Self-Rated Health and Quality of Life in Slovak Rheumatoid Arthritis Patients

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CHAPTER 3

Assessing pain from different perspectives: evaluation of three pain measures in rheumatoid arthritis patients

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European Journal of Psychological Assessment, accepted pending revisions

Abstract

Objective: Pain is one of the most important outcomes in RA. Therefore, as objective as possible assessment of pain is necessary for reliable clinical evaluation and effective treatment planning. The purpose of the present study was to evaluate three pain measures in the sample of 151 newly-diagnosed RA-patients. More specifically, this study evaluates the construct validity of pain instruments and examines relationships between pain, disease activity, disability and psychological well-being.

Methods: In this study pain was assessed using the Nottingham Health Profile (NHP), the Ritchie Articular Index (RAI) and the McGill Pain Questionnaire (MPQ).

Results: The results of factor analysis support the empirical validity of the NHP and the RAI. The factor structure of the MPQ is less clear. Furthermore, the pain instruments were found to be sensitive enough to differentiate between Steinbrocker's functional capacity groups. The outcomes of multiple regression analysis reveal that pain, as assessed by each of the pain instruments, is strongly associated with disability. Pain as measured by the NHP is associated with psychological well-being, whereas pain as measured by the RAI is associated with disease activity.

Conclusion: The results of the present investigation provide support for the construct validity of pain measures in patients with early RA. In addition, the outcomes shed more light on specific qualities of these instruments, indicating that each of the three measures assesses pain from a different perspective.

Introduction

Any individual with a chronic disease in general and rheumatoid arthritis (RA) in particular is well acquainted with pain. In RA pain is among the most significant concomitants of disease along with disability and psychological distress (ACR 1988, Hawley and Wolfe 1991). Pain is therefore indicated as an important outcome measure in RA-research (Skevington 1993, Smedstad et al. 1995). Along with these considerations the following questions arise: *"How do we measure pain most objectively?"*, *"When various measures are available, which of them is most appropriate?"*, *"What are the differences between the accessible pain instruments?"*

The International Association for the Study of Pain (IASP) defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (IASP 1979). This definition implies that pain is a multidimensional phenomenon which cannot entirely be described through neurophysiological concepts. In pain, in addition to pathophysiological factors, psychological, cultural, and in some cases environmental factors have to be taken into consideration (Skevington 1986, Sullivan et al. 1991, Encandela 1993, Reitsma 1994). This reconceptualisation of the construct of pain has also affected the approaches to pain diagnosis and pain therapy, and has induced the development of a number of multidisciplinary pain centres and pain clinics which help patients to cope more effectively with their pain (Reitsma 1994). The need for valid and reliable instruments reflecting this multidimensional concept of pain, employed within these centres but also in clinical practice in general is, therefore, most intelligible.

Even if different approaches and methods may be used in pain assessment, e.g. observation of pain behaviour, applying the algesiometer, or using self-report instruments, all methods depend on the individual patient's reaction to pain or on subjective reports of pain (ACR 1988). Because RA-patients frequently display pain-related motor behaviours, such as guarded movements, rubbing of a painful joint, grimacing, sighing, rigidity and so forth, observation of pain was thought to be rather objective (ACR 1988, Anderson and Chernoff 1993). Nevertheless, pain is a subjective experience, so clinicians are dependent also on patients' verbal descriptions of pain (ACR 1988). Some authors go even further, emphasising that because pain is subjective only patients can assess their own pain, and moreover that descriptions of pain may be more specific and sensitive than measuring patients' autonome reactions (Elton et al. 1979, Skevington 1993).

In this study three frequently-used pain measures are evaluated, namely the Nottingham Health Profile (NHP) (Hunt et al. 1980), the Ritchie Articular Index (RAI) (Ritchie et al. 1968), and the McGill Pain Questionnaire (MPQ) (Melzack 1975). Two of these measures, the NHP

and the MPQ, are based on patients' reports, while the RAI is based on the summation of a number of quantitative evaluations of the pain experienced by the patient when the joints are subjected to firm pressure when exerted over the articular margin. The objective of this study is to examine the construct validity of these instruments in a sample of recently diagnosed RA-patients. Another goal is to determine the differences between the measures, or in other words to explore the qualities of pain instruments by specifying the perspective from which they assess pain.

