Neuropathic pain assessment scales in spinal cord injuries: a review of recent data

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ABSTRACT

Pain due to central or peripheral nervous system lesions, following spinal cord injuries is a widely known pathology, referred to as neuropathic pain.Many inventories have been developed for the evaluation of neuropathic pain, such as the inventory of neuropathic pain symptoms (NPSI) and the short form McGill pain questionnaire 2 (SF-MPQ-2). Neuropathic pain assessment tools represent a significant progress in clinical and in neuropathic pain research and are practical guides for the evaluation of neuropathic pain in patients, especially in primary care settings, providing clinical information for distinguishing neuropathic pain from non-neuropathic pain. Some tools evaluate qualitatively neuropathic pain (mostly used in clinical settings), while others use quantitative parameters (mostly used in research). In this literature review, different neuropathic pain assessment tools are reviewed as well as the usefulness of verbal pain description items, in the classification of pain following spinal cord injuries. Moreover, their predictive validity is considered. According to literature, verbal pain description inventories are not sufficiently specific for the diagnosis and classification of spinal cord injuries pain. Researchers suggest the implementation of multiple variables inventories for pain classification and for the evaluation of their validity either as clinical or research tools.

KEY WORDS: neuropathic pain, verbal descriptor, spinal cord injury, pain scale, assessment tool

Introduction.

Pain is defined as an unpleasant physical sensation or emotional experience associated with an actual or possible tissue damage. Pain evoked by injuries to the central or peripheral nervous system, known as neuropathic pain, has been studied for centuries. The study of neuropathic pain (NP) on animal models resulted in a better understanding possible mechanisms of NP and in the development of effective treatments [1]. The identification of NP by primary care healthcare professionals has become a field of growing interest and importance. Thus, several clinical evaluation tools have been developed for either clinical or research purposes. Most inventories were developed to distinguish NP from non-neuropathic pain (non-NP) and are based on qualitative parameters, while others quantitative tools were developed for the classification of the severity of NP, the monitoring of the effectiveness of the treatment and are used in research [1]. There are many similarities between the various NP evaluation inventories, with some important differences though. In 1997, the neuropathic pain scale (NPS) was published. A number of publications followed on other NP evaluation tools, developed almost simultaneously in various European countries and the USA. Most of these NP tools

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were developed according to symptoms characterizing multiple types of NP. A remarkable exception is NPS, developed in patients with post-herpetic neuralgia (PHN).The unique content of one assessment tool can give additional validity to one test against another when applied to a specific NP patient who exhibits these unique features [2].

The aim of this study is to critically review the latest scientific literature in order to expose the available data regarding the NP assessment tools and their characteristics. Moreover, it is reviewed the validity of the implementation of verbal descriptions for the differentiation between the types of NP evoked by a spinal cord injury.

A literature review was conducted in a scientific publication resource; the MEDLINE (PubMed) (https://www.ncbi.nlm.nih.gov/pubmed).Temporal criteria were applied in order to access the literature of the last fifteen years (from 01/01/2005 to 01/01/2020). In the search were included only articles published in English language. The keywords applied regarded the injury (spinal cord injury), the type of pain (neuropathic pain) and the assessment tools (e.g. scale, inventory, tool, verbal descriptor).

The Boolean search string applied is: "spinal cord injury AND neuropathic pain AND assessment" and "neuropathic pain AND verbal descriptor".

The search of the databases returned 190 articles and publications that did not match the research criteria were excluded during the reading of abstracts. Articles focusing on the treatment or other types of pain were excluded. The literature was screened and reviewed and the final number of articles was 17. The final articles were reviewed and the data were analyzed through narrative (Table 1).

Discussion

Although the scientific community has reached a consensus about the frequency of pain following a spinal cord injury, the definition and classification of this pain is still confusing. This has resulted in an increasing number of different classification systems in literature (up to 29 different classifications until 2002). These classifications are based on various descriptive parameters, resulting in different estimates for the different types of pain following spinal cord injury. Different classification systems, also lead to differences in pain prevalence in the general population. For example, the prevalence of visceral pain is estimated to range from 5-34%, while the prevalence of neuropathic pain due to spinal cord injury is estimated about 14-40% [2]. The overall prevalence of pain, following a spinal cord injury, is estimated about 25-96%, while for severe pain the prevalence is about 30-51%. A main problem, leading to a difference in prevalence is the lack of definition and classification system for the pain following a spinal cord injury, making comparisons between studies arduous [3]. Misclassification due to nomenclature problems and the different definitions used for the same pathology, is a further problem reflected in literature.

