REVIEW ARTICLES

Assessment of musculoskeletal pain in autoimmune diseases

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Abstract

Correct diagnosis and right assessment are cornerstones of clinical success in the practice of pain management. Due to constant pressure on the clinician to prove his/ her efficiency, the core elements in assessment of pain are often overlooked. The pain has been considered as the 'fifth vital sign'. A variety of pain assessment scales are available for evaluating the intensity of acute and chronic pain. Under or over-assessment of pain often lead to errors in pain management. This is mainly due to proceeding with the treatment plan without a proper clinical history collection and clinical examination. This compromises the patient's opportunity to obtain optimum pain relief. The current review provides an overview on the pain assessment tools used in musculoskeletal pain assessment, and to assist clinicians and researchers in selecting the pain assessment methods best suited to serve their purposes.

Keywords: Pain assessment, fifth vital sign, individualised pain management

Introduction

By definition, pain is an internal, subjective experience that cannot be directly observed by others or measured by the use of physiologic markers or bioassays. Hence, the assessment of pain in many cases is largely done through self-reporting. Recognizing the possibility of biases associated with the self-reporting of pain or any other construct, investigators in the field of pain research have been evaluating several ways to refine this self-report methodology.

The International Association for the Study of Pain defines pain as '*an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage'*.[1] The idea of perceiving pain as an emotion is not new. During the 5th and 6th centuries BC, Siddharta Gautama (Buddha) taught that '*pain is a part of life, is the result of desire, and could be ended only with the mind';* in the fourth century BC, Aristotle wrote, '*pain is the passion of the soul*.'

The pain perception is a summation of the following three aspects: sensory-discriminative (e.g., location, intensity), motivational-affective (e.g., depression, anxiety), and cognitive-evaluative (e.g., thoughts of the cause and significance).[2] Pain is considered as a subjective experience, as the response of each person to the same stimulus is unique (e.g., same surgery). The difference in responses could be attributed to some physiologic differences in the nociceptive pathways and not linked to affective interpretation.

Several brain areas are activated by nociceptive stimulation, including the anterior cingulate cortex, frontal and prefrontal cortices, primary and secondary somatosensory cortices, thalamus, basal ganglia, cerebellum, amygdala, and hippocampus.[3] These areas form a cerebral signature for the pain experience.[4] Evidence that pain is indeed a subjective experience is derived from psychophysical studies that have shown pain sensation and pain unpleasantness as two distinct dimensions of pain.[5]

Is it possible to assess pain objectively?

It is very unlikely to perform objective assessment of pain without relying on the individual perception of pain. Non-invasive functional brain imaging may open a window to such assessments.[6]

Standardized measures are needed to maintain consistency and an ability to communicate with patients

and care providers. However, there are considerable differences in the accuracy of pain reports at the individual level.[7] The reporting consistency of pain has also been shown to be weak among the patients.[8] It may be false to evaluate the patient's consciousness to come up with a number corresponding to the discrete internal stimulus before making a report on the sensory and affective qualities of the experience. It is an attempt to construct meaning, influenced by and with reference to a range of internal and external factors.[8] This is a function of the fact that numerous brain structures are involved in sensation. Cognition, emotion, and memory are also activated with each pain experience.

Pain measurement

The tools used for assessing pain should be reliable, valid, and should allow the investigator to communicate (through language, movements, etc.) clearly with the patient. Pain assessment should be comprehensive, documented individualized, ongoing, and should be backed by a good patient history. The description of the pain by the patients should have the following characteristics: mode of onset, location, radiation, temporal pattern, character, intensity and exacerbating and relieving factors.

Pain has been considered as the fifth vital sign.[9] Based on the clinical experience, it has been suggested that the pain should be measured routinely along with other vitals like temperature, pulse, blood pressure, and respiratory rate. It serves as a powerful reminder to clinician to attend the patients' suffering. In addition, pain is a multidimensional perception with inter-related sensory and affective components, but they should be assessed separately.

Most of the self-report pain assessment tools generally assess the pain intensity ratings only for a shorter period of time (e.g. one week).

