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Are Illness Perceptions Associated With Disease Activity or Psychological Well-Being in Rheumatoid Arthritis? A Study With the Evidence of Confirmatory Factor Analysis

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ABSTRACT

Objectives: This study aims to assess the factor structure of the Turkish Revised Illness Perception Questionnaire (IPQ-R) in patients with rheumatoid arthritis (RA) and the relationship of illness perceptions with disease activity and psychological well-being.

Materials and methods: One hundred and fifty RA patients (8 males, 142 females; mean age 51.1±12.7 years; range 21 to 81 years) were included in the study. Confirmatory factor analysis was used to test the factor structure of the IPQ-R. Pain was assessed by visual analog scale, disease activity by Disease Activity Score 28, depression by Beck Depression Inventory, global life satisfaction by the Satisfaction with Life Scale, and illness perception by the IPQ-R.

Results: Three items (items 12, 18, 19) were deleted because of poor factor loadings. The modified 35-item model showed good reliability and discriminant validity. Beck Depression Inventory scores were correlated with identity, consequences, and emotional representations subscales positively (p<0.001); and with illness coherence subscale negatively (p<0.05). There were positive correlations between Satisfaction with Life Scale scores, and treatment control and illness coherence subscales (p<0.05). Satisfaction with Life Scale scores were negatively correlated with identity, emotional representation, and timeline acute/chronic subscales (p<0.05), and consequences subscale (p<0.001). Disease Activity Score 28 was not correlated with IPQ-R domains (p>0.05).

Conclusion: The Turkish IPQ-R appears to be a useful clinical assessment tool to evaluate RA-related illness perceptions. RA healthcare should include psychological intervention to strengthen patients' beliefs about their RA regardless of disease activity.

Keywords: Confirmatory factor analysis; depression; disease activity; illness perceptions; rheumatoid arthritis.

Rheumatoid arthritis (RA) is one of the severe chronic diseases with long duration, usually requiring long-term therapies, and affecting most aspects of one's life.[1] The treatment of RA includes aggressive management of disease activity to minimize inflammation and prevent future disability and morbidity.[2] Although recommendations for the treatment of RA are based on well-validated disease activity measures, authors have recommended that physicians and patients should decide together through a shared decision-making process taking into account patients' values, preferences, and comorbidities.[2]

Illness perceptions are cognitive and emotional representations that patients have regarding their disease. Illness perceptions are not only based on symptoms but also on the illness-related consequences and past experiences, and associated anxiety.[3] Patients develop their own ideas about their illness to make sense of and adapt to the difficulties that their illness causes.[4]

There have been reports on the illness perceptions in several diseases such as RA,[5-8] ankylosing spondylitis,[4] fibromyalgia,[9] sport injuries,[10] low back pain,[11] osteoarthritis,[12] and chronic fatigue syndrome.[13] In RA patients, illness perceptions have shown association with disease activity, pain, disability, quality of life, depression, and anxiety.[5-8] The results of the studies reveal that how the patients perceive their RA has an impact on disease outcome, and RA is more serious in patients with negative beliefs about their illness.[5,6]

The Revised Illness Perception Questionnaire (IPQ-R) has been used extensively for the assessment of illness perception.[14] The reliability and validity of the Turkish IPQ-R was performed by Armay et al.[15] in cancer patients. After that, Brzoska et al.[16] evaluated the factor structure of Turkish IPQ-R in patients with diabetes and cardiovascular disease. Although the Turkish version of the IPQ-R showed a good reliability and discriminant validity, to the best of our knowledge, no published reports have assessed the availability of Turkish version of this questionnaire in RA patients in our country. Therefore, in this study, we aimed to assess the factor structure of the Turkish IPQ-R in patients with RA and the relationship of illness perceptions with disease activity and psychological well-being.

