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BRIEF REPORT

Sub-optimal pain control in patients with rheumatic disease

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Abstract The visual analog scale (VAS) of pain is a ubiquitous clinical and research tool with widespread application in the rheumatic diseases. The objectives of this study were to assess if patients report pain differently to doctors or nurses, to determine reproducibility of this test for diagnosis, age, gender, and treatment, and to ascertain the level of pain in patients attending general rheumatology clinics. Using a standardized line of exactly 100 mm and instructions with identical wording, consecutive patients attending general rheumatology clinics were asked to score their perceived level of pain in the preceding week. Two assessments were carried out, one before and one after the clinic visit, and each patient was questioned by both a doctor and a nurse. Differences between the first and second VAS scores (VAS1 and VAS2) were recorded. One hundred and eight patients completed the study (69 female). VAS1 and VAS2 scores were administered by a similar number of doctors and nurses. There was no significant difference between mean VAS1 and VAS2 scores (41.1 vs. 41.4 mm, $p=0.78$). VAS1 and VAS2 differed by <4 mm in 59% of patients. Age, gender, or diagnosis did not influence VAS1 or VAS2. Differences in scores were independent of which health professional administered the scale ($p=0.19$). Patients taking painkillers had higher mean VAS scores (49 mm) compared with those not on analgesia (27 mm; $p<0.001$). Anti-rheumatic treatment did not influence pain scores ($p=0.13$). The VAS is a reliable and effective method of pain assessment. Results are independent of which health professional administers the scale. Patients with rheumatic disease report their pain similarly regardless of diagnosis. However, pain control is sub-optimal in patients taking analgesia. Specific assessment of pain is, thus, important in patients attending rheumatology clinics.

Keywords Analgesia · Pain · Rheumatic disease · VAS

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Introduction

Pain is a significant and dominant symptom for many patients with rheumatic disease. However, the assessment of treatment effectiveness is frequently made by objective measures of inflammation or joint integrity rather than the patient's perception of qualitative life improvement. Pain, as a subjective symptom, is when a patient is having difficulty to communicate to others and is affected by a variety of psychosocial and demographic factors[1]. Gender, ethnicity, cigarette smoking, and educational levels are thought to influence the reporting of pain by patients with rheumatoid arthritis (RA) [1]. Patients have been shown to complain different pain levels in separate outpatient clinics held on the same day [2]. Thus, several variables may influence the under-treatment or over-treatment of pain adversely affecting the patient in the process.

It is not known if patients report pain differently to a variety of health professionals. If nurses have more dedicated time slots than physicians in a clinic setting, it is possible that patients will complain more to the former health professional. However, in our institution, doctors are the sole prescribers of analgesia, suggesting that patients

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might be more likely to emphasize the severity of pain to physicians rather than nurses.

The visual analog scale (VAS) is a validated tool for measuring different variables, including pain [3–5]. When compared with other scales, such as the numerical rating scale and the verbal rating scale, it has been found that results correlate closely [6–9].

The primary objective of this study was to ascertain whether variability exists between individual patient pain scores when the VAS is administered sequentially by doctors and nurses. Secondly, we set out to establish the reproducibility of the VAS for diagnosis, age, gender, and treatment. Thirdly, we wanted to determine the level of pain in patients attending general rheumatology clinics.

Materials and methods

Consecutive patients attending general rheumatology out-patient clinics were asked to complete two horizontal visual analog scales for pain. This consisted of marking a vertical line across a horizontal line which measured exactly 100 mm. This mark was representative of their individual pain levels for the previous 7 days. The VAS was administered by both rheumatology nurses and doctors. If a nurse-administered the first VAS (VAS1), a doctor would administer the second VAS (VAS2), and vice versa. VAS1 was completed at the beginning of the clinic and VAS2 after the patient's medical consultation.

Doctors and nurses delivered identically worded instructions to the patient for the completion of the VAS. These were as follows: *This is a line that represents your pain level over the last 7 days. This end is "no pain" over the last 7 days (point to "Zero") and this end (point to "100") is the "worst possible pain". I want you to draw a vertical line over the point on the scale that you think best represents your pain level over the last 7 days.*

Patients were blinded from their first VAS score. Doctors and nurses administering the VAS were prohibited from demonstrating how to mark the scale, to prevent influencing patients' scores.

