Learning from Pain Scales: Patient Perspective

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ABSTRACT. ***Objective.*** Rheumatologists often deal with patients'pain, as commonly measured by clinical scales. However, no published study in the last 25 years has explored patient preferences for the 2 most frequently used clinical scales — the verbal rating scale (VRS) and the visual analog scale (VAS). We (1) evaluated patient preferences for the 10 cm horizontal VAS versus the 5 point VRS and identified associated reasons for their preferences; and (2) validated the test-retest reliability and construct validity of these scales.

Methods. Patients with painful rheumatological conditions rated the VAS and the VRS to assess pain intensity and stated which scale they preferred and why. Exploration of tender points and dolorimetry was performed in all cases.

Results. Of 113 patients in the sample, 93% were women, 85% of whom had rheumatoid arthritis. In this sample, 52.8% preferred the VRS, 28.3% the VAS, and 18.9% expressed no preference. Patients who preferred the VRS said it was easier than the VAS to understand and rate. They also reported being more comfortable using words than numbers. Patients who preferred the VAS said that numbers classified pain better and that this allowed them to be objective and precise. Patients with 0–6 years of schooling preferred the VRS, while those with > 6 years preferred the VAS. There was a significant association between the number of tender points and pain intensity with both scales, as well as between threshold and tolerance with the VAS. High correlations were found between the VAS and the VRS (r = 0.79) and between tolerance and threshold (r = 0.96). Test-retest showed a high correlation for both scales: VAS = 0.97 and VRS = 0.89.

Conclusion. Both scales are valid measures of pain intensity. The choice should depend on the setting, the clinician's goal, and the patient's level of education. Patient preference is central to better physician-patient communication. (J Rheumatol 2003;30:1584–8)

Key Indexing Terms:
PAIN PAIN SCALES PATIENT PREFERENCE DOLORIMETRY ARTHRITIS

Determining aspects of patients' experience and perception has become important in clinical practice, since they are related directly to patient satisfaction, which, in turn, is related to quality of care[1]. Patients' experience and perception are often neglected by clinicians, who use mostly biological endpoints and laboratory tests to evaluate the course of disease. Using only these criteria to assess patients' responses to treatment does not accurately reflect patients' perceptions of their own well being and clinical progress[2].

Pain scales have been used widely to assess chronic and acute pain in different medical conditions. The verbal rating scale (VRS) and the visual analog scale (VAS) are the 2 scales most commonly used to assess pain intensity/severity[3].

The VRS consists of a set of words that describe intensity/severity of pain along a continuum — words such as "none," "mild," "moderate," "severe," "extreme," and "worst ever" (or their translated counterparts in languages other than English). Patients are asked to select the word that best describes the characteristics of their pain.

The VAS consists of a 10 cm straight line, the endpoints of which carry a verbal description of each extreme of pain. "No pain" appears at the lower end of the scale, and descriptors such as "extreme pain," "unbearable pain," or "worst pain ever" are at the upper end. Patients place a mark on the line between the 2 endpoints to indicate the severity of their pain[4].

Several studies have shown good correlation between the VRS and the VAS[3,5]. In addition, several clinical studies have compared the 2 scales, outlining their strengths and weaknesses and the methodological problems associated with each. In general, both scales are easy to administer and score and both are suitable for use in clinical and research settings[6,7]. Both take about the same amount of time to answer and may be administered repeatedly during followup.

Some differences in the scales have been documented, however. The VAS, for example, is better at detecting small

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changes of pain over time; this is attributed to the uniformity in distribution of responses and to the number of response categories[4]. But the abstract nature of the scale makes it difficult for some patients to understand and complete, since it requires the ability to imagine pain in terms of an arithmetic or mathematical dimension[7-9]. VRS helps patients describe their pain more accurately by providing words that they use frequently, although the intervals between the word categories do not represent equal distances in pain intensity (producing the usual limitations of non-interval scales) and the same words may have different meanings for different patients[3].

The primary objective of this study was to evaluate patient preference for the 10 cm horizontal VAS versus the 5 verbal descriptor VRS and to identify patients' reasons for preferring one instrument to the other. We also evaluated the test-retest reliability and construct (convergent) validity of both scales, measuring tender points, pain threshold, and pain tolerance.