MATERIALS AND METHODS

One hundred and fifty patients (8 males, 142 females; mean age 51.1±12.7 years; range 21 to 81 years) who met the 1990 American College of Rheumatology criteria for RA[17] were enrolled in the study between February 2015 and March 2016. The sample size for 0.99 power and p<0.01 was calculated as 150. Subjects were excluded if they had other rheumatic diseases, severe somatic or psychiatric disorders, had cognitive dysfunctions, or were not fluent Turkish speakers. None of the patients was receiving psychiatric treatment including psychotherapy or use of antidepressants etc. The study was conducted at the Department of Physical Medicine and Rehabilitation of Medical Faculty of Ondokuz Mayıs University. The study protocol was approved by the Faculty Ethics Committee (B.30.2.ODM.0.20.08/1049). A written informed consent was obtained from each patient. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Participants were questioned about age, sex, working status, smoking habits, educational level and years of education, medical comorbidities, current medications, and disease duration. Laboratory evaluations including erythrocyte sedimentation rate, C-reactive protein, and anticitrullinated protein antibodies were also reported.

The global pain of the patients was assessed by a 10 cm visual analog scale; score 0 indicates no pain and 10 indicates very severe pain.[18] Disease activity was evaluated using Disease Activity Score including 28 joints.[19] Tender joint count, swollen joint count, erythrocyte sedimentation rate, and global assessment score were used. Depression was assessed using Beck Depression Inventory (BDI). The BDI was developed by Beck et al.[20] and adapted to Turkish by Hisli.[21] Turkish version of the Satisfaction with Life Scale (SWLS) was used to measure global cognitive judgments of satisfaction with one's life.[22] Higher scores indicate greater life satisfaction.[23]

The Turkish version of the Illness Perception Questionnaire was used to assess illness perceptions.[15] It was originally developed by Weinman et al.[24] and revised by Moss-Morris et al.[14] It has three sections: the first section is identity component and is concerned with symptoms such as pain, fatigue, and nausea that the patients associate with their illness. Patients were asked whether they experienced a specific symptom and whether they believed this symptom was related to RA. The sum of the yes-rated items on the second question forms the identity subscale. The second section comprises of 38 items with a five-point Likert scale response format (strongly agree to strongly disagree) arranged in seven subscales: timeline acute/chronic (beliefs about the duration of illness), timeline cyclical (beliefs about stability of illness symptoms over time), consequences (beliefs about illness severity and impact on physical, social, and psychological functioning), personal control (belief about one's own ability to control symptoms), treatment control (belief in cure through treatment), illness coherence (comprehension or understanding of the illness), and emotional representation (perception of negative emotions generated by the illness).

The third section consists 18 possible causes that patients might attribute to RA, grouped in four dimensions: psychological attributions, risk factors, immunity, and chance.

Previous research investigating the factor structure of the IPQ-R focused on the 38 items of the seven-dimensional IPQ-R section.[16,25-27] Similarly in this study, second section of IPQ-R was evaluated by means of confirmatory factor analysis, since symptoms in identity section and causes in third section are not always relevant for RA. All subjects were asked for test-retest evaluation after 3-4 weeks.

Statistical analyses

The data were analyzed using the IBM SPSS version 22.0 for Windows (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to characterize the sample. Kaiser-Meyer-Olkin Measure of Sampling Adequacy is 0.857, so we should be confident that factor analysis is appropriate for this data. Bartlett's Test of Sphericity was found to be highly significant as the value $p<0.001$.

Direct maximum likelihood confirmatory factor analysis was used to examine the construct validity of the 38 items of the second section of the Turkish IPQ-R. CFA was conducted using Lisrel 8.7 (Mooresville, IN: Scientific Software, Inc. Joreskog, K. G., and Sorbom, D. (2004). LISREL 8.7 Lincolnwood, IL).[28] The fit of the measurement model was assessed by different fit indices. Absolute fit indices such as chi-square (χ^2/degrees of freedom with acceptable values between 1 and 3) and Goodness of Fit Index (with values ≥0.90 indicating a good fit) were used to evaluate full model fit. The Comparative Fit Index (with values ≥0.95 indicating a good fit) was used to assess the adequacy of the models. The root mean square error of the approximation (with values ≤0.05 indicating good fit, and values between 0.05-0.08 indicating acceptable fit) was calculated to take into account the error approximation of the model fit.