Patients' rheumatic diagnoses were recorded along with age, gender, analgesia, and anti-rheumatic medication. Patients who identified literacy difficulties were noted, but direct questioning with regard to literacy was not pursued.

VAS scores were measured as the distance from "0" to the vertical line placed by the patients along the scale. This distance was measured in millimeters. Where a patient placed an "X" over the VAS, rather than the vertical line as instructed, the score was given as the point at which a perpendicular line drawn from the crossover of the "X" fell onto the scale. A note was made of the number of VAS completed incorrectly, i.e., placing a mark along the scale other than the vertical line requested in the instructions.

Table 1 Patient characteristics

	Number (%)	Mean	SD
Patients	108 (100)		
Age		55.5	14.7
Female	69 (63.9)		
DMARD* use	61 (56.5)		
Analgesic use	68 (62.9)		

DMARD Disease-modifying anti-rheumatic drug

Statistical analysis

Student's *t*-test was used to compare VAS scores for categorical variables, including gender, diagnosis, and the health professional administering the VAS. Pearson's test was used to assess correlation for normally distributed data. A mixed-model analysis of variance (ANOVA) was used to examine for any effects of doctors or nurses on VAS scores and for the effect of time on the VAS. SPSS 14.0 for Windows was used to analyze the data.

Results

This was a cross-sectional study of patients with a variety of rheumatic diseases attending a general rheumatology clinic over a period of 4 weeks. All invited patients agreed to participate in the study (n=108). Demographic, diagnostic, and treatment data are outlined in Tables 1, 2, 3.

Table 2 Diagnostic groupings

	No.	Percentage (%)
RA	38	35.2
OA	15	13.9
Spondyloarthritis	13	12.0
Gout	3	2.8
CTD	7	6.5
Other	14	13.0
Combination	18	16.7
Total	108	100.0

Spondyloarthritis included nine patients with psoriatic arthritis and four with ankylosing spondylitis; CTD included three patients with scleroderma, one SLE, one mixed connective tissue disease, one Sjogren's syndrome and one Takayasu's arteritis; "Other" was composed of fibromyalgia, polymyalgia rheumatica, regional pain syndrome and lower back pain; "Combination" included those with more than one rheumatic diagnosis

RA Rheumatoid arthritis, *OA* osteoarthritis, *CTD* connective tissue disease

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Table 3 Types and frequencies of analgesic medication

Analgesic	No.	Percentage (%)
Paracetamol	15	13.9
NSAID	12	11.1
Topical NSAID	1	.9
Paracetamol/codeine (500 mg/8 mg)	14	13.0
Paracetamol/codeine (500 mg/30 mg)	5	4.6
Tramadol	1	.9
Any combination	18	16.7
Other (nerve block, strong opiate)	2	1.9
No analgesia	40	37.0
Total	108	100.0

NSAID Non-steroidal anti-inflammatory drug

All patients were fluent in English and demonstrated good understanding of the instructions given. There was a time difference of approximately 30 min between the completion of VAS1 and VAS2 during which the patient underwent a thorough clinical evaluation. The means of VAS1 and VAS2 scores were 41.1 and 41.4 mms, respectively (p=0.78; Table 4).

VAS1 and VAS2 scores correlated strongly (Pearson correlation coefficient 0.898, p<0.001; Fig. 1). Most patients complained of pain (mean VAS score=41.3 mm ([VAS1 + VAS2]/2), range 0–100 mm). There was a relatively even distribution of mean VAS scores among the study population (Fig. 2).

VAS and health professionals

VAS1 and VAS2 were administered by an equivalent number of nurses and doctors (Table 4). When a doctor administered VAS1, a nurse-administered VAS2 and vice versa. No significant difference was observed between VAS scores administered by doctors or nurses. The mean of all VAS scores administered by doctors was 40.1 mm while the mean for VAS scores administered by nurses was 42.1 mm (p=0.67). The mean score for doctor-administered VAS1 was 38.1 mm in comparison with 44.1 mm for nurse-administered VAS1 (p=0.26). The mean of VAS2 administered by doctors was 42.9 mm and 39.9 mm by nurses (p=0.58).

VAS and rheumatic diagnosis

VAS scores did not differ significantly between rheumatic diagnoses. The largest diagnostic cohort comprised RA (n=38), while 13.9% had osteoarthritis and 12% seronegative spondyloarthritis. A variety of other rheumatic diseases were also represented and are detailed in Table 2. There was no significant difference in VAS scores between 'inflammatory' (RA, spondyloarthropathy) and 'non-inflammatory' diseases (p=0.76).

