FİZİKSEL TIP VE REHABİLİTASYON BİLİMLERİ DERGİSİ
Journal of Physical Medicine and Rehabilitation Sciences J PMR Sci. 2020;23(2):62-8

ORİJİNAL ARAŞTIRMA ORIGINAL RESEARCH

DOI: 10.31609/jpmrs.2019-71039

The Assessment of the Neuropathic Pain Scales and Disability in Patients with Chronic Low Back Pain Syndrome

Kronik Bel Ağrılı Hastalarda Nöropatik Ağrı Skalaları ve Disabilitenin Değerlendirilmesi

Emel ATAR[a], Korhan Barış BAYRAM[a], Özlem YOLERİ[a], Hikmet KOÇYİĞİT[a]

[a]İzmir Kâtip Çelebi University Atatürk Training and Research Hospital, Department of Physical Medicine and Rehabilitation, İzmir, TURKEY

The manuscript has been presented orally in the 9th World Congress of International Society of Physical and Rehabilitation Medicine (June 19-23, 2015, Berlin, Germany).

ABSTRACT Objective: Chronic low back pain (LBP) is characterized by a combination of nociceptive and neuropathic mechanisms of pain generation. We aimed to determine the neuropathic component of LBP and to evaluate its relation with physical disability. **Material and Methods:** One hundred and two patients with chronic low back pain were included in the study. The patients were evaluated clinically and demographically. Neuropathic pain component and back pain intensity were assessed using the different scales of Leeds Assessment of Neuropathic Signs and Symptoms (LANSS), PAIN/DETECT and DN4 and 10-cm Visual Analog Scale (VAS); Physical disabilities of the patients were also assessed by İstanbul Low Back Pain Disability Index (ILBPDI). **Results:** The mean age of the patients was 44.70±11.98. When LANSS was used, 23.5% patients demonstrated a predominantly neuropathic pain component. We also found the frequency of neuropathic pain as 18.6% in PAIN/DETECT and 35.3% in DN4. The presence of neuropathic pain according to all neuropathic pain scales was significantly correlated with the scores of ILBPDI ($p<0.05$). **Conclusion:** Nociceptive pain is more prominent in acute LBP, whereas neuropathic component is more prominent in chronic conditions. It is important to identify the underlying mechanisms of chronic LBP. Chronicity of pain and disease progression in LBP patients can only be prevented with proper and early mechanisim-targeted treatment methods.

Keywords: Chronic low back pain; neuropathic pain

ÖZET Amaç: Kronik bel ağrısı, nosiseptif ve nöropatik ağrı oluşum mekanizmalarının bir kombinasyonu ile karakterizedir. Çalışmanın amacı farklı nöropatik ağrı skalalarını kullanarak kronik bel ağrılı hastalarda nöropatik ağrı bileşenini belirlemek ve bel ağrısı ile fiziksel yetersizlik arasındaki ilişkiyi değerlendirmektir. **Gereç ve Yöntemler:** Çalışma kronik bel ağrılı 102 hasta ile yürütüldü. Hastalar klinik ve demografik olarak değerlendirildi. Nöropatik ağrı komponentleri ve ağrı şiddeti LANSS Ağrı Skalası (The Leeds Assessment of Neuropathic Pain Symptoms and Signs), PainDETECT, DN4 skalası (Douleur Neuropathique 4 Questions) ve 10 cm'lik vizüel analog skala (VAS) ile; fiziksel kısıtlılık İstanbul Bel Ağrısı Disabilite Indeksi ile değerlendirildi. **Bulgular:** Hastaların yaş ortalaması 44,70±11,98 idi. LANSS kullanıldığında %23,5 hasta, baskın olarak nöropatik ağrı bileşeni gösterdi. Ayrıca nöropatik ağrı sıklığını PAIN-DETECT'te %18,6 ve DN4'te %35,3 olarak bulduk. Tüm nöropatik ağrı skalalarına göre nöropatik ağrının varlığı, İstanbul Bel Ağrısı Disabilite İndeksi skorları ile anlamlı olarak ilişkiliydi ($p<0,05$). **Sonuç:** Nosiseptif ağrı, akut bel ağrısında daha belirgin iken, kronik durumlarda nöropatik bileşen daha belirgindir. Kronik bel ağrısının altında yatan mekanizmaları tanımlamak önemlidir. Bel ağrılı hastalarda ağrının kronikliği ve hastalığın ilerlemesi ancak uygun ve erken mekanizma hedefli tedavi yöntemleri ile önlenebilir.