The test-retest reliability was assessed by the intraclass correlation coefficient between scores obtained in main survey and follow-up. The Cronbach's alpha (Cronbach's α) coefficient was also calculated for the original and modified Turkish IPQ-R. Internal reliability of the second section of the modified Turkish IPQ-R was evaluated by composite reliability estimates with values ≥0.60 indicating satisfactory reliability in the latent factors. Discriminant validity of the seven factors was assessed by the size of their intercorrelations with correlation coefficients <0.85, indicating acceptable discriminant validity. Convergent validity was assessed by examining the correlation between the second section of the modified Turkish IPQ-R and other parameters. Correlations were evaluated by Spearman's rank correlation analyses.

RESULTS

Demographic and clinical characteristics of the patients are shown in Table 1. Patients reported that the main cause of their RA was "stress or worries" (67.3%). Patients considered that the second and third most important causes were "hereditary" (58.7%) and "altered immunity" (51.3%), respectively.

Table 2 shows the goodness-of-fit indices for the two models. The first model included the original 38 items and resulted in poor fit indices (χ^2=1336.8 [degrees of freedom=644, $p<0.001$], root mean square error of the approximation=0.085 [90%-confidence interval=0.079-0.091], Goodness of Fit Index=0.68, Comparative Fit Index=0.827, Akaike Information Criterion=1,530.80). Evaluation of factor loadings identified three items (item 12 from personal control factor "There is a lot which I can do to control my symptoms", item 18 from timeline acute/chronic factor "My illness will improve in time", and item 19 from treatment control "There is very little that can be done to improve my illness") with factor loadings below 0.40 criteria. For a modified model, these three items were excluded. A second model with 35 items and four error covariances resulted in good fit suggesting superiority to the first model (χ^2=1,059.04 [degrees of freedom=603, $p<0.001$], root mean square error of the approximation=0.071 [90%-confidence interval=0.064-0.078], Goodness of Fit Index=0.80, Comparative Fit Index=0.90, Akaike Information Criterion=1259.04). Mean scores on all modified IPQ-R subscales are shown in Table 3.

Table 1. Demographic and clinical characteristics of rheumatoid arthritis patients

	n	%	Mean±SD	Median	Min-Max
Age (year)			51.1±12.7	51	21-81
Years of education			5.9±3.8	5	0-16
Disease duration (year)			10.5±8.6	9	1-37
Visual analog scale pain score (0-10)			5.6±2.2	6	0-10
Erythrocyte sedimentation rate (mm/h)			29.2±18.1	28	2-107
C-reactive protein (mg/L)			2.4±3.9	0.9	0.1-39
Disease activity score 28			3.4±0.9	3.52	0.97-5.70
Beck depression inventory			12.6±8.6	10	0-53
Satisfaction with life scale			22.3±6.4	23	6-33
Occupation					
Housewife	120	80			
Retired	14	9.3			
Other	16	10.7			
Education					
Literate	21	14			
Primary education	99	66			
Secondary education	22	14.7			
College	8	5.3			
Anticitrullinated protein antibodies					
Positive	48	32			
Negative	35	23.3			
Unknown	67	44.7			
Smoking	17	11.3			
Drug treatment					
Disease-modifying anti-rheumatic drugs	133	88.7			
Corticosteroid	107	71.3			
Biological agents	95	63.3			
Comorbidity					
Hypertension	34	22.7			
Diabetes	19	12.7			
Asthma	8	5.3			
Heart disease	5	3.3			
Other	7	4.7			

SD: Standard deviation.