VAS and medication use

Table 3 outlines the number of patients prescribed a variety of analgesics. Forty patients were not using any painkillers or anti-inflammatory drugs, while 68 were taking daily analgesics, either single agents or a combination of products. VAS scores were significantly higher in those patients taking analgesics (mean VAS score 49.5 mm) in comparison with patients using none (mean VAS score 27.4 mm; p<0.001; Fig. 3). Patients taking a combination of analgesics had higher VAS scores (mean VAS 58.5 mm) compared with those using single analgesic agents (mean

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Table 4 Mean and median values of the VAS scores

	No. (%)	Mean (mm)	Median (mm)	SD (mm)	*P* value
VAS1	108 (100)	41.1	41.0	27.4	0.78
VAS2	108 (100)	41.4	38.5	27.0	
VAS1 by doctors	53 (49.1)	38.1	37.0	26.9	0.26
VAS1 by nurses	55 (50.9)	44.1	46.0	27.7	
VAS2 by doctors	55 (50.9)	42.9	39.0	27.1	0.58
VAS2 by nurses	53 (49.1)	39.9	36.0	27.2	
VAS1 + VAS2[a]					
Doctors	108 (100)	40.1	38.5	26.9	0.67
Nurses	108 (100)	42.1	39.0	27.4	
VAS2-VAS1[b]					
Doctors[c]	53 (49.1)	1.92	0.0	8.9	0.19
Nurses[c]	55 (50.9)	−1.22	1.0	14.7	

[a] VAS1 + VAS2 represents the mean of all VAS scores administered by doctors and by nurses
[b] VAS2 − VAS1 refers to the difference between VAS1 and VAS2
[c] Health professional administering VAS1

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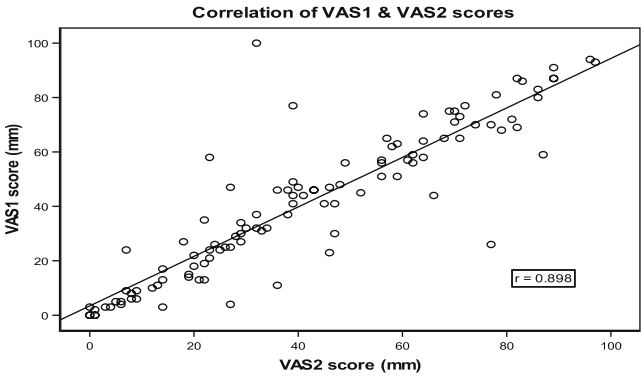

Fig. 1 The plot is linear signifying correlation between VAS1 and VAS2 scores

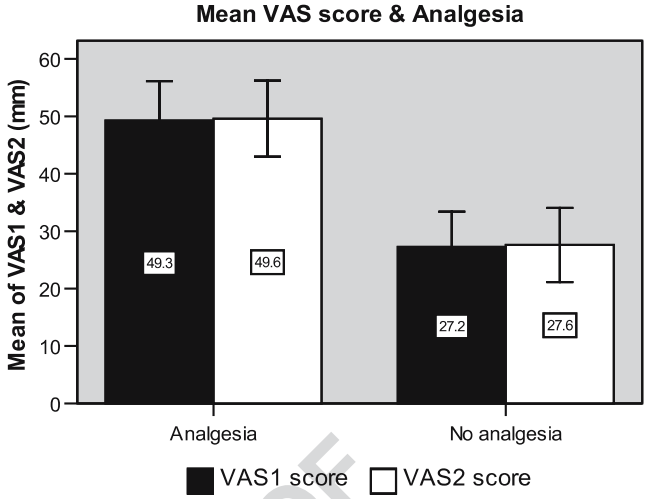

Fig. 3 This *bar graph* highlights the difference in mean VAS scores between those taking and not taking analgesia ($p<0.001$)

VAS 46 mm). However, this difference did not reach statistical significance ($p=0.1$).

Sixty-one patients were taking disease-modifying anti-rheumatic drugs (DMARD), either as single agents ($n=20$) or in combination ($n=41$). Mean VAS scores were 35.8 mm for those prescribed one DMARD and 45.9 mm for those on combination treatment. However, no significant difference was observed ($p=0.13$).