A variety of pain assessment scales are available for evaluating the intensity of acute and chronic pain. An ideal pain measure should be sensitive, accurate, reliable, valid, and useful for both clinical and experimental conditions, and should be able to separate the sensory aspects of pain from the emotional aspects. The three most commonly used methods to quantify the pain experience (usually pain intensity) are Verbal rating scales (VRS), Numerical rating scales (NRS), and Visual analog scales (VAS). Currently available measures can be categorized into two: single-dimension scales and multidimensional scales. The numbers obtained from these tools should be considered as guides and not absolutes.
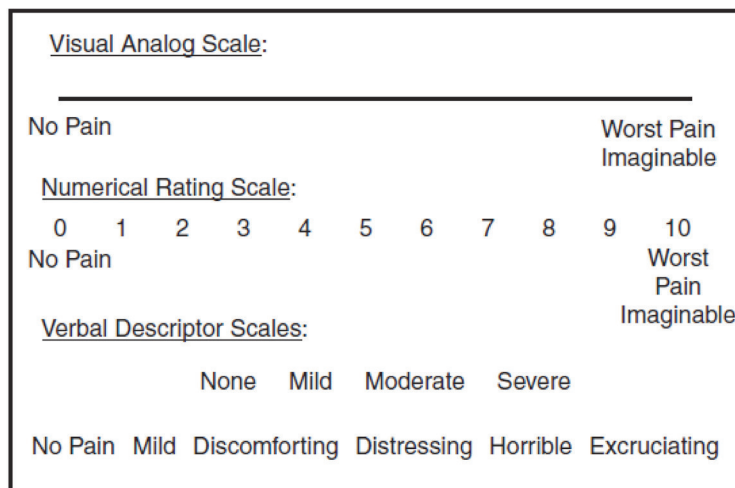
Single dimension scales

Visual analog scales (VAS)

VAS is the most commonly used tool. It is a straight 100-mm line and with words 'no pain' at the left end and 'worst pain imaginable' at the right end (Fig. 1).[10]

Advantages

VAS is a validated tool with greater sensitivity to changes in a patient's pain experience.[11-13] It is user friendly and relatively easy to understand for most of the patients. It avoids the need of extensive description to explain the pain and assists in meaningful comparison of measurements over time. VAS has been shown to have ratio scale properties, which means that changes in VAS measurements indicate actual percent differences between the measures.[14]

Fig 1: Single dimension pain scales

Disadvantages

It attempts to describe the complex, multidimensional experience with a single value. Some patients may find it difficult to choose a single number to represent their pain sensation. In addition, they often have no clear idea of the term 'worst pain imaginable', because each pain experience is different, and one may not be able to judge whether the present experience is the 'worst.' Although the VAS may appear linear, it has a false ceiling at the upper-most end. It is not possible to document the changes made to the recorded experience. If a patient wanted to change the marking from 100-mm end to worse.

Another disadvantage is that it designates a value for the patient's pain intensity, and the decision on treatment and management strategies is based on the value assigned. There is no way to differentiate what constitutes a mild, moderate or severe pain.

Numeric rating scales (NRS)

NRS is similar to the VAS with marking at the extreme left end as 'no pain' and at the right end as 'worst pain imaginable' (Fig. 1). The difference is that, instead of a line without marks, numbers from 0 to 10 are spaced evenly across the page. Patients are instructed to circle the number that represents the amount of pain that they are experiencing at the time of evaluation. The verbal numeric scale (VNS), a variant of this scale, in which patients are asked to verbally state a number between 0 and 10 that corresponds with their present pain intensity.[15,16.]

Advantages

NRS and VNS are validated, quick and easy to use. The VNS is very user friendly, particularly in an acute setting, where speed of evaluation is crucial.

Disadvantages

It attempts to assign a single number to the pain experience. Ceiling effect has also been noted in NRS. For example, if the patient has selected '10' and the pain worsened subsequently, there is no way to express this change. In practice, patients using VNS often rate their pain as some number higher than 10 (e.g., 15 out of 10) in an attempt to express their extreme level of pain intensity.

Verbal descriptor scale (VDS)

VDS has a list of words to describe the pain experience, arranged on the basis of severity from least to most. Patients need to either circle or write the appropriate word that best describes their pain intensity at that moment.

It is a simple validated tool and quick to use.[17] Assigning a single value (in this case one adjective) to the pain experience is the major disadvantage of single-dimensional scales. In addition, VDS compels patients to choose words that are not of their own choice to describe their pain.

Multiple dimension scales

McGill pain questionnaire (MPQ)

MPQ (Fig. 2) is also a numerical multidimensional measure of pain quality. It is in the format of a form with three different parts for patient's pain assessment.[18] The first part consists of line drawings of the back and front of a human body in which the patients can specify the pain experiencing regions. The second part is a six-word VDS to document the present pain intensity. The third part comprises of 20 sets of 78 adjectives that clearly state the sensory, affective, and evaluative qualities of the patient's pain.