Of the patients, 114 were reevaluated for test-retest reliability. Test-retest correlation coefficients of timeline acute/chronic, consequences, personal control, treatment control, illness coherence, timeline cyclical, and emotional representations were found as 0.98 (p<0.001), 0.99 (p<0.001), 0.93 (p<0.001), 0.96 (p<0.001), 0.98 (p<0.001), 0.97 (p<0.001), and 0.99 (p<0.001), respectively. Test-retest correlation coefficients were 0.98 (p<0.001) for identity subscale, 0.99 (p<0.001) for psychological attributions subscale, 0.99 (p<0.001) for risk factors subscale, 0.99 (p<0.001) for immunity subscale, and 0.98 (p<0.001) for chance subscale. Test-retest correlation coefficient of BDI and SWLS was 0.99 (p<0.001). Internal consistency (Chronbach's α) of the original IPQ-R was 0.812. After the elimination of three items because of low factor loadings, Chronbach's α of the modified IPQ-R was calculated as 0.804.

The standardized solutions and error variances for each item in the modified model are presented

Table 2. Goodness-of-fit indices for original and modified models of Turkish Illness Perception Questionnaire

Model	Chi-squared (df)		RMSEA (90%-CI)		GFI	CFI	AIC
Model 1 original (38 items)	1336.8	644*	0.085	0.079-0.091	0.68	0.86	1530.80
Model 2 modified (35 items, 4 error covariances)	1059.04	603*	0.071	0.064-0.078	0.80	0.90	1259.04

Chi-squared (df): Chi-square test of model fit and degrees of freedom; RMSEA (90%-CI): Root mean square error of approximation and 90%-confidence intervals; GFI: Goodness of Fit Index; CFI: Comparative Fit Index; AIC: Akaike Information Criterion; * p<0.0001.

Table 3. Mean scores of modified Illness Perception Questionnaire subscales

IPQ-R subscales	Normal range	Mean±SD	Median	Min-Max
Identity	0-14	5.4±2.9	5	0-13
Timeline (acute/chronic)	5-25	19.2±5.0	20	5-25
Consequences	6-30	19.5±4.6	20	6-30
Personal control	5-25	14.0±3.9	14	5-25
Treatment control	4-20	15.8±2.5	16	8-20
Illness coherence	5-25	19.1±4.1	19	6-25
Timeline (cyclical)	4-20	15.4±2.9	16	4-20
Emotional representations	6-30	21.2±5.9	23	6-30
Cause				
Psychological	6-30	13.6±4.6	13	6-29
Risk factors	7-35	13.8±3.9	13	7-32
Immunity	3-15	8.0±2.3	8	3-15
Chance	2-10	4.0±1.6	4	2-10

IPQ-R, Revised Illness Perception Questionnaire; SD: Standard deviation; Min: Minimum; Max: Maximum.

in Table 4. All factors were statistically significant and composite reliability estimates exceeded the recommended threshold of 0.60, indicating satisfactory reliability in the latent factors.

In terms of discriminant validity, intercorrelations between the seven latent factors of the second section of the modified Turkish IPQ-R are presented in Table 5. No intercorrelation exceeded the threshold of 0.70, suggesting acceptable discriminant validity. The largest correlation was found between the consequences and emotional representation factors (r=0.488).

In terms of convergent validity, consequences and emotional representation subscales were correlated with BDI scores positively (p<0.001). There was also a negative correlation between illness coherence subscale and BDI scores (p=0.041). There were negative correlations between timeline acute/chronic subscale (p=0.024), consequences subscale (p<0.001), emotional representation subscale (p=0.001), and SWLS scores. Treatment control (p=0.008) and illness coherence (p=0.006) subscales were positively correlated with SWLS scores. The correlations between the second section of the modified IPQ-R and BDI and SWLS scores confirm the convergent validity of the second section of our modified IPQ-R.

Table 6 shows the correlation analyses between the subscales of modified IPQ-R and the clinical parameters. Personal control subscale was correlated with age (p<0.001) and disease duration (p=0.003) negatively, and with years of education (p=0.009) positively. Timeline acute/chronic subscale was positively correlated with disease duration (p<0.001). There was a negative correlation between treatment control and age (p=0.049). There were positive correlations between BDI scores and identity (p<0.001), psychological attributions (p=0.001), risk factors (p=0.028), and immunity (p=0.009) subscales. A negative correlation was observed between SWLS scores and identity subscale (p=0.001) (Table 6).

