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CHRONIC LOW-BACK PAIN: INTERCORRELATION OF REPEATED MEASURES FOR PAIN AND DISABILITY

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ABSTRACT. **Subjective experience of pain and disability was assessed for 4–5 weeks on a weekly basis in 14 consecutive out-patients complaining of low-back pain and/or leg pain that had lasted for at least 6 months. The following measures were used for assessment: a visual analogue scale (VAS) (present pain and worst pain during preceding 2 weeks), a short-form McGill Pain Questionnaire (SF-MPQ), the Pain Disability Index (PDI) and the pain drawing. In addition, psychological variables of pain experience were evaluated with the Comprehensible Psychopathological Rating Scale (CPRS). When the median of the variation coefficient for repeated measures was compared, the most stable measures were, in rank order: PDI, total number of words chosen in the SF-MPQ and worst pain during the preceding two weeks (VAS). The Spearman correlation showed statistically significant intercorrelation for present pain assessed with the VAS score, for the sensory word score of the SF-MPQ and for the PDI. Especially the PDI, which represents a global score for disability, showed very little test–retest variability and a high intercorrelation with the other methods of assessment, i.e. the pain drawing, the VAS scale for pain and the SF-MPQ. Total marks in the pain drawing was the best pain drawing subscale with respect to both test–retest variability and intercorrelation with other assessment methods. Subjective pain experience and disability measures, such as those tested, apparently measure very similar aspects, whereas subtle differences become evident when subscales are compared.**

Key words: chronic low-back pain, disability, pain measurement.

Measurement of pain is always very subjective and the interpretation of results is never simple. Pain threshold may also vary interindividually and intraindividually (3). Several different measures to assess subjective pain experience have been developed (3, 5, 7–9, 11, 17). With visual analogue scales (VAS) only subjective intensity of pain can be evaluated and the scale is not easy for the patient to comprehend. A pain description scale based upon choice of words, assessing the various qualities of pain, and the McGill Pain Questionnaire (MPQ) was developed by Melzack (8), and later (9) a shorter version of this questionnaire, the short-form McGill Pain Questionnaire (SF-MPQ), was introduced. The pain drawing adds the dimension of pain distribution and of distinguishing the regional distribution of pain from other subjective sensations, e.g. numbness and stiffness. The Pain Disability Index has been suggested as a useful adjunct to other assessment methods for subjective pain experience (11, 13). We employed all these assessment methods, and additionally the Comprehensible Psychopathological Rating Scale (CPRS) of Åsberg et al. (17), using five different VAS's for sadness, bodily discomfort, inner tension, concentration difficulties and memory disturbances, respectively. A group of patients suffering from chronic low-back pain and/or leg pain was studied.

METHODS

Patients

Originally, 31 patients were included in the study, 12 men and 19 women (mean age 48 yrs, range 28–62 yrs). These patients all fulfilled the inclusion criteria of having had back and/or leg pain for at least 6 months, and no other major disease, including psychiatric illness, or trauma. Seventeen of these patients had to be excluded, however, because of incomplete data. Of the excluded patients, 5 were men and 12 women. Their mean age was 48 yrs (range 28–62 yrs). More complete data on patients included in and excluded from the study are presented in Table I.

The patients were consecutive general hospital out-patients. They had suffered from back pain and/or leg pain for at least 6 months and specific treatment was no longer considered possible. The patients had mainly been referred for assessment to the hospital out-patient clinic by general practitioners or physicians in the field of occupational medicine.

Table I. *Patient data for chronic low back pain patients included in and excluded from study because of insufficient data*

	Patients included	Patients excluded
Number of patients	14	17
Male (%)	7 (50.0)	5 (29.4)
Female (%)	7 (50.0)	12 (70.6)
Mean age (range)	47.9 (31–59)	48.0 (28–62)
Mean duration of pain, months (range)	104.4 (10–240)	83 (6–240)
Predominantly low back pain, %	8 (57.1)	11 (64.7)
Predominantly leg pain, %	6 (42.9)	6 (35.3)
Previous surgery, %	2 (14.2)	3 (17.6)

Some of them had been seen for orthopaedic evaluation and surgery was not considered feasible. On arrival at the hospital out-patient clinic, a thorough clinical examination and the first assessment were made. Thereafter the patient was reassessed at weekly intervals for 4–5 weeks. No medication was prescribed during the assessment period. Only general and more specific ergonomic advice was offered all the patients. No attempt was made to rehabilitate the patients physically.