Examining the validity of a certain instrument means dealing with the question of whether the instrument truly measures what it is intended to measure (Polit and Hungler 1991, Bowling 1992). Validity may be estimated by applying different approaches. In the present study special attention is paid to construct validity, which is concerned with whether a measure reflects the underlying latent variable, i.e. the construct. Construct validity may be considered as a "labelling" issue. When a phenomenon with a certain "label" is measured, is that label the correct one? The estimation of construct validity is relevant in cases where the variables of interest cannot be directly observed. It is highly relevant therefore in assessment of a complex phenomenon such as pain (McDowell and Newell 1987, Polit and Hungler 1991, Bowling 1992).

In investigating the construct validity of measures, several techniques may be applied. In this study two frequently-used approaches are employed, i.e. factor analysis and the known-group technique (McDowell and Newell 1987, Polit and Hungler 1991). The first approach uses factor analysis for the assessment of a number of dimensions that underlie a variable. By employing factor analysis it is possible to determine whether the measurement model fits the hypothesised theoretical structure. This technique determines how far the various items of the instrument accord in measuring one or more common themes. If the items relate to a single dimension, the combination of items into a single measure is expected. When the items relate to a number of different dimensions, then refinement of subscales is more appropriate in this respect (McDowell and Newell 1987, Bowling 1992). The second approach, the so-called known-group technique, involves determining whether pain scores discriminate significantly among groups of individuals with specific characteristics who are expected to differ in their level of pain. In general, any difference between the groups which is in line with the expectations supports the validity of a measure (Polit and Hungler 1991). In this study disease activity, disability and psychological well-being are regarded as known characteristics. A strong association between pain and disability is well documented in the literature (Hawley and Wolfe 1991, Anderson and Chernoff 1993, MacKinnon et al. 1994). Based on these findings, patients with more disability are expected to experience more pain. The relationship between psychological well-being and pain has been studied

rather extensively as well (Hawley and Wolfe 1988, Brown 1990, Smedstad et al. 1995). In general, emotional distress is considered to be a fundamental component of pain, and it may be regarded as either a consequence or as a cause of pain (Craig 1984). Pain may lead to anxiety and depression, but it is also well known that emotional distress may amplify the intensity of pain (Arntz 1991, Turk and Melzack 1992, Krol et al. 1993). Accordingly, increased levels of psychological distress are expected to be associated with increased pain. Finally, since in RA inflammation is undoubtedly a major cause of pain, elevated disease activity, i.e. more inflammation, is expected to be associated with more pain (Ritchie 1968, Smedstad et al. 1995).

Method

Sample and procedure

The results of the present investigation are based on the data of the "EUropean Research on Incapacitating DIseases and Social Support" project in Slovakia (EURIDISS 1990). This international project involves six European countries, specifically France, Germany, the Netherlands, Norway, the United Kingdom and Slovakia. The objective of the project is to survey and specify a number of factors determining the course of the disease and the quality of life in people suffering from RA.

The research sample for the study was selected through a purposive sampling procedure in accordance with the EURIDISS protocol (EURIDISS 1990). The inclusion criteria were the following: age from 20 to 70 years at the onset of the study, diagnosis of RA according to the 1987 ARA criteria, time since establishing the RA diagnosis less or equal to four years. The exclusion criteria were the presence of another serious disease, malignant RA with systemic vasculitis or very disabling RA (stage IV of Steinbrocker's classification). Subjects were asked to sign a written informed consent statement.

The sample consisted of 151 RA-patients, of whom 126 were women and 25 were men. The patients' mean age was 48.9 years (SD 12.2). Mean disease duration was 22.9 months (SD 16.0). Table 1 shows additional demographic data from the sample.

Health status data were collected during a medical check-up of about 30 minutes. A rheumatologist arranged an appointment with each patient in the rheumatology outpatient department and collected the data. Within a fortnight after the medical check-up another appointment was made with each patient in order to collect data from an interview. The interview took from 60 to 120 minutes and was conducted by a trained interviewer in non-hospital surroundings, specifically in a university office. During the interview the patients answered questions asked by the interviewer and filled in the self-report questionnaires.