DISCUSSION

There are four studies evaluating the factor structure of translated versions (Turkish, Swedish, Chinese, and Spanish) of the second section of the IPQ-R.[16,27,29,30] In these studies, the measurement model proposed by Moss-Morris et al.[14] had to be modified to obtain good model fit. The authors demonstrated that before the application of the IPQ-R in researches, the evaluation of this instrument's factor structure is necessary. For this reason, we evaluated the factor structure of Turkish IPQ-R in RA patients before the assessment of the relationship of their illness perceptions with disease activity and psychological well-being.

In the present study, the factor structure of the second section of the IPQ-R was supported after deletion of three non-fitting items (item 12 from personal control factor, item 18 from timeline acute/chronic factor, and item 19 from treatment control), which partially differed from the original structure. Similarly, item 18 and item 19 were the most frequently determined items that had the lowest factor loadings in

Table 4. Results of confirmatory factor analysis of modified model of Turkish Illness Perception Questionnaire

	Completely standardized factor loading	Standard error	ρ
Timeline acute/chronic			0.910
Factors and items			
1st question	0.79**	0.09	
2nd question	0.91**	0.08	
3rd question	0.87**	0.09	
4th question	0.83**	0.08	
5th question	0.83**	0.09	
Consequences			0.767
Factors and items			
6th question	0.40*	0.09	
7th question	0.79**	0.09	
8th question	0.78**	0.08	
9th question	0.55**	0.09	
10th question	0.35*	0.10	
11th question	0.52*	0.10	
Personal control			0.819
Factors and items			
13th question	0.78**	0.08	
14th question	0.90**	0.08	
15th question	0.61**	0.09	
16th question	0.38*	0.10	
17th question	0.53**	0.09	
Treatment control			0.712
Factors and items			
20th question	0.84**	0.07	
21st question	0.85**	0.07	
22nd question	0.86**	0.06	
23rd question	0.76**	0.06	
Illness coherence			0.847
Factors and items			
24th question	0.66**	0.08	
25th question	0.85**	0.08	
26th question	0.89**	0.09	
27th question	0.96**	0.08	
28th question	0.61**	0.08	
Timeline cyclical			0.784
Factors and items			
29th question	0.76**	0.08	
30th question	0.87**	0.06	
31st question	0.66**	0.09	
32nd question	0.67**	0.05	
Emotional representations			0.918
Factors and items			
33rd question	0.95**	0.10	
34th question	0.98**	0.09	
35th question	0.77**	0.10	
36th question	0.59**	0.08	
37th question	0.76**	0.09	
38th question	0.72**	0.09	
Error covariance between items 1 and 5	0.94**	0.08	
Error covariance between items 2 and 5	0.91**	0.08	
Error covariance between items 15 and 17	0.92**	0.09	
Error covariance between items 19 and 23	0.87**	0.08	

ρ: Composite reliability; * p<0.01; ** p<0.001.

previous researches.[16,25,26,29-31] Differently, item 12 (There is a lot which I can do to control my symptoms) showed a low factor loading in our study. Respondents may not understand the meanings of "symptoms". Instead, "There

is a lot which I can do to control my illness" may be clearer for our patients. Brzoska et al.[16] deleted four items (items 17, 19, 20, 31) because of poor factor loadings on the Turkish version of the IPQ-R in patients with diabetes

Table 5. Intercorrelations between seven modified Illness Perception Questionnaire latent factors

Factors	1	2	3	4	5	6	7
Timeline (acute/chronic)							
Consequences	0.387**						
Personal control	0.006	0.007					
Treatment control	-0.149	-0.110	0.301**				
Illness coherence	0.053	-0.223**	-0.333**	0.152			
Timeline (cyclical)	0.137	0.182*	-0.117	0.255**	0.193*		
Emotional representations	0.137	0.488**	0.157	-0.022	-0.268**	0.238**	-

* $p < 0.05$; ** $p < 0.01$.