Assessments

The following assessments were made once a week: 1) Present pain and worst pain during the preceding 2 weeks with a vertical 100 mm VAS; 2) short-form McGill Pain Questionnaire (9), total number of words chosen, total score for sensory and affective words; Pain Disability Index (PDI) (11, 13), seven separate horizontal numerical (0–10, marks of no disability and total disability at each end of scale) scales, assessing disability related to family/home responsibilities, recreation, social activity, occupation, sexual behaviour, self-care and life-support activity. The global score was calculated; 3) Pain drawing with separate calculation of total score, marks in lower back (from costal arch to gluteal folds), leg regions, and pain marks vs. marks for other sensations (numbness, feeling of tightness or weakness). A grid of squares (3 mm×3 mm) was used for the quantitative evaluation. Marks falling into the squares or touching the boundaries were counted; 4) Comprehensible Psychopathological Rating Scale as modified by Almay (1). Five vertical 100 mm VAS scales for assessment of sadness, bodily discomfort, inner tension, concentration difficulties and memory disturbances were simultaneously marked by the patient. This permitted ranking of these psychological self-estimates.

Statistical analysis

A BMDP computer program was used for calculating the mean value and standard deviation of repeated measurements for each patient, for each assessment method. The coefficient of variation (standard deviation ×100/mean) was then calculated. The median value of the coefficient of variation between patients was then used to compare the overall stability of the assessment methods evaluated. The between patient median and not the mean value was chosen owing to the small patient sample, this making it improbable that the between patient distribution would be Gaussian. The methods of assessment were then ranked according to the median value of the coefficient of variation with the smallest value indicating least variation of obtained weekly assessment values. The Spearman intercorrelation between assessment methods was then calculated. Significance of intercorrelation was then calculated using a cut-off value of $p<0.05$.

VAS values in the CPRS test for sadness, bodily discomfort, inner tension, concentration difficulties and memory disturbances were evaluated by simply ranking the mean of the obtained values in decreasing order.

RESULTS

Of the 31 patients originally entered in the study, 17 had to be excluded owing to insufficient data. No major differences were observed between the groups of patients included in and excluded from the study. In the excluded group there was, however, a predominance of female patients (Table I).

Stability of assessment methods

Ranking of the assessment methods according to the median value of the coefficient of variation is shown in Table II. The measure of disability PDI showed the least variation from one patient visit to another. Of

Table II. *Rank order of assessment methods according to median value of coefficient of variation*

SF-MPQ=Short-form McGill Pain Questionnaire, VAS=visual analogue scale

Assessment	Median of coefficient of variation (%)
1. Pain disability index	15.5
2. SF-MPQ (total words)	19.5
3. Worst pain 2 weeks (VAS)	26.0
4. Inner tension (VAS)	31.0
5. Total markings (pain drawing)	33.5
6. SF-MPQ (sensory word score)	34.5
7. Bodily discomfort (VAS)	35.0
8. Present pain (VAS)	38.0
9. Low back pain (pain drawing)	38.0
10. Concentration difficulties (VAS)	41.0
11. Pain (pain drawing)	41.5
12. Sadness (VAS)	42.0
13. Non-pain markings (pain drawing)	55.5
14. Pain in legs (pain drawing)	57.5
15. SF-MPQ (affective word score)	69.0
16. Memory disturbances (VAS)	76.0

Table III. *Significances of the Spearman intercorrelations of subjective pain and disability assessments*

Pain 2 wk = worst pain during preceding two weeks; Sensory word score (SF-MPQ), Words = total number of words chosen (SF-MPQ); Total nr. of markings = (pain drawing). Other = non-pain markings (pain drawing); NS = no significance

	Present pain	Pain 2 wk	Sensory word score	Words	Pain disability index	Total no. of markings	Other	Pain markings
Affective word score	0.05	NS	NS	0.02	NS	0.01	0.05	0.01
Present pain		0.01	0.01	NS	0.01	0.05	NS	NS
Pain 2 wk			0.01	0.01	NS	NS	NS	NS
Sensory word score				0.001	0.02	0.05	NS	0.05
Words					NS	NS	NS	NS
Pain disability index						0.05	0.02	NS
Total no. of markings							NS	0.001
Other								NS

the pain intensity, VAS assessments of worst pain during the preceding 2 weeks showed less test–retest variability than the similar assessments of present pain. Most variation was seen with VAS assessment of memory disturbances and with the affective word score in the SF-MPQ. Of the SF-MPQ measures, assessment of total number of words appeared to be more stable than either sensory word score or affective word score. Least variation was seen with total marks in the pain drawing, whereas marks of low-back pain, pain marks, non-pain marks and pain in the legs marks showed increased variability in that order. Of the psychological CPRS VAS assessments, inner tension and bodily discomfort showed the least variability.