Measures

Dependent variables

Nottingham Health Profile (NHP)

The NHP is a generic multidimensional measure of self-reported morbidity, assessing several aspects of the patient's physical, psychological and social condition (Hunt et al. 1981, Hunt et al. 1980). The questionnaire was developed as an indicator of distress caused by morbidity, reflecting rather the lay than the professional concept of health (Hutchinson et al. 1992). This instrument consists of two parts. Part I comprises 38 items covering six areas of perceived health status, particularly physical mobility, energy, sleep, social isolation, emotional reactions, and pain. Part II consists of questions referring to perceived problems due to health status in seven different areas of life, including job or work, home life, social life and holidays (Bowling 1992, Hutchinson et al. 1992).

In this study the pain subscale of the NHP was used as a self-report measure of pain. This subscale contains eight statements related to experience of pain during the last four weeks. The patient was instructed to circle yes (= 1) or no (= 0) to these statements, depending on whether the statements resembled his/her own condition. The NHP-pain total score was obtained by summing the item scores and ranges from 0 to 8. Higher scores indicate more pain.

Ritchie Articular Index (RAI)

The RAI is a single, clinically convenient measure allowing a quantitative approach to the assessment of RA-pain (Ritchie et al. 1968). The underlying idea of developing this instrument is that joint tenderness correlates with inflammatory changes within the joint. By applying firm pressure over the joint margin, therefore, the tenderness of the joint may be elicited. Registration and quantification of patients' reactions to the pressure produces the pain index.

In this study a rheumatologist administered the instrument in order to assess the degree of joint pain. The assessment of pain was performed by firmly pressing the selected joints, as indicated by the RAI (Ritchie et al. 1968). The patients' reactions to the pressure were registered as follows: 0 (= no pain), 1 (= patient complains of pain), 2 (= patient complains of pain and winces), 3 (= patient complains of pain, winces and withdraws). The RAI total score consists of the sum of patient's reactions to pressure with a range from 0 to 72. The higher the total score the more pain the patient experiences.

McGill Pain Questionnaire (MPQ)

Melzack's (1975) McGill Pain Questionnaire (MPQ) is a generic self-report instrument allowing a subjective approach to evaluation of pain (Davis

1989, Bowling 1995). This instrument consists of 78 adjectives which may be classified into 3 major categories: sensory, affective and evaluative/ miscellaneous. Various forms of instruction may be given to the patients. Most frequently the respondent is asked to select the word that most accurately describes his/her pain at that time. However, patients may also be asked to describe their most intense pain, their average pain, or how their pain typically feels (McDowell and Newell 1987). Four possible scoring methods are usually reported: the sum of the scale values, called Pain Rating Intensity Score-PRI(S), the sum of the rank placement of the words, called the Pain Rating Intensity Rank-PRI(R), the Number of Words Chosen-NWC, and the Present Pain Intensity-PPI (Melzack 1975, Leavitt et al. 1978, McDowell and Newell 1987, Hutchinson et al. 1992). The MPQ was originally designed in Canada, but by now it has been translated into about 13 languages, among others into Arabic, Chinese, Dutch, French, Japanese, Norwegian, Polish, and Slovak (Bartko et al. 1984, Turk and Melzack 1992, Hutchinson et al. 1992).

In the present study, the patient was asked to select words which best characterise his/her RA pain from the list of 78 MPQ adjectives describing pain. No limit was set for the number of words that could be selected. The total score was obtained by summing the selected adjectives, and ranges from 0 to 78.

Independent variables

To measure disease activity the Erythrocyte Sedimentation Rate (ESR, mm 1st/hour) and C-Reactive Protein (CRP, g/ml) were recorded. The ESR and CRP were analysed according to using standard methods. Higher scores indicate more inflammation.