Table 6. Correlation coefficients between clinical variables and modified Illness Perception Questionnaire subscales

IPQ-R	Age	Years of education	Disease duration	VAS	DAS28	BDI	SWLS
Identity	-0.014	-0.047	0.049	-0.003	-0.047	0.412**	-0.281*
Timeline (acute/chronic)	0.057	0.098	0.360**	0.014	-0.035	0.087	-0.180*
Consequences	-0.088	-0.070	0.058	0.158	0.114	0.352**	-0.282**
Personal control	-0.303**	0.213*	-0.263*	-0.035	-0.030	0.015	-0.137
Treatment control	-0.173*	0.050	-0.142	-0.067	-0.067	-0.097	0.215**
Illness coherence	0.072	-0.125	0.151	-0.081	-0.042	-0.167*	0.222**
Timeline (cyclical)	0.096	-0.136	0.039	0.033	-0.073	0.008	0.030
Emotional representations	-0.105	-0.051	-0.025	0.096	0.122	0.499**	-0.261**
Psychological attributions	-0.081	-0.005	-0.039	-0.023	0.031	0.262**	-0.181
Risk factors	-0.139	0.011	-0.147	-0.114	0.011	0.179*	-0.108
Immunity	-0.073	-0.027	-0.102	-0.065	-0.042	0.213*	-0.125
Chance	0.102	0.011	0.018	0.013	-0.037	0.119	-0.162

IPQ-R: Revised Illness Perception Questionnaire; VAS: Visual analog scale; DAS28: Disease activity score 28; BDI: Beck depression inventory; SWLS: Satisfaction with life scale; * $p < 0.05$; ** $p < 0.01$.

and cardiovascular disease. Although there are no cultural differences, these findings may have resulted from the illness specific variations in the same culture.

In the current trial, the Turkish IPQ-R showed good stability over a three-four-week period with correlations ranging from 0.93 to 0.99. Correlation coefficients of the original IPQ-R ranged from 0.35 to 0.82 in RA patients over a six-month period.[14] Armay et al.[15] found that the correlation coefficients of the Turkish IPQ-R ranged from 0.53 to 0.78. We found that the original and modified Turkish IPQ-R items presented adequate internal consistency ($\alpha=0.812$ and $\alpha=0.804$, respectively). Chronbach's α coefficients of the original IPQ-R and Turkish version of the IPQ-R ranged from 0.67 to 0.89 and from 0.41 to 0.78, respectively.[14,15] The results of composite reliability estimates revealed satisfactory reliability in the latent factors.

According to the results of the intercorrelations between the factors of our modified questionnaire,

there were moderate or weak relationships between the subscales. These results were in line with the original and the Turkish versions of the IPQ-R[14-16] and indicated that the constructs may be empirically distinct. The strongest effects between the consequences and emotional representation factors indicated that patients who believed that their RA was serious were emotionally distressed. On the other hand, patients perceiving RA as a long-term condition thought their disease had serious consequences. Additionally, patients who perceived their treatment as effective had stronger beliefs about personal abilities to control their RA.

Based on previous studies on illness perceptions, we had anticipated that disease activity and pain intensity would be correlated with illness perceptions.[5,6,32-34] However, these relationships were not found in our study. In the literature, there are a few studies investigating the relationship between illness perceptions and disease activity in RA and the results are contradictory.[6-8] Cordingley et al.[6] and Fraenkel and Cunningham[7] found a correlation between disease activity and patients'

illness beliefs. In concordance with our study, Graves et al.[8] reported that disease activity scores showed no associations with illness beliefs and they concluded that patients' beliefs about their RA cannot be explained by disease status. Patients with higher disease activity would be expected to have more negative illness representations because their illness was more active and severe. On the contrary, the current trial suggests that disease activity and pain intensity may not play a role in the Turkish RA patients' beliefs about their illness.