Intercorrelation of assessment methods

Spearman correlation analysis revealed a significant correlation between several of the assessment methods, the correlation being, however, higher between submeasures within a single assessment method (Table III) than between different assessment methods. The most significant correlation ($p<0.001$) was found between total number of words chosen and between sensory word score in the SF-MPQ and between total marks and pain marks in the pain drawing. A slightly less significant correlation ($p<0.01$) was found between the following measures: Present pain and worst pain during the preceding 2 weeks, sensory word score in the SF-MPQ and either present pain or worst pain during the preceding 2 weeks, total number of words chosen in the SF-MPQ and worst pain during the preceding 2 weeks, PDI and present pain, total marks in the pain drawing and score of affective words in the SF-MPQ, pain marks in pain drawing and score of affective words in the SF-MPQ. Many of the other calculated intercorrelations were also, albeit somewhat less, significant (Table III). Table IV shows a simple rank order for the five VAS scales of experience of sadness, bodily discomfort, inner tension, concentration difficulties and memory disturbances. Bodily discomfort and inner tension were placed in the highest rank order by most of the patients most of the time.

DISCUSSION

The correlation between pain intensity and other modalities of pain, e.g. sensory, affective and mood, has

Table IV. *Rank order of Comprehensive Psychopathological Rating Scale subscales*

Subscale	No. of patients ($n=14$) ranking the highest
Bodily discomfort	8
Inner tension	4
Concentration difficulties	1
Sadness	1
Memory disturbances	0

been reported as becoming stronger with chronicity (16). There are also studies (6, 12) which suggest depressive symptomatology increases with pain duration. Perceived functional disability in chronic pain patients has been found to correlate well with higher scores on the Minnesota Multiphasic Personality Inventory (MMPI) (10).

In chronic low-back pain patients, Sternbach et al. (12) noted passiveness, dependency in life-style, depression, social withdrawal and physical and psychological fatigue. Back-pain-related life events, e.g. hospitalization, dismissal from work following absenteeism, marital disruption and isolation may eventually lead to increasing depression (2). Recovery from low-back pain and return to work after eight weeks of rehabilitation at an occupational rehabilitation centre was recently studied by Colligan et al. (4), using stepwise discriminant analysis. Scores on the Beck Depression Inventory, the Spielberger State Anxiety Inventory and physical functional capacity best predicted post-treatment ability to work. Those unable to work after the rehabilitation period had the highest level of depression on admission (4). Thus psychological variables, in addition to physical functioning, are clearly important determinants of prolonged back disability. In the present study the pain of the patients could be supposed to be in a steady state. This makes the measurements of stability and correlations meaningful.

Expressed by the median value of the coefficient of variation, test–retest repeatability was best for the PDI, and for the total number of words chosen in the SF-MPQ in our study. The affective word score in the SF-MPQ showed much more variation from one time of assessment to another (69.0% vs. 19.5%), whereas the sensory word score was only slightly less stable than the total number of words chosen (34.5% vs. 19.5%). A less marked difference was noted between the VAS pain intensity score assessed for worst pain during the preceding 2 weeks and a similarly evaluated present pain intensity (26.0% vs. 38.0%). The assessment methods showed high intercorrelation with each other. This is seen clearly in Table III. More specifically, a high correlation between present pain VAS scores and the other assessments was very obvious, whereas a similarly estimated worst pain during the preceding two weeks only correlated well with measures of the SF-MPQ. Similarly, the sensory word score in the SF-MPQ, the PDI score and total marks in the pain drawing showed a high correlation with the other assessment methods. Thus, especially the PDI scores, which reflect a global score for subjective disability (11, 13), showed very little test–retest variability and correlated well with other measures of pain. Also total markings in the pain drawing and sensory word score in the SF-MPQ showed very little test–retest variability (Table II). Total marks seem to be the best element of the pain drawing, in accordance with the findings of Udén et al. (14), who recommend the pain drawing to be interpreted by a glance. Used in that way the method is clinically very practical.

The high intercorrelation noted might suggest that these assessments measure very similar aspects of chronic back-pain experience. They can perhaps be substituted for each other, without losing essential aspects of the evaluation. Clinical diagnostics can thus be enriched, in a fairly simple way, by using e.g. the PDI to evaluate the subjective illness-experience (15). In addition to total marks, the other subscales of the pain drawing also correlated well with the affective word score of the SF-MPQ. Pain markings only correlated highly with the affective and sensory word scores, whereas non-pain markings showed an additional high ($p<0.02$) correlation with PDI scores, even higher than that ($p<0.05$) noted with total pain marking scores. Also of interest was the fact that the total number of words chosen in the SF-MPQ only correlated well with the two-week pain VAS score.

The results of the present pilot study, although interesting, ought to be interpreted with great caution, owing to the small number of patients studied. Significant intercorrelations, however, become apparent when subjective pain and disability assessment methods are compared.

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