VAS and age and gender

Age had no influence on VAS1 or VAS2 scores ($p=0.51$ and 0.89, respectively). There was no correlation between age and the difference between VAS1 and VAS2 ($p=0.18$).

The mean VAS1 score for males was 37.2 and 43.4 mm for females ($p=0.26$) while mean VAS2 scores were 38.5 and 43.1 mm for males and females, respectively ($p=0.40$). These VAS scores were not influenced by which health professional administered the test ($p>0.5$). Differences in VAS scores, [VAS2−VAS1], between males and females were not significant ($p=0.51$).

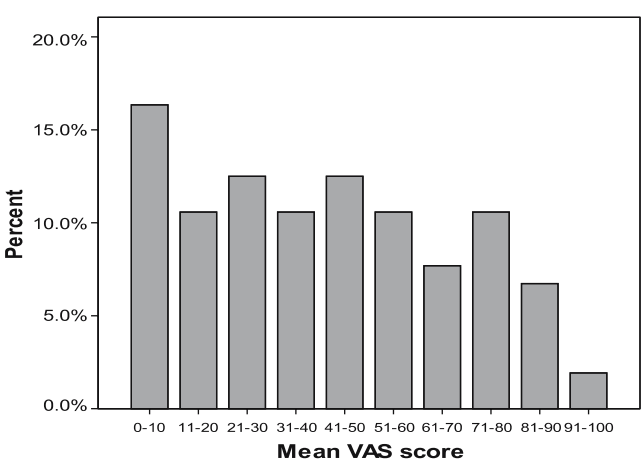

Fig. 2 The distribution of mean VAS scores ([VAS1 + VAS2]/2) and the proportion of patients within each of the VAS ranges

VAS and Literacy

Two patients identified themselves as having poor literacy skills. The first patient had a 20+ mm discrepancy between VAS1 and VAS2. The second patient marked the scale incorrectly, but both VAS1 and VAS2 correlated.

Sixteen patients (14.8%) marked the VAS incorrectly by placing an "X" on the scale or a mark that did not conform to the vertical line requested in the instructions. While those who marked the VAS incorrectly had a tendency to rate their pain at the 50% range (mean VAS1 and VAS2 of 51.1 and 52.3 mm, respectively), compared to those correctly marking the VAS (39.4 and 39.6 mm), this was not significant ($p=0.11$ for VAS1; $p=0.08$ for VAS2).

There was no significant difference between the means of [VAS2−VAS1] for those marking the VAS correctly and incorrectly ($p=0.76$).

Discussion

This study assessed the reliability of the visual analog scale of pain in patients attending general rheumatology clinics. The results were not influenced by which health professional administered the test and scores were similar regardless of age, gender, and rheumatic diagnosis.

Most patients in this study reported joint pain. However, levels of pain did not differ significantly between rheumatic diagnoses or with DMARD use. Where joint integrity is preserved, but inflammation is present, the dominant symptom may be 'stiffness' rather than severe pain. Thus, a VAS of joint stiffness may be a better symptom discriminator between rheumatic diseases.

Patients taking analgesia reported higher pain levels than those who were not using painkillers or non-steroidal anti-

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inflammatory drugs. This suggests that pain control in those prescribed analgesia in the outpatient setting is inadequate. As there are several modes of action for different analgesics, closer attention should be paid to the efficacy of pain management in rheumatology clinics.

Literacy may influence the ability to complete a VAS [10]. Although such skills were not formally tested in this study, 15% of patients did not complete the test according to the carefully worded instructions, suggesting that this issue should be taken into account when using this type of measurement.

Completing two VAS tests within a short time frame may suggest that the second result could be influenced by the first, in what has been called the halo effect [7]. However, all of the patients in this study underwent a thorough clinical assessment between VAS1 and VAS2, thus, reducing the likelihood of this phenomenon.

This study demonstrates that the VAS is an accurate measure of pain in patients with rheumatic disease and is reproducible regardless of whether it is administered by a doctor or nurse. It is not influenced by age, gender, diagnosis, or DMARD treatment. However, literacy and educational level may affect the ability to understand and complete the VAS instructions and should be taken into account in future studies using this assessment tool. Higher pain scores were reported in patients taking analgesics suggesting that pain control may be sub-optimal. Traditional outcomes in the treatment of rheumatic disease include the reduction of inflammation and joint destruction. However, the VAS has an important role in ensuring that pain levels are also optimally suppressed.

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