The definition of neuropathic pain, following a spinal cord injury reached a consensus in 2011. The International Classification of Chronic Spinal Cord Injury (ISCIP) was adopted by many of the world's leading professional associations on spinal cord injuries and pain. The validity and reliability of this classification was tested [4].Pain characteristics are classified in three grades; Tier 1 (pain type) consists of nociceptive, neuropathic, other and unknown pain, Tier 2 (pain subtype) consists of a further classification according to the location of the pain (e.g. in neuropathic pain, the symptom is further classified according to the level of the spinal cord injury), Tier 3 (source of pain or pathology) consists of a more specific classification according to the site of injury [5]. In this classification, the neuropathic pain caused by spinal cord injuries is described in relation to the neurological rather than the skeletal level of injury. As this may differ between the two sides of the body, the lowest level in the spine with normal sensation or motor function is used[5].

In individuals with pain following a spinal cord injury, it is recommended also the evaluation of the anatomical site, where the pain is perceived, the severity of the pain, the recurrence of pain and the triggering and protective factors. The International Classification of Chronic Spinal Cord Injury (ISCIP) proposes a standard list of pain points, as well as coding schemes for other features. Numbness, defined by the IASP as an unpleasant, abnormal, spontaneous, or causing sensitivity, should be classified only if accompanied by a painful sensation [6].

Several tools have been developed for the qualitative evaluation of neuropathic pain. The Leeds Assessment of Neuropathic Symptoms and Signs (LANSS) was developed in 2001 and was the first tool for the differential diagnosis of NP from non-NP. It combines items regarding the patient's symptoms and physical examination and requires a trained physician. However, a modified version of the tool has been also suggested, the S-LANSS that can be self-administered by the patient [7]. A score>12 (max. total score24) is indicative of NP with 82% sensitivity and 80% specificity [8].LANSS is relatively simple tool, validated in many languages, with a higher specificity and sensitivity compared to other tools. However, it cannot assess quantitatively the severity of NP [9].

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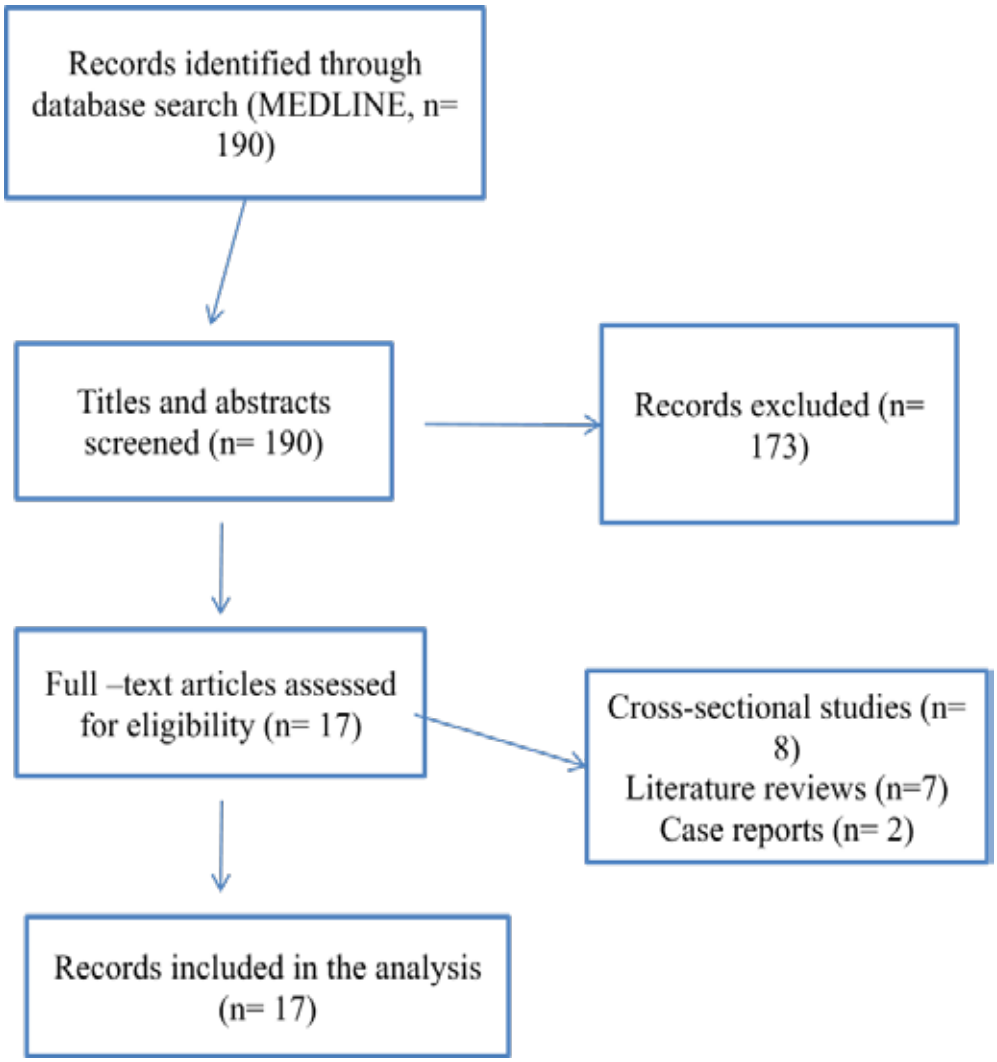
Table 1. Flow-chart



