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Validity of the Patient-Rated Wrist Evaluation questionnaire in rheumatoid arthritis

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Abstract

Background: The Patient-Rated Wrist Evaluation (PRWE) is a patient-reported questionnaire focusing on symptoms and function in wrist pathologies. It consists of 15 questions regarding pain and functional activities of the wrist. Rheumatoid arthritis (RA) is a multi-systemic disease characterized by inflammation of the wrist and hand joints in almost all patients. This study aims to test the validity of PRWE in patients with RA.

Method: Seventy-five patients with RA from a single outpatient clinic participated in the study. Patients filled out the Michigan Hand Outcomes Questionnaire (MHOQ) and grip strength of both hands were measured. Patients filled out the PRWE questionnaire consecutively once for the dominant and once for the non-dominant hand. Correlations between PRWE and MHOQ and grip strength scores were analyzed by Spearman's correlation method.

Results: Our results demonstrated that there was a very strong correlation between the PRWE and the MHOQ and a moderate correlation between the PRWE and grip strength ($P < .001$). PRWE also showed negative and fair correlation with grip strength of both hands ($P < .001$).

Conclusions: The Patient-Rated Wrist Evaluation is a valid tool for evaluating wrist involvement in patients with RA. PRWE may be preferred in the busy clinical setting since it has simple and short questions. Additionally, it may provide a sensitive follow-up tool for patients separately using its subscales of pain and function.

KEYWORDS

Patient-Rated Wrist Evaluation, patient-reported outcome measures, rheumatoid arthritis, rheumatoid hand

1 | INTRODUCTION

Rheumatoid arthritis (RA) is a common rheumatic disease characterized by synovial inflammation involving small joints of hands and wrists in almost all patients.[1-3] The frequency of wrist involvement has been reported to be 50% in the first 2 years of the disease and it increases up to 90% in the 10-year follow-up period.[4] Inflammation and synovial proliferation of the wrist joint result in pathological changes which cause pain, dysfunction and decrease in health-related quality of life.[5-7] Therefore, assessment of patients with RA should include the outcome measures of dysfunction and disability.

Assessment of the RA hand generally includes objective methods like grip strength and range of motion measurements as well as swollen joint count and laboratory tests.[8-10] However, such clinician-based outcome measures may sometimes fail to notice the patient's daily life difficulties. Available data strongly emphasize that the assessment methods should also include patient-reported

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outcome measures.[9-12] The Patient-Rated Wrist Evaluation (PRWE) questionnaire, Michigan Hand Outcomes Questionnaire (MHOQ), and Disabilities of Arm, Shoulder and Hand (DASH) questionnaire are among the most commonly used patient-reported outcome measures in hand therapy.[13] These self-rated questionnaires have been validated in several pathological conditions of the hand.[9,14,15] MHOQ, for example, has been validated for patients with RA.[9] However, none of the validated questionnaires has focused on the wrist separately as wrist is the most involved region in this disease.[4]

The PRWE which was developed by MacDermid et al[16] is a self-reported questionnaire used in wrist pathologies. It has been shown to be valid in measuring the disability levels in patients with wrist pathologies, such as distal radius and scaphoid fractures, distal radio-ulnar dysfunction and carpal tunnel syndrome.[14,17] Moreover, a systematic review of 22 studies showed that PRWE had satisfying psychometric properties in various wrist/hand conditions.[18] However, it has not been validated in patients with RA. The aim of this study is to evaluate the validity of the PRWE questionnaire in RA, as wrist involvement is very common in this disease.

2 | METHODS

This study was performed with the collaboration of Rheumatology Division and Rheumatological Rehabilitation Unit, Gazi University Faculty of Health Sciences. The study protocol was approved by the local ethics committee. All the patients completed an informed consent form which was prepared according to international declarations.

The target sample size was calculated as 75 according to Hatcher's recommendations.[19] It is recommended that the number of subjects should be five times larger than the number of variables for questionnaire validity studies. Thus, 75 adult patients diagnosed with RA were included in the study. Patients with upper extremity injury or surgery history within the previous year were excluded from the study. Demographics including age, gender, and hand dominance of the patients were recorded. Grip strength of both hands were measured and patients filled out the PRWE and MHOQ within the same visit. The two scales were given to the patients in a randomized order. Each patient separately filled the PRWE once for dominant and once for non-dominant hands.