Anahtar Kelimeler: Kronik bel ağrısı; nöropatik ağrı

Low back pain (LBP) is a common health problem in the society which leads to loss of productivity and disability with high expenses of diagnosis and treatment.[1] Chronic LBP is a major cause of activity limitation in people below 45 years of age and the third leading problem resulting in disability in people between 45-64 years of age.[2]

Correspondence: Emel ATAR
University of Health Sciences Sultan Abdülhamid Han Training and Research Hospital,
Department of Physical Medicine and Rehabilitation, İstanbul, TURKEY/TÜRKİYE
E-mail: dreml83@hotmail.com

Peer review under responsibility of Journal of Physical Medicine and Rehabilitation Science.

Received: 19 Aug 2019 ***Received in revised form:*** 10 Feb 2020 ***Accepted:*** 12 Mar 2020 ***Available online:*** 01 May 2020

The diagnosis and treatment of chronic LBP necessitate a multidisciplinary approach. It is generally resistant to established treatment regimes and it is becoming an increasingly serious socioeconomic burden.[3] Treatment strategies consist of bed rest, lumbar supports, exercise, manipulation, mobilization, massage, acupuncture, cognitive therapy, low back school, and physical therapy modalities.[4-7] However, good evidence has been found only for psychological interventions (cognitive-behavioral therapy and progressive relaxation), exercise, spinal mobilization, interdisciplinary rehabilitation, and functional restoration.[4] Optimal evaluation and treatment protocol of chronic LBP has not yet been established. Treatment should be planned according to the specific characteristics of the patient.

Neuropathic pain is a functional disorder of peripheral and central nervous system without stimulation of nociceptors at nerve terminals. The prevalence of neuropathic pain in LBP has been reported as 25-35% in epidemiological studies and chronic lumbar radicular pain has been accepted as the most common neuropathic pain syndrome.[8] Lumbosacral radicular pain radiates to one or more dermatomes as a consequence of nerve root irritation/inflammation and/or compression and other radicular irritation symptoms like straight leg raising positivity and/or motor and sensory loss may or may not accompany.[9] Neuropathic pain intervenes when pain control is not achieved, and LBP whether radicular or non-radicular gains chronicity and recognition of neuropathic pain in the approach to chronic LBP is essential to the success of treatment.[10]

Medical history, physical examination, and radiologic investigations are important in the evaluation of patients with neuropathic pain. Various pain scales can be used in the assessment of neuropathic pain symptoms, intensity and also in the discrimination of neuropathic and nociceptive pain.

In this study, neuropathic pain was investigated with LANSS, PainDETECT and DN4 scales in patients with chronic low back pain and the relationship between neuropathic pain and physical disability was evaluated with ILBPDI.[11-14]

MATERIAL AND METHODS

Patients with chronic LBP who were referred to the outpatient clinic of our physical medicine and rehabilitation department were evaluated and 102 patients who fulfilled the inclusion criteria were recruited in the study. All patients signed the informed consent form and the study was approved by the local ethics committee (Number of ethics committee approval: 30.10.2014-234).

Patients between 20-65 years of age and with a history of mechanical LBP lasting more than 3 months were included in the study. Exclusion criteria were the history of lumbar operation, vertebral fractures, inflammatory, infectious, vascular, malignant or psychiatric disorders, and presence of neurologic deficit.

Patients went through a detailed physical examination and their demographic data were recorded (Table 1). Pain intensity was evaluated with a 10 cm Visual Analog Scale (VAS). Neuropathic pain was investigated with LANSS (Leeds Assessment of Neuropathic Symptoms and Signs), PainDETECT and DN4 (Douleur Neuropathique en 4 Questions). A score of 12 and more in LANSS, 19 and more in PainDETECT and 4 and more in DN4 indicate a predominance of neuropathic pain.