Steinbrocker's classification of functional capacity (STB)

Steinbrocker's classification of functional capacity (STB) was also used (Steinbrocker et al. 1949). The description of the functional capacity grades is as follows: grade I (= complete functional capacity with ability to carry on usual duties without handicaps), grade II (= functional capacity adequate to conduct normal activities despite discomfort or limited mobility of one or more joints), grade III (= functional capacity adequate to perform only few or none of the usual duties or usual occupation or self-care), grade IV (= largely or wholly incapacitated with patient bedridden or confined to wheelchair, permitting little or no self-care). Patients with grade IV were not included in the study, as required by the EURIDISS protocol (EURIDISS 1990).

Groningen Activity Restriction Scale (GARS)

The Groningen Activity Restriction Scale (GARS) measures restrictions in performing everyday activities (Suurmeijer et al. 1994, Kempen et al.

1996). The scale consists of 18 items covering both ADL (Activities of Daily Living) and IADL (Instrumental Activities of Daily Living) functions. These activities include abilities to dress, use bath, transfer, prepare meal, carry out household work, or do shopping. The GARS measures whether the patient is able to perform a certain ADL/IADL activity and not if (s)he actually performs it. For each item four response options are available. The patient can perform the activity: 1 (= fully independently without any difficulty), 2 (= fully independently but with some difficulty), 3 (= fully independently but with great difficulty) to 4 (= can not do it fully independently, he/she can only do it with someone's help). The GARS total score is obtained by summing the eighteen item scores, and ranges from 18 to 72. Higher scores indicate more severe disability with more activity restrictions.

General Health Questionnaire-28 (GHQ-28)
The 28-item scaled version of the General Health Questionnaire (GHQ-28) was used as an indicator of psychological well-being (Goldberg and Hillier 1979). In the questionnaire the respondent is asked to compare his recent psychological state, i.e. during the last four weeks, with his usual state. For each item four answer categories are possible. In the present study the total score is the sum of the 28 items, and ranges from 28 to 112. Higher scores indicate poorer psychological well-being.

Statistical methods
To analyse the data t-test, correlations, one-way analysis of variance (ANOVA) with corrections for multiple comparisons with Scheffe procedure ($p \leq .05$), multiple linear regression and principal component analysis (PCA), available in the SPSS/PC+ statistical package were used (Nie et al. 1975).

Results

Demographic data, means and standard deviations
Table 1 presents demographics, means and standard deviations on the study variables. Between males and females no significant differences were found on variables apart from the RAI. Female mean values on the RAI were significantly higher than male mean values.

In the total sample the mean score on the RAI was 12.5 (SD 8.8) and on the NHP was 4.5 (2.7) (Table 1). On the MPQ the mean number of words chosen were 8.7 (SD 6.2) for total scale, 4.9 (SD 3.3) for sensory, 1.6 (1.7) for affective, and 2.2 (SD 1.9) for evaluative/miscellaneous subscales. Table 2 presents the 20 most frequently selected MPQ adjectives.

Table 1 Description of the sample: means and standard deviations (SD) on study variables

	Total sample N=151	Males N=25	Females N=126	
Age in years	48.9 (12.2)	50.8 (13.5)	48.5 (12.0)	ns
Disease duration in month	22.9 (16.0)	24.4 (17.2)	22.6 (15.9)	ns
ESR	22.8 (17.2)	21.9 (16.6)	23.0 (17.4)	ns
CRP	11.1 (17.9)	10.7 (22.0)	11.2 (17.0)	ns
GARS	32.2 (10.6)	28.7 (10.1)	32.9 (10.5)	ns
GHQ-28	54.1 (12.2)	51.3 (10.0)	54.7 (12.5)	ns
NHP-pain	4.48 (2.7)	3.84 (2.8)	4.61 (2.7)	ns
MPQ	8.7 (6.2)	7.9 (5.9)	8.8 (6.3)	ns
RAI	12.5 (8.8)	9.1 (7.7)	13.1 (8.8)	*

Note 1: Abbreviations: ESR=Erythrocyte Sedimentation Rate, CRP=C-Reactive Protein, GARS=Groningen Activity Restriction Scale, GHQ-28=General Health Questionnaire-28, NHP=Nottingham Health Profile, MPQ=McGill Pain Questionnaire, RAI=Ritchie Articular Index