MATERIALS AND METHODS

Subjects. One hundred thirteen patients from the rheumatology outpatient clinic of 2 large general hospitals in Mexico City were included in the study. These 2 hospitals are the largest tertiary care facilities of the 2 main health care institutions in Mexico. The first one, Hospital General de Mexico, belongs to the Ministry of Heath and serves mainly a low income population that has no access to other types of medical care. The second one is the Hospital de Especialidades Centro Medico Nacional Siglo XXI-IMSS. It belongs to the Mexican Social Security System (Instituto Mexicano del Seguro Social), which provides medical care for salaried workers and their families.

All patients included in the study were diagnosed as having painful rheumatological diseases according to the American College of Rheumatology (ACR) criteria for classification of rheumatoid arthritis (RA), fibromyalgia (FM), and osteoarthritis (OA)[10,11]. Patients who had difficulties using the scales because of mental or physical disabilities were excluded from the study. All current patients were invited to participate in the study and, after receiving a full explanation about its purpose and clinical protocol, gave their informed consent to participate. The study protocol was approved by the National Research Committee at IMSS.

Measures. Visual analog scale. The VAS used in our study was adapted by Grossman, *et al* from the original, which used a scale drawn on a piece of paper[8]. The present instrument consists of a plastic ruler with a sliding marker that moves within a groove that measures 10 cm. The side facing the patient has a 10 cm horizontal line. Patients rate pain intensity by placing the plastic tab at the location of the line that best reflects pain severity. The descriptor "The worst pain imaginable" is written on the far right side of the scale, and "No pain" is written on the far left side.

Verbal rating scale. The VRS used in our study was a 5 point Likert-type scale with the following verbal descriptors: no pain, mild, moderate, severe, and very severe. Patients were asked to select the word that most closely described the intensity of their pain[4].

Tender points. Clinical examination of tender points was carried out by digital thumb palpation of tender and control points in strict accordance with the guidelines provided by the ACR for the classification of FM in adults[12]. This examination procedure included 18 tender points as follows: occiput: bilateral, at the sub-occipital muscle insertions; low cervical: bilateral, at the anterior aspects of the intertransverse spaces at C5–C7; trapezium, at the midpoint of the upper border; supraspinatus, at origins above the scapula spine near the medial border; paraspinous, 3 cm lateral to the midline at the level of the midscapula; second rib, at the second costochondral junctions, just lateral to the junctions on the upper surfaces; lateral pectoral, at the level of the fourth rib at the anterior axillary line; lateral epicondyle, 2 cm distal to the epicondyles; medial epincondyle, at the epicondyles; gluteal, at the upper outer quadrants of buttocks in anterior fold of muscle; greater trochanter, just posterior to the trochanteric prominence; knees, at the medial fat pad proximal to the joint line; and 3 pairs of control points, at the distal dorsal third of the forearm, thumbnail, and midpoint of the dorsal third metatarsal[10].

Dolorimetry. Dolorimetry provides a reproducible measure of pain threshold and tolerance, both of which measure pain intensity[13]. In our study, it was used as an additional measurement to validate the self-report of pain. Threshold and tolerance to pain were evaluated by a Fisher dolorimeter, a device with a rubber tip nearly 1 cm in diameter[14]. To perform the examination, the Fisher dolorimeter was placed over the point of tenderness and advanced at a rate of 1 kg/cm^2/s. Before the procedure, patients were instructed to state the moment at which they noticed a change from pressure to pain (threshold). Once pain was felt, a reading of the scale was made and recorded. Then the dolorimeter was advanced further until the patients indicated the moment at which they could not further tolerate advancement of the stimulus, due to the pain severity (tolerance). Again, a reading of the scale was made and recorded. Results were expressed as the mean of 6 dolorimetries over the right and left trapezium, the right and left medial fat pad of the knee, the right lateral epicondyle, and the right second rib.