İstanbul Low Back Pain Disability Index was used to evaluate disability. Duruöz et al. have reported that this scale is a low cost, user-friendly, time-sparing scale with good psychometric qualities and reliable and valid for discrimination of neuropathic pain and prediction of prognosis.[14]

STATISTICAL ANALYSIS

SPSS 15.0 for Windows was used for statistical analysis. Comparison of categorical variables between groups was made with Pearson Chi-Square and Fisher's Exact test and comparison of constant variables between groups was made with Independent Sample t-test and Mann Whitney U. Kruskal Wallis H was used to compare the variables belonging to more than 2 groups. Correlation of variables was evaluated with Pearson and Spearman correlation analysis. A value of $p<0.05$ was accepted as statistically significant.

TABLE 1: Demographic and clinical characteristics of the participants.

		n	%	Mean±SD	Min-Max
Age				44.7±11.98	20-66
Body mass index (kg/m²)				27.56±4.58	19.14-39.73
Duration of disease (month)				30.94±53.88	3-360
Gender	Female	67	65.7		
	Male	35	34.3		
Diagnosis	Lomber Strain	3	2.9		
	Spondylosis	30	29.4		
	Discopathy	49	48.0		
	Myofascial Pain	6	5.9		
Visual Analog Scale-pain				6.47±1.89	2-10
İstanbul Low Back Pain Disability Index				26.63±18.84	0-81

SD: Standard deviation; Min: Minimum; Max: Maximum.

RESULTS

Neuropathic pain was detected in 24 patients (23.5%) according to LANSS in 19 patients (18.6%) according to PainDETECT in 36 patients (35.3%) according to DN4 (Figure 1).

Patients with or without neuropathic pain (NP) according to LANSS scale were evaluated in regard to age, BMI, duration of pain, the intensity of pain and ILBPDI scores. The groups were statistically significantly different according to ILBPDI scores (p=0.002) and the other variables were statistically similar (p>0.05) (Figure 2).

According to PainDETECT scale, when there are neuropathic pain groups with and without pain, the distribution of age, body mass index (BMI), duration of disease, severity of pain, and the values of İstanbul Low Back Pain scale are examined there was a statistically significant difference between the groups in terms of BMI, VAS and İstanbul Low Back Pain scale values. In the Bonferroni-corrected Mann-Whitney U analysis to find out from which groups the difference originated; there was a statistically significant difference between the BMI values of the patients without neuropathic pain group cases and the BMI values of the group cases with NP not defined

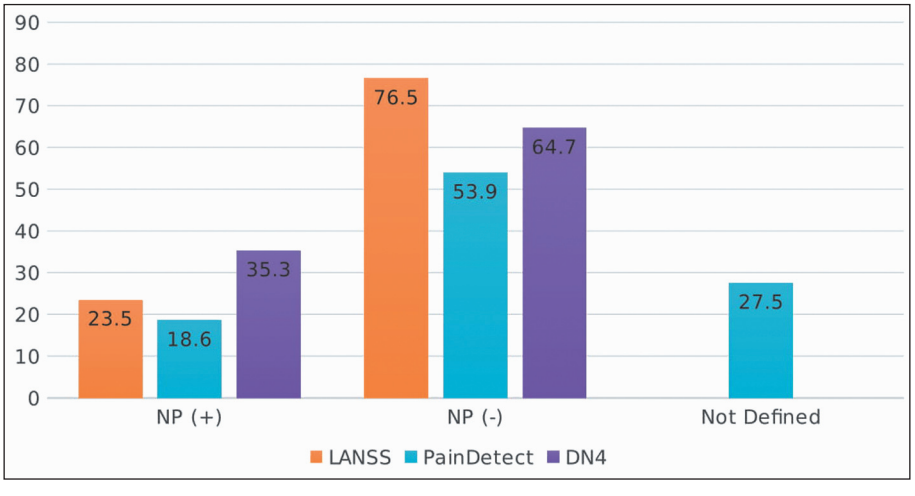

FIGURE 1: Distribution of ratios of groups with and without neuropathic pain according to LANSS, painDETECT and DN4 scales.
NP: Neuropathic pain, LANSS: Leeds Assessment of Neuropathic Symptoms and Signs, DN4: Douleur Neuropathique en 4 Questions.