Note 2: Gender differences, ns-nonsignificant difference; *p≤ .05

Table 2 Twenty most frequently selected MPQ pain descriptors in RA-patients

	MPQ descriptors	%
1	pulling	59.9
2	tiring	44.5
3	numb	39.4
4	troublesome	35.0
5	pricking	33.6
6	exhausting	30.7
7	cramping	30.7
8	taut	29.9
9	sickening	29.2
10	tender	27.0
11	nagging	24.8
12	burning	23.4
13	shooting	22.6
14	boring	21.9
15	dull	21.9
16	drilling	20.4
17	sharp	19.0
18	penetrating	16.1
19	fearful	15.3
20	radiating	15.3

Early RA-patients most commonly selected such words as "pulling", chosen by 59.9 % of patients, "tiring" (44.5%), "numb" (38.4%), "troublesome" (35%), or "pricking" (33.6%) for describing their pain.

Principal Component Analysis

Principal Component Analysis (PCA) with varimax rotation was performed in order to explore the factor structure of the measures supporting the empirical validity of the instruments. In the NHP one significant factor (with eigenvalue equal to 4.06) accounted for 50.7% of the total variance. Each of the 8 NHP pain items loaded significantly on this component (range 0.66-0.76), indicating the unidimensionality of the scale (Table 3).

Table 3 Loadings (item-component correlations) of the NHP 8 items in the sample as obtained by PCA

	Items	Loadings	Item-scale correlations
1	p. when going up/down stairs	.74	.72***
2	p. when standing	.66	.67***
3	p. when sitting	.68	.69***
4	unbearable pain	.68	.69***
5	p. when walk	.75	.74***
6	p. at night	.70	.71***
7	constant p.	.71	.72***
8	p. at changing position	.76	.75***

Note 1: p. = pain

Note 2: ***p≤ .001

PCA with varimax rotation was then carried out also for the RAI. In this study five factors explained 63.7% of the total variance in the RAI. Furthermore, the results of the analysis reveal that the 24 RAI items are symmetrically clustered (Table 4). In more detail, for instance on 'component 1', items measuring right ankle, right astragalocalcanean mobilisation and right metatarsophalangeal joints show significant loadings together with left ankle, left astragalocalcanean mobilisation and left metatarsophalangeal joints. Similarly, on 'component 2', items measuring right elbow, right wrist and right metacarpophalangeal joints show significant loadings together with items measuring left elbow, left wrist and left metacarpophalangeal joints.

Finally, PCA with varimax rotation was applied to the MPQ, using the sum of the original Melzack and Togerson (1971) scale weights of the words chosen within each group as the scores for 20 variables in the analysis. The question was whether Melzack's grouping of words does indeed reflect the three dimensions he proposed. In the present study we

Table 4 Loadings (item-component correlations) of the RAI 24 items in the sample as obtained by PCA

	Items-Joints	Components				
		1	2	3	4	5
1	Temporomandibular	.10	-.08	.14	.28	.37
2	Acromioclavicular	-.04	-.03	**.73**	.07	-.06
3	Sternoclavicular	.13	-.16	**.63**	-.06	-.13
4	Lat.flex.cervical spine	.01	-.15	.30	.37	.34
5	R.shoulder	.22	.16	**.62**	-.01	**.46**
6	R.elbow	.06	**.72**	.10	.04	.26
7	R.wrist	**.44**	**.63**	.04	.04	-.12
8	R.MCP	.24	**.54**	.11	**.61**	-.06
9	R.PIP	.03	.01	-.04	**.91**	.05
10	R.hip flexion	.11	.14	-.09	.00	**.82**
11	R.knee	.17	.28	**.62**	.12	.00
12	R.ankle	**.53**	.40	.39	-.04	.17
13	R.AGC mobilisation	**.74**	.17	.28	.24	.08
14	R.MTP	**.86**	.12	-.02	.07	.14
15	L.shoulder	.17	.24	**.58**	-.01	**.52**
16	L.elbow	.07	**.72**	.05	.00	.22
17	L.wrist	**.56**	**.63**	.12	.11	-.09
18	L.MCP	.21	**.54**	.11	**.60**	-.09
19	L.PIP	.06	.03	-.01	**.88**	.05
20	L.hip flexion	.11	.18	-.05	-.03	**.88**
21	L.knee	.22	.25	**.63**	.08	.09
22	L.ankle	**.52**	.38	.40	-.07	.20
23	L.AGC mobilisation	**.73**	.11	.32	.21	.04
24	L.MTP	**.85**	.08	.03	.00	.17