MPQ is a reliable tool that can assign the most appropriate descriptions based on a patient's pain experience.[19-22] The scale has the potential to differentiate between various types of pain syndromes. It has been shown to be sensitive to changes in the amount of pain experienced by patients in response to various analgesic therapies in both the acute and chronic setting.[23-26] One disadvantage of the MPQ is that filling the form is time consuming. It may take 5 to 15 minutes to complete the form, which some patients may find very difficult.

Short-form McGill pain questionnaire

The short-form McGill Pain Questionnaire (SF-MPQ, Fig. 3) also has three different parts for assessment of a patient's pain experience.[27] In addition to a six-word VDS and VAS, the questionnaire has 15 adjectives (sensory, 11 words and affective, 4 words) to describe the qualities of the patient's pain.

The SF-MPQ has been validated and appears to correlate well with the original long-form MPQ.[28] Similar to the long form, the SF-MPQ may be used to differentiate between different types of pain syndromes and has been found to be sensitive to changes in pain brought about by various analgesic therapies in both acute and chronic settings.[29-31]
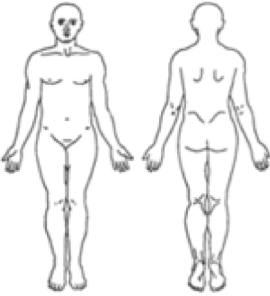
Brief pain inventory

The brief pain inventory (BPI, Fig. 4) is used to evaluate a patient's pain experience using different scales.[32] Line

Fig 2: McGill pain questionnaire

drawings of the front and back of a human body are included for patients to mark the pain location. Patients also need to list the treatment or medications they are using, and the relief attained in the past 24 hours. It is a validated tool and shown to be reliable in various pain states.[32-35] It is an excellent tool for monitoring the effect of pain and/or treatment in terms of a patient's functional ability or disability over time.[36] The major disadvantage is that it takes 5 to 15 minutes to complete, making it less desirable for repeated use in an acute setting.

Behavioural observation

Patients communicate their pain discomfort through vocalizations, facial expressions, body postures, and actions. These verbal and non-verbal behaviours have been termed pain behaviours, and they have emerged as an important component of behavioural models of pain. Though various pain behaviour coding systems are developed, most of them are specific to particular pain conditions. For example, the osteoarthritis (OA) pain behaviour coding system assesses the position, movement, and specific pain behaviours (e.g., guarding, rubbing, flexing) noted in OA patients during standardized tasks.[37]

Pain assessment in elderly

Both acute and chronic pain are very common in elderly patients. Pain management in these subjects is very important to achieve effective mobilization and functional independence. It may also contribute to reduce morbidity and healthcare expenditures.

Pain assessment and reporting is often challenging in this population. One of the contributing factors is underreporting

Fig 3: Short-form McGill pain questionnaire

SHORT-FORM McGILL PAIN QUESTIONNAIRE
RONALD MELZACK

PATIENT'S NAME: _____   DATE: _____

	NONE	MILD	MODERATE	SEVERE
THROBBING	0) ____	1) ____	2) ____	3) ____
SHOOTING	0) ____	1) ____	2) ____	3) ____
STABBING	0) ____	1) ____	2) ____	3) ____
SHARP	0) ____	1) ____	2) ____	3) ____
CRAMPING	0) ____	1) ____	2) ____	3) ____
GNAWING	0) ____	1) ____	2) ____	3) ____
HOT-BURNING	0) ____	1) ____	2) ____	3) ____
ACHING	0) ____	1) ____	2) ____	3) ____
HEAVY	0) ____	1) ____	2) ____	3) ____
TENDER	0) ____	1) ____	2) ____	3) ____
SPLITTING	0) ____	1) ____	2) ____	3) ____
TIRING-EXHAUSTING	0) ____	1) ____	2) ____	3) ____
SICKENING	0) ____	1) ____	2) ____	3) ____
FEARFUL	0) ____	1) ____	2) ____	3) ____
PUNISHING-CRUEL	0) ____	1) ____	2) ____	3) ____

NO PAIN |————————————————| WORST POSSIBLE PAIN

PPI

0 NO PAIN   ____
1 MILD   ____
2 DISCOMFORTING ____
3 DISTRESSING   ____
4 HORRIBLE   ____
5 EXCRUCIATING   ____

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of discomfort as the patient, might be reluctant to complain. In addition, such patients may use pain to mask other newly developing physical or cognitive disabilities.