In our study, the correlations were in the expected direction with illness perceptions, and depression and life satisfaction, in line with previous studies.[5,6,32-35] Patients with poor well-being had more symptoms attributed to RA, and perceived negative consequences and negative emotions due to RA. Patients who believed that they understood their disease had lower level of depression and more life satisfaction. Additionally, "stress or worries" was the main cause of RA reported by our patients. There is evidence that patients' beliefs about their disease are related to aspects of well-being including life satisfaction, physical symptoms, and depression.[36] With respect to RA, different domains of illness perceptions have been shown to be related to depression.[5,6,8,32-35] The association between the illness perceptions, and depression and life satisfaction scores in Turkish RA patients may be mutual. Patients may view their illness more negatively because of the poor well-being, or negative beliefs of the patients about their RA may cause them to become depressive and less satisfied with life. Longitudinal studies are required to determine the direction of causality in this relationship.

Although, it was reported that age might influence patients' perceptions, the relationship between age and illness perception in RA patients is not well-known.[37] Our study showed negative associations between age, and personal control and treatment control indicating that as the patient ages, he/she may have negative beliefs about personal abilities to control his/her RA and about the ability of treatment to control RA. It may be expected that longer disease duration leading to erosions and living with affected joints for many years may lead to negative beliefs about RA. Or, subjects who had RA for a longer time may worry less about their illness and have strong

perceptions about their RA due to experience and competence. In this trial, it seems that the patients with longer disease duration were likely to have strong beliefs about the chronicity of RA. On the other hand, a lower level of control over RA may be connected to longer disease duration. In a study by Wahl et al.,[38] it was found that higher educational level was significantly associated with higher scores for illness coherence in patients with psoriasis. In the current study, the association between years of education and personal control may indicate that RA patients with lower years of education may feel they have no control over their disease.

The findings of this study have several clinical implications. This is the first trial to identify illness perceptions in Turkish RA patients with Turkish IPQ-R. Our modified 35-item model showed a good reliability and discriminant validity indicating that it could be a valuable instrument in the assessment of illness perceptions in Turkish RA patients. A major finding of this study was that illness perceptions of Turkish RA patients were associated with psychological well-being rather than clinical severity. Additionally; older age, lower years of education, and longer disease duration seem to contribute to negative beliefs about the personal capacity for controlling RA.

There are a number of potential limitations of this study. Self-regulation theory by Leventhal et al.[39] suggests that illness representations change over time. Main limitation of this study is its cross-sectional design, so it is not possible to show how illness representations change over time to infer direction or causality of the correlations. Although in studies with longitudinal designs, authors found no change in the mean illness perception scores taken at intervals,[33,40] longitudinal studies would be needed to detect how illness representations and clinical features interact and change over time during the adaptation to RA. Patients' education program about RA or presence of close relatives with RA may increase patients' understanding about the disease. In the current study, these factors, which may affect the illness perceptions, were not evaluated. Another possible limitation is that the sample consisted of patients with established RA. Individuals with recent onset disease may have different patterns of illness perceptions.[41]

In conclusion, patients' views of their illness are affected by the social and cultural systems in which they live. In this study, IPQ-R, which is the most commonly used instrument for the assessment of illness perceptions, was confirmed for Turkish RA patients. Patients' education, which may increase their understanding about the disease, and psychological intervention regardless of disease activity, may help to alleviate the perceived threat of their illness and to strengthen their beliefs about their RA. Since the illness perception is critical for providing effective treatment, which is not fully captured by disease activity,[7] more data about these beliefs are needed to meet long-term needs. Based on the results of this study; our modified Turkish IPQ-R may be used in clinical practice to evaluate the illness perceptions of Turkish RA patients. It may be beneficial to design targeted interventions to improve psychological health and life satisfaction in Turkish RA patients regardless of disease activity. Given the increasing use of the IPQ-R in different clinical and cultural circumstances, verification of the reliability and validity of this instrument may contribute to its generalizability and availability.

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