Note: R.=right, L.=left, MCP=metacarpophalangeal, PIP=proximal interphalangeal, AGC=astragalocalcanean, MTP=metatarsophalangeal

therefore applied a forced three factor solution (Table 5). PCA reveals that the three factors explain 44.8% of the variance. The outcomes also provide some support for retrieval of the affective subscale with items loading on 'component 2', and also for retrieval of the evaluative subscale with items loading on 'component 1'. The sensory subscale could not be retrieved clearly, however.

Correlational analysis

The results of correlational analyses provide support for the concurrent validity of pain instruments. The correlation coefficient between the NHP and the MPQ is 0.40 ($p \leq .001$), between the NHP and the RAI it is

Table 5 Loadings (item-component correlations) of the MPQ 20 clusters in the sample as obtained by PCA

	Components		
MPQ Clusters	1	2	3
1	**.66**	-.08	.32
2	.18	.05	**.67**
3	-.05	.28	**.60**
4	.19	.05	**.58**
5	**.52**	.22	.18
6	.08	.53	.13
7	**.50**	.26	.22
8	**.74**	.11	.04
9	.12	**.46**	.43
10	.33	.12	**.51**
11	.10	**.68**	.18
12	.40	**.55**	.23
13	**.57**	**.53**	-.06
14	.32	**.57**	.22
15	**.49**	.36	-.26
16	**.45**	**.43**	.13
17	**.64**	.15	.27
18	.19	**.46**	.20
19	.08	**.62**	-.12
20	**.61**	**.44**	.22

Note: Items 1-10 sensory subscale, 11-15 affective subscale, 16-20 evaluative/miscellaneous subscale

0.43 ($p \leq .001$), and finally between the MPQ and the RAI the correlation coefficient is 0.26 ($p \leq .01$).

One-way ANOVA

The validity of the pain instruments was further examined by means of the known-group technique. Table 6 demonstrates mean pain scores by three functional capacity groups according to Steinbrocker's classification. One-way ANOVA procedure with corrections for multiple comparisons (Scheffe, $p \leq .05$) was performed in order to detect differences between the groups.

The three functional capacity groups differed significantly on the RAI. Likewise, significant differences were found between Steinbrocker's groups I and II, as well as groups I and III on the NHP. Regarding the MPQ no significant differences were found between the three Steinbrocker groups.

Table 6 Mean pain scores by the Steinbrocker's functional capacity classification

	Steinbrocker's grade			Post-Hoc Sheffe comparisons
	I	II	III	(p≤.05)
NHP	2.60	4.80	5.33	1-2,1-3
MPQ	6.27	8.90	10.78	ns
RAI	5.70	12.59	25.85	1-2,1-3,2-3

Note 1: For abbreviation see Table 1

Note 2: 1-2 means significant difference between group I and group II, etc.

Table 7 Multiple regression analyses: disease activity, functional disability, and psychological well-being on pain

	NHP		RAI		MPQ	
	β	p	β	p	β	p
Regression model 1						
ESR	.08	.43	.22	**.02**	.16	.12
CRP	-.01	.91	.24	**.01**	.07	.50
R^2	*.008*		*.16*		*.004*	
F-value (p-value)	*0.42 (.66)*		*14.82 (.00)*		*1.24 (.29)*	
Regression model 2						
ESR	.01	.91	.22	**.02**	-.20	**.04**
CRP	.03	.76	.23	**.01**	.09	.35
GHQ-28	.64	**.00**	.28	**.00**	.33	**.00**
R^2	*.40*		*.22*		*.10*	
F-value (p-value)	*32.61 (.00)*		*15.02 (.00)*		*6.01 (.00)*	
Regression model 3						
ESR	-.04	.53	.19	**.04**	-.23	**.02**
CRP	-.01	.90	.21	**.02**	.08	.41
GHQ-28	.33	**.00**	.09	.31	.16	.13
GARS	.56	**.00**	.34	**.00**	.29	**.01**
R^2	*.61*		*.29*		*.15*	
F-value (p-value)	*56.89 (.00)*		*15.99 (.00)*		*6.90 (.00)*	