2.1 | Assessments

2.1.1 | PRWE-T

The PRWE questionnaire, which was developed by MacDermid and colleagues, evaluates the pain intensity of the wrist joint and disability level in a patient-reported manner.[16] The scale consists of 15 questions in total and has two separate subcategories of questions. The pain subscale (PRWE-P) measures the pain intensity and frequency with five questions while the function subscale (PRWE-F) consists of 10 questions. The PRWE-F subscale also has two subscores that separately indicate the specific and daily functions. The questionnaire is scored by the sum of total points of each subscale. Each question has a 10-point scale; 0 point means no pain/no difficulty and 10 point means worst ever/unable to do. Responses of 15 items are added to derive a composite score out of 100, where pain and disability are equally weighted. Higher scores on the subscales represent greater pain or functional disability. The Turkish version of the PRWE questionnaire (PRWE-T) was validated in 2015.[20]

2.1.2 | MHOQ-T

The MHOQ is a 37-item questionnaire, which is divided into six subscales and separately yields results for each hand. The MHOQ total score is obtained by summing the scores for all six subscales (after reversing the pain scale) and then dividing the sum score by 6. The total score ranges from 0 to 100 with a higher score indicating better hand performance. The Turkish version of the MHOQ (MHOG-T) was validated in 2013 by Öksüz et al.[21] The scale has been validated in patients with RA by Waljee et al.[9]

2.1.3 | Grip strength measurements

Grip strength was measured by using a hand-held dynamometer. Grip strength assessments were performed with the patient in an upright position, sitting in a chair with the back supported. Each measurement was repeated three times for both hands. During assessments, the patient's arm was in adduction with the elbow in a flexion of 90°.[22] The average score of the three repetitions was recorded.

2.2 | Statistical analysis

Statistical analyses of the study were performed using SPSS 20.0 (IBM). Kolmogorov-Smirnov test was used to determine whether the parameters are normally distributed or not. The results are given in mean ± standard deviation for parametric variables and in median ± interquartile range for non-parametric ones. Gender and hand dominance are given in percentages. The relationships between the PRWE and MHOQ and grip strength results were tested using Pearson or Spearman correlation analysis methods according to normal distribution of the variables.

3 | RESULTS

The study was carried out with 75 patients with RA who were consulted at the Rheumatological Rehabilitation Unit by the physician and agreed to participate in this study. The demographic features of the whole sample are presented in Table 1 and the results of PRWE and MHOQ (for both dominant and non-dominant hands) are shown in Table 2.

TABLE 1 Demographic features of subjects

Variable	Value
Age, y	53.92 ± 13.4
Disease duration, mo	119.92 ± 84.89
Gender	
Male	19 (25.3%)
Female	56 (74.7%)
Dominant hand	
Right	70 (93.3%)
Left	5 (6.7%)

Note: Values are presented as number (%) or mean ± standard deviation.

3.1 | Criterion validity

Considering the results of the Kolmogorov-Smirnov test, data were distributed in a non-normal fashion. Therefore, the concurrent validity between the PRWE and MHOQ and grip strength scores of the both hands were assessed using Spearman's correlation coefficient with the criteria of very weak (ρ = .00-.19), weak (ρ = .20-.39), moderate (ρ = .40-.59), strong (ρ = .60-.79), and very strong (ρ = .80-1.00). Our results demonstrated that PRWE has negative and very strong correlation with MHOQ and it has moderate correlation with grip strength for the dominant hand. Further, PRWE has negative and strong correlation with MHOQ and it has moderate correlation with grip strength for the non-dominant hand (Table 3). All correlations were statistically significant (P = .05). MHOQ has positive and moderate correlation with grip strength for both hands. MHOQ showed statistically significant difference for dominant and non-dominant hands in the same individual (Table 4).

4 | DISCUSSION

Rheumatoid arthritis is a multidimensional disease in which hand and wrist involvement are frequently seen and thus functional impairments may develop during the course of chronic disease. Thus, evaluation methods should also cover the function besides the main domains of the disease, (eg laboratory findings).[10] Therefore, the overall evaluation becomes completed with the patient-reported outcomes that are followed by physician-based assessments.[4] Among the patient-reported outcomes, pain and disability seem to be the most apparent ones in RA. In this study, we investigated the validity of the PRWE questionnaire which focuses on pain and disability of the wrist joint in patients with RA. Our results suggest that the PRWE is a valid questionnaire for the assessment of wrist pathologies in RA patients.

In this study, we evaluated the correlation between the PRWE, the MHOQ and grip strength. The MHOQ gives separate scores for right and left hand disability,[20] but in the PRWE, questions are directed only for 1 extremity including "affected hand" phrase.[16] However, in RA, involvement of hand and wrist is frequently bilateral.[3] That is why we used two questionnaires: one each for the dominant and non-dominant hands. We asked the questions as "your dominant/non-dominant hand" instead of "your affected hand." By this way, we could evaluate both wrists of the patients.