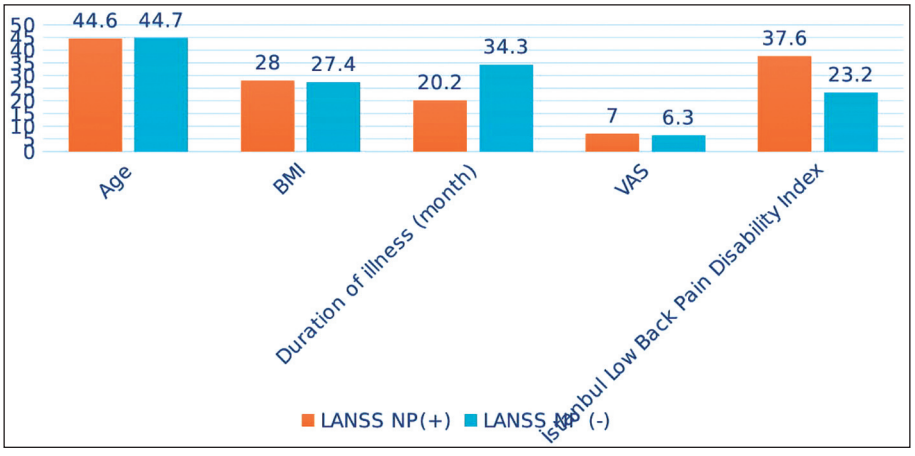

FIGURE 2: Pain according to LANSS scale the mean distribution of age, BMI, duration of pain, intensity of pain and ILBPDI scores patients with or without neuropathic pain.

BMI: Body mass index, NP: Neuropathic pain, LANSS:Leeds Assessment of Neuropathic Symptoms and Signs, ILBPDI: İstanbul Low Back Pain Disability Index.

(p=0.044). A statistically significant difference was found between the VAS values of the patients with and without NP (p=0.006). A statistically significant difference was found between the groups in all of the pairing pairs in İstanbul Low Back Pain scale (p=0.001). There was no statistically significant difference between the groups in terms of the other variables (p>0.05) (Figure 3).

Patients with or without neuropathic pain according to DN4 scale were significantly different in regard to ILBPDI scores (p=0.002). The groups were statistically similar when compared according to BMI, VAS, and duration of pain (p>0.05) (Figure 4).

When a correlation analysis was carried out between age, BMI, pain duration and intensity and scores of LANSS, PainDETECT, DN4 and ILBPDI; a positive, weak and statistically significant relationship was found between the VAS scores and the İstanbul Pain Scale values (p=0.005 r=0.274). No statistically significant relationship was found between the other variables (p>0.05) (Table 2).

DISCUSSION

Low back pain is a common pain syndrome that heals spontaneously in 80-90% of patients in 6 weeks without major treatment attempts while 5-15% develop

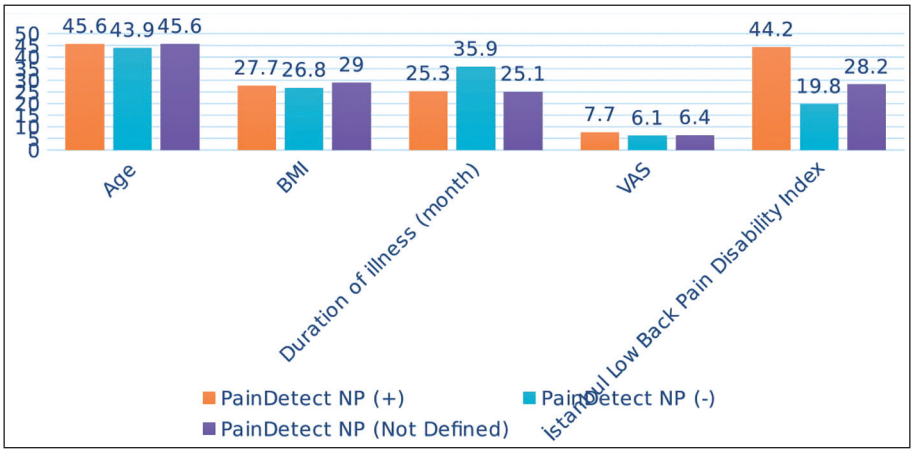

FIGURE 3: Pain according to PainDetect scale the mean distribution of age, BMI, duration of pain, intensity of pain and ILBPDI scores patients with or without neuropathic pain.