Note: For abbreviation see Table 1

Multiple linear regression

With the aim of examining further the construct validity of the three pain instruments, multiple regression analysis was employed. In this analysis, pain as assessed by the MPQ, NHP and RAI was the dependent variable, and psychological well-being (GHQ-28), disability (GARS) and disease activity (ESR, CRP) were the independent variables. Table 7 displays the standardised regression coefficients, the corresponding p values, and the percentages of explained variance after entering the variables into the equation.

The results of the analysis show that the GARS, a disability measure, is significantly associated with pain as assessed by any of the three instruments, the NHP, RAI or MPQ. Psychological well-being as measured by the GHQ-28 appears to be significantly associated with pain as assessed by the NHP, whereas the disease activity measures (ESR and CRP) have significant effect on pain as assessed by the RAI. The ESR also appears to have significant effect on pain as assessed by the MPQ, but this relationship is less clear since it is only present if the GARS or the GHQ-28 or both variables (GARS and GHQ-28) are also entered into the equation.

Discussion

The purpose of the present study was to evaluate three pain measures - the NHP, RAI and MPQ - in a sample of patients with early RA. The study examines the construct validity of these instruments by means of factor analysis and known-group technique. In addition, the study evaluates the specific qualities of pain instruments in terms of specifying the perspective from which the instruments measure pain.

The mean scores on the RAI and the NHP are comparable with earlier findings (Krol et al. 1995). Considering the MPQ the mean number of words chosen on the MPQ total scale and subscales are also in line with previous results (Parker et al. 1988, Drewes et al. 1993). The specific words most commonly chosen by RA-patients for describing their pain are the following, in line with Wagstaff et al. (1985): burning, pricking, drilling, cramping, shooting, boring, and sharp. Similarly, Papageorgiu and Badley (1989) reported such words as burning, nagging, cramping, shooting, tender, sharp, tiring, troublesome, and exhausting, whereas Charter et al. (1985) found these words to be important for RA-patients: shooting, sharp, cramping, pulling, burning, tender, tiring, sickening, and fearful. All these pain descriptors can be found among the twenty most frequent MPQ adjectives chosen by RA-patients within the present study. Charter et al. (1985) also reported that RA-patients describe their pain more frequently with affective rather than sensory words, supporting the assumption that chronic pain has a predominantly emotional component.

Our findings do not confirm these considerations, however. The RA-patients in our study most frequently selected words from the sensory dimension. A considerable difference in disease duration may account for these dissimilar results. The patients in our study were fresh cases with disease duration less or equal to four years, whereas the Charter et al. (1985) study involved patients with mean disease duration of about nineteen years. It can be hypothesised that for early RA-patients the sensory aspect is more important for describing their pain, but as the disease advances the words from the affective subscale become more significant.

The construct validity of the pain measures was investigated using two commonly applied methods, factor analysis and known-group technique. When considering factor analysis, the NHP pain items loaded on one significant factor, indicating the unidimensionality of the scale. This significant factor accounted for 51% of the total variance. PCA with varimax rotation was also carried out for the RAI. In this measure the five factors accounted for 64% of the total variance. The symmetrical clustering of the RAI 24 items is in line with existing knowledge about the character of rheumatoid arthritis, and supports the validity of the measure. In RA the joint involvement is typically polyarticular and tends to have bilateral and symmetrical distribution (Kantor 1988). For the MPQ we carried out a forced three factor solution in order to retrieve the three dimensions of pain - the sensory, the affective and the evaluative - as proposed by Melzack (1975). The three factors accounted for 45% of the total variance. The results of PCA provided some support for retrieval of the affective and evaluative dimensions. The sensory dimension could not be clearly retrieved, however. PCA was then repeated without using the option of a forced factor solution. The results of this second analysis are in line with the findings of previous studies reporting from four to seven factors that were interpretable. These factors were reported to cut across Melzack's groupings and to take words at similar levels of intensity from a wide range of subscales (Leavitt et al. 1978, McDowell and Newell 1987). Nevertheless, there still remain concerns over the structure of the MPQ, and several methodological problems can be identified in examining how closely the MPQ results reflect Melzack's theory of pain. In the MPQ, words from different components (e.g., affective, evaluative) may correlate with one another, while different subscales in each component do not necessarily intercorrelate (Melzack and Togerson 1971, McDowell and Newell 1987). Words from the sensory component for example may simultaneously show high loadings on two components, e.g. sensory and affective or sensory and evaluative/miscellaneous. Nevertheless, despite some queries about the psychometric properties of the MPQ and especially of its factor structure, this instrument is still a very important measure of pain since it meets the need for measuring the qualitative aspect of pain (Bowling 1995).