Procedures. Patients were given a complete explanation of all procedures to be carried out in the study. They were assured that there would be no consequences in terms of care if they refused to take part. Then they were invited to participate and were asked to give oral consent. After verbal instruction, patients were told to rate both scales (VAS and VRS) 2 times each, to assess overall pain intensity in the context of: (a) today's pain [i.e., the day the study was done (VAS-1 and VRS-1)], and (b) an average of the pain perceived during the last week (VAS-7 and VRS-7). Next, patients were asked: "Which one (of these 2 scales) would you rather answer?" and "Why?"

During the same visit, physical exploration of tender points and dolorimetry were performed on each patient. In a subgroup of patients, the scales were applied twice 2 hours apart using the same order, to assess test-retest reliability (reproducibility). The application of the pain scales and physical exploration were carried out by a rheumatologist and a psychologist (PC and PL) specifically trained to perform the procedure.

Data analysis. Univariate analyses were performed to describe the sample characteristics and the mean, percentage, and standard deviation values of pain intensity for the VAS and the VRS, dolorimetry, and tender points. Patients' preferences were transcribed literally and coded by 2 of the authors; discrepancies between coders were resolved by consensus. Coded preferences were displayed in a 2-way matrix in order to calculate proportions and make comparisons.

To estimate the bivariate correlation between the VAS and the VRS, the VAS and VRS with tender points, threshold, and tolerance, we used Pearson or Spearman correlation coefficient, as needed, depending on the type of variables (continuous or categorical). For convergent construct validation, we hypothesized that pain intensity scales and tender points would be positively associated and that pain intensity scales and threshold and tolerance would be negatively related. We used the intraclass correlation coefficient for the VAS-1 test-retest, and Spearman correlation coefficient for the VRS-1 test-retest. Chi-square test was used to assess the differences between the preferences regarding the type of scale (VRS and VAS) and their association with the interviewees' level of schooling [we defined 2 categories: (1) 0 to 6 years and (2) 7 or more years]. For all tests, we established $p \leq 0.05$ for statistical significance.

RESULTS

Complete information was collected for 113 adult patients; 93.8% of them were women with an average of 5.2 years of

schooling (range 0 to 16). The majority (85.8%) had a diagnosis of RA, with a long period of disease duration (mean 9.0 yrs) (Table 1).

Table 2 shows the description of the measurements of pain intensity in the group: today's pain, the average of the pain perceived in the last week, and the mean tender points, pain threshold, and pain tolerance. For both scales, "today's pain" was rated lower than "last week's pain"; "today's pain" intensity was more often rated in the "no pain" to "mild" categories; while "last week's pain" was more often rated in the "moderate" to "very severe" end of the scale.

Slightly more than half (52.8%) the patients preferred the VRS, while only 28.3% preferred the VAS ($p < 0.001$, degrees of freedom, df = 2). In 18.9% of cases, the patients expressed no preference. The reasons most often given by patients who preferred the VRS were that "it was easier to understand" (88.9%), and they "felt more comfortable using words than numbers," since the VRS allowed them "better communication with their physician about their pain experience." Patients who preferred the VAS said that "it was more comprehensible" (61.6.%), that "numbers classified better" (11.6%), and that using this type of scale allowed them to be "objective and precise" in explaining pain (38.4%).

We found that patients with less schooling preferred the VRS to the VAS (65.1% or 54 patients vs 15.7% or 13 patients), while patients with more schooling preferred the VAS to the VRS (35% or 7 patients vs 50.0% or 10 patients) ($p = 0.006$, df = 1). The remaining patients did not express a preference.

The correlation coefficients between the VAS and the VRS scales for today's pain intensity and 7 day pain intensity were high and statistically significant ($\rho = 0.79$ and 0.74, respectively; $p < 0.05$).

Table 3 shows the association of tender points, threshold, and tolerance with today's and 7 day pain intensity scales. There was a significant ($p = 0.01$) association between the number of tender points and the pain intensity in both scales, at both times of measurement (today's and 7 day pain intensity). Threshold and tolerance had a significant association with VAS-1 ($p = 0.05$). VRS-1 and VRS-7 pain intensity were not associated either with tolerance or threshold. Even when not all of them showed statistical significance, it is important to note that all correlations between tolerance, threshold, and pain intensity moved in the same direction. Higher threshold and tolerance was associated with lower pain intensity as hypothesized. Tolerance and threshold measured by dolorimetry showed a very high correlation (r

Table 1. General characteristics of the study population. Values are percentages or mean ± standard deviation.

