code No: 2018-137).

Informed Consent: Written informed consent was obtained from the patients who agreed to take part in the study.

Peer Review: Externally peer-reviewed.

Author Contributions: Supervision – N.K., Ü.P., N.K.; Design – N.G., S.A.E., H.G.; Resources – E.K., B.Ş., Ü.P.; Materials – N.G., N.K.; Data Collection and/or Processing – B.Ş., S.A.E., H.G.; Analysis and/or Interpretation – E.K., Ü.P., N.G.; Writing Manuscript – E.K., Ü.P., N.G., N.K.; Critical Review – N.G., N.K., Ü.P.

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