The neuropathic pain questionnaire (NPQ) is a self-administered questionnaire of 12 questions about the quality of symptoms (e.g. burning, sensitivity to the touch, numbness, tingling, compression, feeling cold), the aggravating factors and the effect of emotions (discomfort, shock) on pain sensation. The sensitivity and specificity of the questionnaire is 66.6% and 71.4% respectively [8]. NPQ is useful for the differentiation of NP from non-NP and it may be particularly useful for primary care physicians. Moreover, it is the only tool taking into consideration information regarding the impact of weather conditions on the individual's pain, and the psychological impact of NPS [8].

The Neuropathic Pain Diagnostic Questionnaire (DN4) is a four-items questionnaire having a 82.9% specificity and a 89.9% sensitivity for NP screening. It is a quantitative evaluation tool, which has been also used for the evaluation of NP therapy results[8,10].Pain DETECT is a seven-items self-administered questionnaire evaluating the quality of symptoms such as burning, tingling /stinging, numbness and sensitivity to light pressure. The analysis of patients' pain description was included in the development of this tool. The tool has an 85% sensitivity and an 80% specificity [11]. Another self-administered tool for the qualitative evaluation of NP is the ID Pain. This is a quick and easy, six-item questionnaire, that has a73% sensitivity and a 69% specificity. This tool evaluates also the distribution of pain

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[8]. The Standardized Evaluation of Pain (StEP) is a twelve-item questionnaire that has been developed for the diagnosis of NP related to lower back pain due to a peripheral nerve compression. This tool has a high sensitivity and specificity of about 95-97% respectively. However, this test can be administered only by trained personnel [12].

Several tools have been developed for the evaluation of NP in research settings. These are the neuropathic pain scale (NPS) and the modified Pain Quality Assessment Scale (PQAS), which are research tools for the evaluation of the response of treatment in patients with NP, rather than for use in daily practice [3].The Neuropathic Pain Symptom Inventory (NPSI) has been developed for the evaluation of the various symptoms of NP and for the identification of the different subtypes of NP, even those types that are characterized by psychological components. It is a tool that has not been developed for the differentiation of NP from non-NP and it is used in research settings [13]. Another evaluation tool that has been developed for the assessment of NP and the response to therapy, but has a low diagnostic value in the differentiation of NP from non-NP, is the latest version of the Short Form McGill Pain Questionnaire-2 (SF-MPQ-2) [14].

Neuropathic pain assessment tools are an important aid in practice and research and are suitable for providing significant information to diagnose NP or differentiate it from other types of pain. Quality tools are simple and accurate enough to use in clinical practice, and those that have quantitative parameters are important research tools, especially for developing new phenotypic profiles of patients with neuropathic pain based on their symptoms. The use of verbal descriptors in characterizing the individual's pain such as "numbness" or "burning" or "tingling" is common and these labels can be used in the development of NP phenotypes [15].Verbal descriptors are used by most inventories to categorize NP following a spinal cord injury. Unfortunately, the validity of the verbal descriptions for the differentiation between the types of pain that follow the spinal cord injury has not yet been determined. The combination of both quantitative methods and qualitative inventories based on verbal descriptors is recommended, since more information is obtained regarding the individual's pain and a better therapeutic plan can be structured [8]. Moreover, it is emphasized the usefulness of verbal descriptors in NP management for the development of individualized therapeutic plans and the individual's follow up [16]. The experience from a study on cancer patients in Norway, using verbal descriptors for the characterization of the quality of pain, showed that verbal descriptors are a valuable tool in pain definition and management, even though they cannot be used as a single tool for the understanding of the mechanism of the symptom [17].

The development of NP assessment tools has changed the clinical practice of pain diagnosis and management. Advances in the field of research have also been accomplished. These tools provide important information for the diagnosis of NP and the location of the injury. NP tools have different characteristics and some of them have been developed for specific populations, such as the Standardized Evaluation of Pain (StEP) tool that has been developed for the diagnosis of NP related to lower back pain due to a peripheral nerve compression. Tools based on quality parameters are simple and sufficiently accurate to use in clinical practice, and those that have quantitative characteristics are preferred for research purposes. The review of current literature reflects the vast availability of these tools and the thorough study of their characteristics, their validity, specificity and sensitivity in pain diagnosis. The researchers point out the need for further study in the use of verbal descriptors in pain assessment tools and suggest that future studies will provide additional information on the efficacy of these features in both research and clinical practice.

Conflict of interest disclosure

The authors declared no conflicts of interest.

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