Variable	
Sex, %	
Female	93.8
Male	6.2
Diagnosis, %	
Rheumatoid arthritis	85.8
Fibromyalgia	9.7
Other (osteoarthritis, gout)	3.5
Age, yrs	47.2 (± 11.8)
Formal education, yrs	5.2 (± 3.5)
≤ 6	3.9 (± 2.4)
> 6	10.6 (± 1.9)
Duration of disease, yrs	9.0 (± 8.0)

Table 2. Patient ratings of pain at different points in time, with the 2 pain scales studied (VAS and VRS) and in response to dolorimetry. Values are mean (± SD) or percentages.

Instrument	Score
VAS	
Today's pain intensity (VAS1), mm	39.8 (± 30.2)
Pain intensity over the past 7 days (VAS7), mm	52.2 (± 30.8)
VRS	
Today's pain intensity (VRS1)	
No pain	23.9
Mild	33.6
Moderate	21.2
Severe	15.0
Very severe	6.2
Pain intensity over the past 7 days (VRS7)	
No pain	10.0
Mild	21.0
Moderate	32.0
Severe	22.0
Very severe	15.0
Dolorimetry	
No. of tender points	7.1 (± 4.8)
Pain threshold, kg/s	4.7 (± 1.6)
Pain tolerance, kg/s	5.5 (± 1.8)

Table 3. Correlations between pain measurements with the 2 scales studied (VAS and VRS) at different points in time, and with dolorimetry.

	r	p
Pain intensity		
VAS1 vs VRS1	0.791	0.01
VAS7 vs VRS7	0.744	0.01
Tender points		
VAS1 vs tender points	0.465	0.01
VAS7 vs tender points	0.320	0.01
VRS1 vs tender points	0.332	0.01
VRS7 vs tender points	0.260	0.01
Threshold		
VAS1 vs threshold	–0.223	0.05
VAS7 vs threshold	–0.069	NS
VRS1 vs threshold	–0.106	NS
VRS7 vs threshold	–0.049	NS
Tolerance		
VAS1 vs tolerance	–0.229	0.05
VAS7 vs tolerance	–0.074	NS
VRS1 vs tolerance	–0.140	NS
VRS7 vs tolerance	–0.056	NS

NS: nonsignificant.

= 0.96) with a direct proportional relation: higher thresholds were related to higher tolerance (Figure 1). The test-retest showed a good correlation for the VRS (0.89, p = 0.01) and a good intraclass correlation coefficient for the VAS (0.98, 95% confidence interval 0.97–0.99).

DISCUSSION

Pain is a personal feeling, multidimensional in expression; because of this complexity it is often incompletely or inadequately evaluated[15,16]. Instruments that attempt to give a comprehensive measurement of pain, like the McGill Pain Questionnaire[17,18], are long and time consuming[19]. Instruments like the VAS or the VRS overcome these problems, but they only measure pain intensity/severity.

Despite the widespread use of these scales, patient preference for one scale over another has been largely ignored (for an exception, see reference 20). The main objective of our study was to explore patient preferences for the use of a clinical instrument intended to measure a fundamentally qualitative variable (i.e., pain). We found a clear preference for the VRS as compared to the VAS (52.8% vs 28.3%, respectively). The main reasons for this preference were that patients considered the former scale easier to understand and they preferred to communicate their pain with words instead of numbers. The only previous study that assessed preferences (Joyce, *et al*[20]) compared the 10 cm VAS to the 4 point fixed-interval scale (FPS). Patients in that study had almost the same reasons for preferring the FPS to the VAS. These reasons were that the FPS was "easier" and "needs less imagination," than the VAS does. The patients who preferred the VAS over the FPS said that it was "more accurate," and that it "gave better indication of their pain."

We think these findings may be related to several factors. First, patients with 6 or fewer years of schooling preferred the VRS, while patients with more than 6 years of formal education preferred the VAS (p = 0.006). Published literature suggests that using the VAS requires patients to imagine pain as a numerical function, not an easy task for someone with just a few years of schooling since mathematical thinking is mostly developed through education[7].