Most pain assessment techniques, validated in middle-aged adults, have also been psychometrically evaluated in elderly. Research shows that increased frequency of incomplete or nonscorable responses on a VAS has been linked to advanced age, but not on VRS or NRS. VAS failure rate in cognitively intact elderly patients was found to be between 7% to 30% of respondents, while it was significantly higher (up to 73%) in cognitively impaired samples.[38] Hence, it could be concluded that cognitive intactness of elderly patients influences the effective use of VAS or NRS. However, VAS is the least preferred method in elderly.[39] If there are doubts about the cognitive abilities of the patient, it is advocated to choose VDS or the Faces

pain scale (FPS). Both the scales have been shown to be easy to understand and user friendly.[40, 41] The FPS (Fig. 5) is a visual scale with six somewhat realistically drawn faces that range from a content-looking smiling face to a distressed-looking face.[42]

Impaired hearing and visual acuity may complicate pain assessment. The patient may need to provide extensive explanation or should have good visualization to perform the assessment. The VDS may be the easiest tool for the elderly to use, as the patient can describe the feeling in common words rather than choosing a number, facial representation or a point somewhere on a straight line.

Evaluating the impact of pain on patient lives is an important factor in pain assessment in elderly. Patients may try to meet necessary activities of daily living, despite
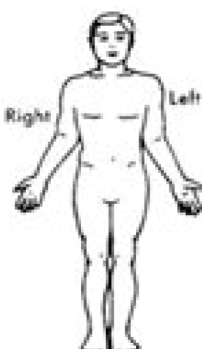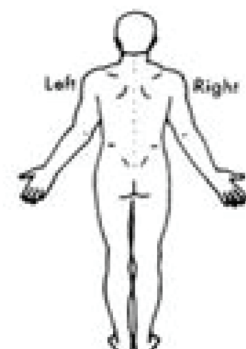
Fig 4: Brief pain inventory

FORM 3.2 **Brief Pain Inventory**

Date ____ / ____ / ____   Time: _____

Name: _____
          Last   First   Middle Initial

1) Throughout our lives, most of us have had pain from time to time (such as minor headaches, sprains, and toothaches). Have you had pain other than these everyday kinds of pain today?
   1. Yes   2. No

2) On the diagram shade in the areas where you feel pain. Put an X on the area that hurts the most.

3) Please rate your pain by circling the one number that best describes your pain at its **worst** in the past 24 hours.
   0   1   2   3   4   5   6   7   8   9   10
   No pain   pain as bad as you can imagine

4) Please rate your pain by circling the one number that best describes your pain at its **least** in the past 24 hours.
   0   1   2   3   4   5   6   7   8   9   10
   No pain   pain as bad as you can imagine

5) Please rate your pain by circling the one number that best describes your pain on the **average**
   0   1   2   3   4   5   6   7   8   9   10
   No pain   pain as bad as you can imagine

6) Please rate your pain by circling the one number that tells how much pain you have **right now**.
   0   1   2   3   4   5   6   7   8   9   10
   No pain   pain as bad as you can imagine

7) What treatments or medications are you receiving for your pain?

_____

8) In the Past 24 hours, how much **relief** have pain treatments or medications provided? Please circle the one percentage that most shows how much relief you have received
   0% 10 20 30 40 50 60 70 80 90 100%
   No relief   Complete relief

9) Circle the one number that describes how, during the past 24 hours, pain has **interfered** with your:
   A. General activity
   0   1   2   3   4   5   6   7   8   9   10
   Does not interfere   Completely interferes

   B. Mood
   0   1   2   3   4   5   6   7   8   9   10
   Does not interfere   Completely interferes

   C. Walking ability
   0   1   2   3   4   5   6   7   8   9   10
   Does not interfere   Completely interferes

   D. Normal work (includes both work outside the home and housework
   0   1   2   3   4   5   6   7   8   9   10
   Does not interfere   Completely interferes

   E. Relations with other people
   0   1   2   3   4   5   6   7   8   9   10
   Does not interfere   Completely interferes