BMI: Body mass index, NP: Neuropathic pain; VAS: Visual analog scale-pain, ILBPDI: Istanbul Low Back Pain Disability Index.

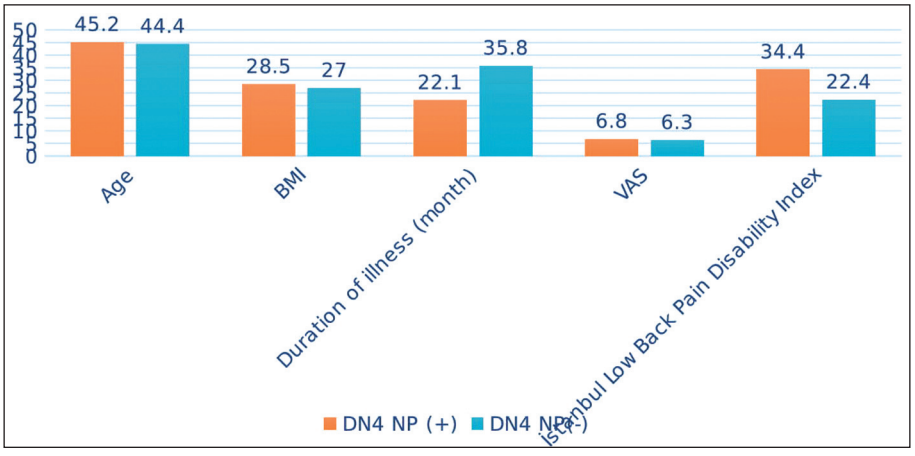

FIGURE 4: Pain according to DN4 scale the mean distribution of age, BMI, duration of pain, intensity of pain and ILBPDI scores patients with or without neuropathic pain.
BMI: Body mass index, NP: Neuropathic pain; VAS: Visual Analog Scale-pain, ILBPDI: İstanbul Low Back Pain Disability Index.

TABLE 2: Relationship between age, BMI, disease duration and severity of pain and LANSS, PainDETECT, DN4 and İstanbul Low Back Pain scale values.

	LANSS		PainDetect		DN4		İstanbul Low Back Pain Scale	
	r	p	r	p	r	p	r	p
Age	0.020	0.845**	0.009	0.932**	-0.017	0.865**	0.088	0.378*
BMI	-0.081	0.419**	0.140	0.162**	-0.191	0.055**	0.064	0.520*
Disease duration (months)	0.055	0.580**	0.029	0.769**	-0.028	0.782**	-0.166	0.096*
Pain severity (VAS)	-0.134	0.178**	-0.168	0.091**	-0.127	0.203**	0.274	0.005*

*Pearson correlation **Spearman correlation.
BMI: Body mass index, LANSS:Leeds Assessment of Neuropathic Symptoms and Signs, DN4 :Douleur Neuropathique en 4 Questions, VAS: Visual Analog Scale.

chronic LBP.[2] Chronic LBP is caused by various pathophysiological mechanisms of which neuropathic components play a major role. A lesion of nociceptive branches caused by a degenerative disc, mechanical pressure on the nerve or nerve root and/or secretion of inflammatory mediators participate in the development of neuropathic low back pain.[10]

Neuropathic pain may be subject to underdiagnosis due to the opinion that holds solely the nerve roots responsible for neuropathic pain and lack of awareness of the role of inflammatory processes and other neural structures. Inadequate knowledge of neuropathic pain questionnaires can also be another factor in underdiagnosis or delay of diagnosis.[15] While the prevalence and incidence of chronic LBP have been thoroughly investigated, there is inadequate data related to the role of neuropathic pain in chronic low back pain.[10]

We evaluated the presence of neuropathic pain in patients with chronic low back pain with 3 separate scales (LANSS, PainDETECT, DN4).