Second, the preference for the VRS could also be related to the character of pain itself. Pain is a subjective experience that involves different dimensions (sensory-intensity and affective), each one inseparable from the other. These characteristics make it difficult for patients to express and for physicians to accurately measure the pain experience. The use of words that describe the experience of pain may help patients differentiate these dimensions of pain and better communicate them to their physician[7].

An interesting finding of our study, and to our knowledge one not reported before, is the convergent validity shown in the correlation between tender points and pain intensity in both scales. Patients with a higher number of positive tender points reported higher intensity of pain in their ratings in both scales (p = 0.01). This finding also validates the patients' self-reports of their own pain and indicates that clinicians should assign higher credibility to patients'statements regarding their own pain intensity. This may also enhance overall patient-physician communication.

The VAS was significantly correlated with threshold and tolerance, which was not the case with the VRS. Thus, the VAS, which is a continuous scale, is more sensitive to detecting small changes in pain as compared with the VRS, which is a categorical scale. Although this finding has been reported previously, Langley[9] pointed out that it may be a result of the physical structure of this scale, or it may be due to the behavioral tendencies of patients, rather than a true phenomenon. It has also been reported that the VAS produces systematic overestimations of pain intensity, which are also related to that scale's properties[9].

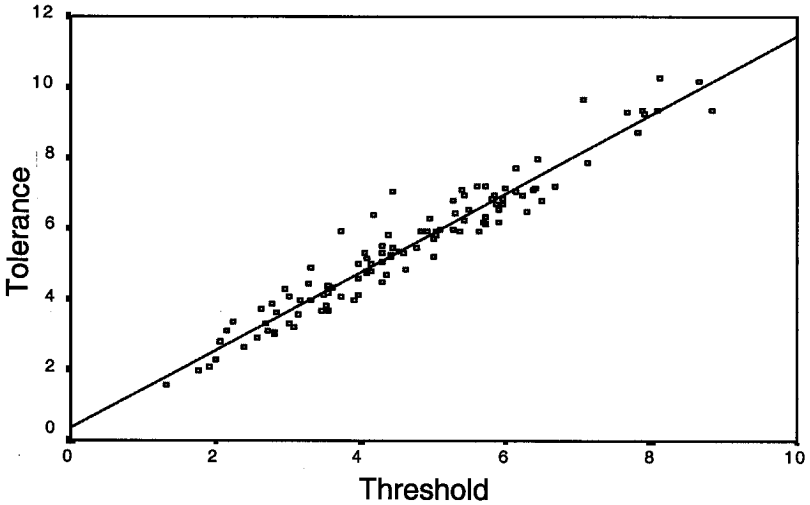

Figure 1. Correlation between pain tolerance and pain threshold, measured by dolorimetry (r = 96).

The high correlations found between both scales in our study (0.791 for today's pain and 0.744 for 7 day pain) are consistent with previous reports[3,7,9] and support the idea that these instruments are measuring the same phenomenon. Our study was limited in that only 2 scales were applied — the 10 cm VAS and the VRS with 5 verbal descriptors, so our results only pertain to these scales. Further, our study population had a low income and low education level, so our results cannot be applied to other, wealthier populations. Nevertheless, 80% of the world's population lives in developing countries[21] and even in highly developed countries such as the United States, there is a growing number of people (mostly minority populations) who have the same clinical problems and the same relative level of education and wealth as those described in our study. Another limitation of our study population is that our sample was mostly women. This is, of course, because the most frequent rheumatological diseases (RA, OA, and FM) are more prevalent in women than in men. Nevertheless, this study should be repeated with a sufficiently large sample of men before generalizing our results to men.

In summary, we believe that despite the differences we found in the use of these 2 scales, both are simple, reliable, and valid and both measure the same phenomenon — pain intensity. The choice for using either scale depends on several factors: the clinician's goal and the setting in which the scale is to be used (clinical or research), the patient's level of formal education, and the training time available in the setting. Finally, we want to highlight the importance of taking into account the patient's preferences and choice of scales. This is a central issue in enhancing physician-patient communication. It will not only influence treatment, it will also increase patients' satisfaction and improve the quality of care.

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