The construct validity of the pain measures was also investigated using known-group technique. In this technique, the instrument is administered to groups that are expected to differ on the criterion because of some known characteristic. RA pain has often been reported as being associated with functional capacity. Correspondingly, we expected pain instruments to discriminate between patients with different functional capacity according to Steinbrocker's classification. The results of the analysis indicate that the RAI and NHP seem to be sensitive enough to distinguish between the three functional capacity groups, whereas the MPQ appears to be less sensitive. Similarly, in line with previous findings, RA pain is reported to be associated with more inflammation, more disability, and lower psychological well-being (Ritchie et al. 1968, Hawley and Wolfe 1988, Hawley and Wolfe 1991, Brown 1990, Turk and Melzack 1992, Anderson and Chernoff 1993, MacKinnon et al. 1994, Smedstad et al. 1995). Therefore, in order to examine the relationships between the variables, multiple regression analysis was employed. This analysis explored in more detail the relationships between reports of greater pain on the one hand, and more inflammation, more disability and lower psychological well-being on the other. The outcomes of the analysis confirm the strong association between disability and pain. Disability was significantly related to pain independently of which pain instrument was used. Psychological well-being was most strongly associated with pain as assessed by the NHP, whereas disease activity was significantly associated with pain as assessed by the RAI.

Correlation coefficients between the three pain measures indicate the interrelatedness of the scales, and suggest that the instruments measure the same construct (pain) to some extent. On the other hand, the correlations display important differences between the three instruments as to their properties. The NHP seems to measure more general or more common aspects of pain, since it is closely related to both the RAI and the MPQ. On the other hand, when comparing the RAI and the MPQ they appear to measure rather dissimilar pain qualities.

All in all, the present research suggests optimism in the employment of the three instruments - NHP, MPQ and RAI - for better understanding of pain in patients with a chronic disease. As already mentioned, despite extensive knowledge about pain physiology, neurochemistry and clinical management, pain remains a subjective experience. It is a construct that encompasses many dimensions, so clinicians are dependent on patients' verbal descriptions of pain, although observations of pain behaviour (e.g. wincing or withdrawing while a joint is being examined) are important clues to perception of pain as well. When comparing the three instruments for usefulness in clinical situations, the NHP is a convenient self-report measure that does not require the presence of a specially-trained person. This measure reflects the psychological aspect of pain, and moreover in

comparison with the RAI it does not cause discomfort to the patient. When considering the advantage of the RAI, it has been found to be sensitive enough to indicate the activity of the disease and has been shown to reflect exacerbations and improvements induced by antirheumatic drugs (Turk and Melzack 1992). The third pain measure, the MPQ, provides a great deal of information concerning the qualitative aspect of pain. The results of the present study also support the assumption that it is possible to use the MPQ descriptors as measures of disease outcome. For example descriptors indicating great pain may be replaced after the treatment with words of lesser intensity (Turk and Melzack 1992). This assumption is also supported by the finding that in the MPQ the various scoring methods are closely related, with correlation coefficients among them ranging between 0.89 and 0.97 (Melzack 1975).

To conclude, in order to obtain a comprehensive picture of pain in RA-patients, these pain assessment instruments should not be used as the sole measures of pain.

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