   F. Sleep
   0   1   2   3   4   5   6   7   8   9   10
   Does not interfere   Completely interferes

   G. Enjoyment of life
   0   1   2   3   4   5   6   7   8   9   10
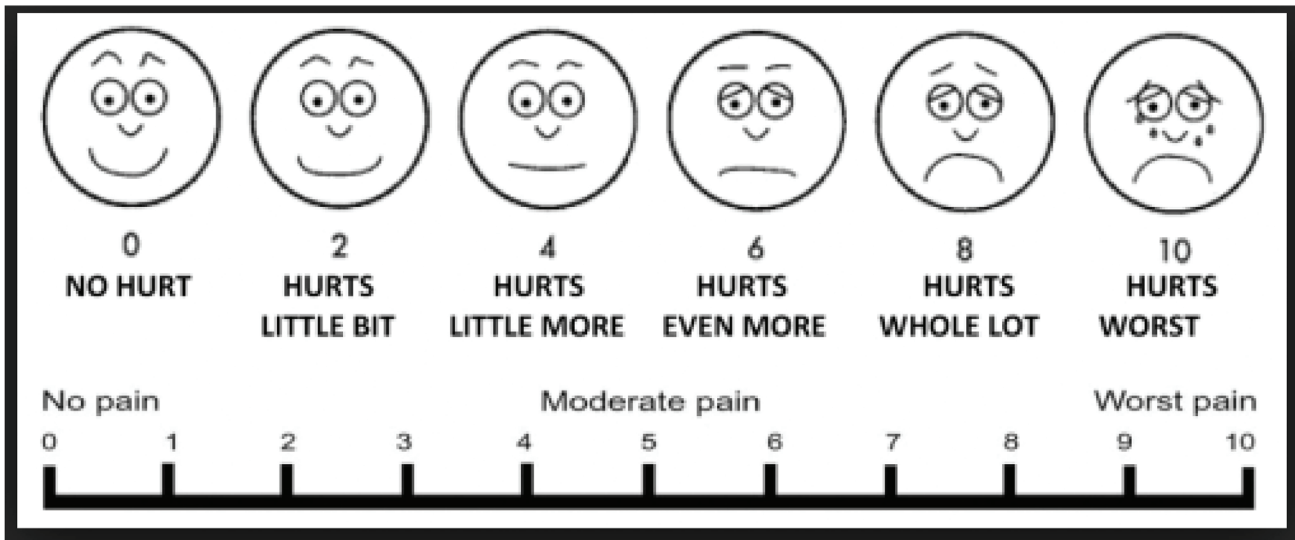   Does not interfere   Completely interferes

severe pain. However, the severity of pain may correlate with the effect of pain on elective activities such as social functions or advanced activities of daily living. In patients with cognitive disability, worsening of pain impairs any baseline activity.

Daily diaries: In different clinical settings, daily diaries are becoming the standard tools for assessing pain-related symptoms, as it assists in minimizing memory biases.

Bias in pain assessment

Overall, the estimation of pain symptoms by healthcare experts is reported to be suboptimal. In most of the cases, diagnostic and treatment-planning decisions are influenced by formal and informal clinical judgments of a patient's pain-related symptoms. Underestimation of pain may lead to improper pain management, enhanced patient suffering, and delayed recovery. On the other hand, overestimation of pain can result in overtreatment and adverse iatrogenic

Fig 5: Faces pain scale

consequences.[43]

Which scale will be suitable for clinical practice?

In OPD settings, it is preferable to use general multidimensional scales. If the functionality of the patient is a concern, it is advocated to use BPI. A review of the extensive cancer pain literature has concluded on the superiority of single-item VAS, VRS, and NRS, and none of the measures were found to be consistently superior.[44] However, literature findings support the use of a VRS or NRS in elderly or in cognitively compromised subjects.

If the patient has acute postoperative pain and did not have any previous episodes of chronic pain, the somatic portion of the experience plays a major role and use of the single-dimension scales (e.g., VAS, NRS, VNS, and VDS) probably gives adequate information for treatment. However, if the patient has chronic pain or underwent surgery for an emotionally charged condition (e.g., cancer), the affective qualities of pain are likely the major determinants of the pain experience. Hence, it is necessary to address the multidimensional aspect of the pain, at least in a limited fashion. In an acute care setting, the questions should specifically focus on the following aspects of patients' experience: pain, anxiety, depression, anger, fear, and interference with physical activity.

Use of the single-dimension scales to track the change in a patient's pain rating over time or after an intervention is often more helpful than trying to use them to measure an absolute level of pain at a given point of time.

Conclusion

Pain is a subjective experience. Though a wide array of valid and reliable measurement tools is available, there is no specific objective measure for pain. A minimum of one self-report measure should be considered as a part of any assessment of pain, and it is recommended to use either multiple measures or a multidimensional measure of pain. The clinician should be aware of the limitations of the measures. In addition, sound clinical judgment and understanding the patient's discomforts plays a paramount role in pain management.

Key points

• The experience of pain is subjective, private, and internal.

• Though there is currently no 'objective' measure of pain, a number of self-report pain assessment tools have proven to be valid and reliable.

• Psychophysiology, behavioural, and functional neuroimaging-based assessment methods cannot be used as substitute for an individual's self-reported pain experience.

• Biases in estimating a person's pain are common, as healthcare providers tend to underestimate and under treat patients' pain.

• Good history collection and examination are vital. We need to understand the limitations of these measurements, use sound clinical judgment and always listen to the patient.

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