Several upper extremity questionnaires have been used to measure hand and wrist disability in patients with RA.[4,9,12] The DASH questionnaire has often been used to study upper extremity problems.[12,23] However, the DASH does not separately evaluate right and left hand. Moreover, it focuses on the entire upper limb, not only on the wrist. Shoulder and elbow disabilities are not uncommon in RA. Therefore, specific assessment focusing on the wrist is not possible with the DASH. The Cochin Rheumatoid Hand Disability scale has been developed to measure the effectiveness of surgery on rheumatoid hands and has been shown to be valid in this population.[24] However, it does not include important aspects of the patients' perspectives such as pain or patient satisfaction. The PRWE is superior in the assessment of the wrist since it includes important aspects of subjective instruments and focuses only on the wrist. Furthermore,

TABLE 2 The scoring data for the PRWE and MHOQ for dominant and non-dominant hands

	Value		
Variable	Median	Min-Max	IQR
PRWE (D)	20	0-86	9.75-48.25
PRWE- (ND)	22.75	0-83.5	6.875-38.625
MHOQ (D)	83.31	5.65-100	60.11-90.53
MHOQ (ND)	83.75	10.23-100	62.55-90.93

Abbreviations: D, dominant; IQR, interquartile range; MHOQ, Michigan Hand Outomes Questionnaire; ND, non-dominant; PRWE, Patient-Rated Wrist Evaluation.

TABLE 3 Correlations between PRWE and MHOQ and grip strength scores of both hands

	MHOQ		Grip strength	
Variable	ρ	P	ρ	P
PRWE (D)	−.83	<.01	−.52	<.01
PRWE (ND)	−.79	<.01	−.56	<.01

Abbreviations: D, dominant; MHOQ, Michigan Hand Outomes Questionnaire; ND, non-dominant; PRWE, Patient-Rated Wrist Evaluation.

TABLE 4 Correlations between MHOQ and grip strength for dominant and non-dominant hands

	Grip strength	
Variable	r	P
MHOQ (D)	.524	<.01
MHOQ (ND)	.521	<.01

Abbreviations: D, dominant; MHOQ, Michigan Hand Outcomes Questionnaire; ND, non-dominant.

the MHOQ has been previously reported to be suitable in rheumatoid hands.[9] This is the reason why we used the MHOQ to correlate with the PRWE.

According to our results for both dominant and non-dominant extremities, there was a very strong correlation between the PRWE and the MHOQ and there was a moderate correlation between the PRWE and grip strength scores. These results suggested that the PRWE is a valid questionnaire for rheumatoid hands. The PRWE includes 15 questions while the MHOQ includes 37 items, thus it appears much more practical to use the PRWE especially in busy clinics.[16,21] Furthermore, the PRWE may also be preferred for the reason that it evaluates pain and function from the patient's perspective. Moreover, MHOQ includes the evaluation of the hand as a whole while PRWE focuses only on the wrist. As a result, the PRWE may give more accurate information regarding both surgical or non-surgical treatments when only the wrist joint is considered.

This study assessed the validity of the PRWE questionnaire which focuses on the wrist joint for RA. Although wrist involvement is very common and disabling in those patients, none of the previous questionnaires validated for RA has focused on this joint so far. Nevertheless, we had some limitations throughout the study. First, responsiveness has not been analyzed in this study. A questionnaire's responsiveness in such a chronic condition might be relevant for the follow-up of the disease progress. However, as this was a validation study, it was beyond our scope. Moreover, our patients were all outpatients and we were not able to contact the same patients after a few months to test the responsiveness. This issue can be considered for further investigations. Second, we did not record any patient characteristics about the disease activity. However, we considered that the patient selection bias was as low as possible, because, results of the grip strength, which is an objective assessment method, were distributed in a wide range (6-33 kgf). This wide-range distribution of the results reflects that the patient selection did not result in a restriction in the predictive parameter (grip strength) measurements. However, we are aware that more details regarding clinical status may provide additional evidence in the future studies.

In conclusion, we have demonstrated that the PRWE is a valid questionnaire evaluating the wrist in patients with RA. The PRWE may be preferred because of its simplicity and its specificity for the assessment of the wrist.

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AUTHOR CONTRIBUTIONS

Zeynep Tuna: design of the study with Oguzhan Mete, interpretation of the results and writing the manuscript. Gizem Tore, Songul Baglan Yentur: data collection and analysis. Özkan Varan: patient examination and decision on inclusion. Berna Goker and Deran Oskay: interpretation of the results and reviewing the manuscript.

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