When LANSS scale was used, 24 (23.5%) patients were found to have neuropathic pain. In a similar study carried out by Kaki et al., 1169 patients have been followed through 6 months and 54.7% were found to have neuropathic pain according to LANSS.[16] Hassan et al., in their research with 100 patients with chronic LBP have detected the neuropathic component in 41%.[17] In a study conducted with a large population of 1134 patients, El Sissi et al. have diagnosed neuropathic pain in 628 (55.4%) patients.[18] When compared with these studies, it is clearly observed that the prevalence found in our study is significantly lower. The underlying reasons can be the presence of various pathoanatomic etiologies, the necessity of using the translated form of the scales, larger patient population in other studies, and the variability of the natural sample in determining the prevalence. Neuropathic pain research has mostly been conducted in pain centers or specific branch clinics with patient populations who have longstanding and more severe pain that is resistant to treatment

and this may constitute another reason for the relatively high prevalence of neuropathic pain in the literature.

Patients with and without neuropathic pain according to LANSS were evaluated in regard to gender, age, height, BMI, pain duration, pain intensity, and ILBPDI scores. The groups were significantly different as to ILBPDI scores. The groups were similar in respect to the other variables. In a study conducted by Hassan et al., no significant relationship was found between neuropathic pain and gender, height and duration of pain.[17] El Sissi et al. have found that female gender was more related to neuropathic pain by 2% which indicated significance.[18] Kaki et al. have reported that age, female gender, tall stature, Caucasian origin, hypertension, diabetes mellitus, smoking, history of lumbar operation and previous drug usage were associated with neuropathic pain. Weight and pain duration were not found to be related to neuropathic pain. LANSS has been found to be a simple and useful questionnaire in the differential diagnosis of neuropathic and nociceptive pain.[16]

When PainDETECT questionnaire was used to evaluate the neuropathic component in low back pain, 19 (18.6%) patients were found to have neuropathic pain. Freynhagen and his coworkers have designed the PainDETECT scale to investigate the prevalence of neuropathic pain in patients with chronic low back pain and they have found that it has similar specificity and sensitivity when compared with other scales such as LANSS, DN4, NPQ, NPS and that it is an easily applicable questionnaire that allows early diagnosis and proper treatment in their multicenter study with 8000 patients.[12] Morso et al. have detected neuropathic pain in 19.3% of 145 patients according to PainDETECT.[19] Beith et al. have diagnosed neuropathic pain in 16% of 343 patients.[20] Our results were in concordance with those of Morso and Beith.

Patients with and without neuropathic pain according to PainDETECT were evaluated in regard to gender, age, height, BMI, pain duration, pain intensity, and ILBPDI scores. A statistically significant difference was found between the VAS values of the patients with and without neuropathic pain and the İstanbul Low Back Pain scale values between the groups. Freynhagen et al. have found that as PainDETECT scores increased, VAS scores also increased. Forty-three percent of patients in the neuropathic pain group had VAS scores of 7 and more while this was 24% in the group without neuropathic pain. Disability was evaluated with the Hannover Functional Ability Questionnaire (FFbH-R) and it was shown that as the PainDETECT score increased, functional ability decreased.[12] Beith et al. have evaluated disability with Roland-Morris Disability scores in 343 patients and found that disability and decline in quality of life were significantly more evident in the neuropathic pain group.[20] Morso et al. have shown a significant correlation between Roland-Morris Disability scores and PainDETECT scores in 145 patients.[19] Similarly, we also revealed that the presence of neuropathic pain was associated with more physical disability.

When patients were evaluated according to the DN4 questionnaire, 36 (35.3%) patients were found to have neuropathic pain. By using the DN4 scale, Walsh et al. have reported that the prevalence of neuropathic pain was 42% in 45 patients with chronic low back pain.[21] Haliloğlu et al. have used the DN4 scale in 108 patients and shown neuropathic pain in 42 (38.9%) of them.[22] Our results were similar to those of Haliloğlu and coworkers.

Patients with and without neuropathic pain according to the DN4 questionnaire were evaluated in regard to gender, age, height, BMI, pain duration, pain intensity, and ILBPDI scores. The groups were significantly different as to ILBPDI scores and similar as to other variables. In a study conducted by Haliloglu et al., it has been demonstrated that as Roland-Morris disability scores increase, the prevalence of neuropathic pain increases, too. They have reported that female gender and higher BMI are more closely correlated with neuropathic pain.[22] Attal et al. have recruited 132 patients and shown that neuropathic pain is not associated with gender and pain duration.[23]

Neuropathic pain makes a major contribution to chronic LBP. Early diagnosis is of vital importance for the prevention of disability and the establishment

of an effective treatment protocol. Neuropathic pain questionnaires are useful tools for the diagnosis of neuropathic pain. The insufficiency of research in this area seems to be a handicap for comparison and evaluation of our results. Utilization of these questionnaires in clinical practice will enable better comprehension of pain mechanisms and gathering quantitative data for future therapeutic trials. Our study has exposed the need for new studies in this field.

Further studies with larger sample size are needed to confirm whether there is an association between neuropathic pain and disability in patients with chronic low back pain syndrome.

REFERENCES

1. Krismer M, van Tulder M. Strategies for prevention and management of musculoskeletal conditions. Low back pain (non-specific). Best Pract Res Clin Rheumatol. 2007;21:77-91. [Crossref] [PubMed]
2. McBeth J, Jones K. Epidemiology of chronic musculoskeletal pain. Best Pract Res Clin Rheumatol. 2007;21:403-25. [Crossref] [PubMed]
3. Helmhout PH, Staal JB, Heymans MV, et al. Prognostic factors for perceived recovery or functional improvement in non-specific low back pain: secondary analyses of three randomized clinical trials. Eur Spine J. 2010;19:650-9. [Crossref] [PubMed] [PMC]
4. Chou R, Huffman LH. Nonpharmacologic therapies for acute and chronic low back pain: a review of the evidence for an American Pain Society/American College of Physicians clinical practice guideline. Ann Intern Med. 2007;147:492-504. [Crossref] [PubMed]
5. Poitras S, Brosseau L. Evidence-informed management of chronic low back pain with transcutaneous electrical nerve stimulation, interferential current, electrical muscle stimulation, ultrasound, and thermotherapy. Spine J. 2008;8:226-33. [Crossref] [PubMed]
6. van Middelkoop M, Rubinstein SM, Kuijpers T, et al. A systematic review on the effectiveness of physical and rehabilitation interventions for chronic non-specific low back pain. Eur Spine J. 2011;20:19-39. [Crossref] [PubMed] [PMC]
7. van Middelkoop M, Rubinstein SM, Verhagen AP, et al. Exercise therapy for chronic nonspecific low-back pain. Best Pract Res Clin Rheumatol. 2010;24:193-204. [Crossref] [PubMed]
8. Freynhagen R, Baron R. The evaluation of neuropathic components in low back pain. Curr Pain Headache Rep. 2009;13:185-90. [Crossref] [PubMed]
9. Van Boxem K, Cheng J, Patijn J, et al. Lumbosacral radicular pain. Pain Pract. 2010;10:339-58. [Crossref] [PubMed]
10. Audette JF, Emenike E, Meleger AL. Neuropathic low back pain. Curr Pain Headache Rep. 2005;9:168-77. [Crossref] [PubMed]
11. Bennet M. The LANSS pain scale: the leeds assessment of neuropathic symptoms and signs. Pain. 2001;92:147-57. [Crossref] [PubMed]
12. Freynhagen R, Baron R, Gockel U, et al. PainDETECT: a new screening. Curr Med Res Opin. 2006;22:1911-20. [Crossref] [PubMed]
13. Bouhassira D, Attal N, Alchaar H, et al. Comparison of pain syndromes associated with nervous or somatic lesions and development of a new neuropathic pain diagnostic questionnaire (DN4). Pain. 2005;114:29-36. [Crossref] [PubMed]
14. Duruöz MT, Özcan E, Ketenci A, et al. Development and validation of a functional disability index for chronic low back pain. J Back Musculoskelet Rehabil. 2013;26:45-54. [Crossref] [PubMed]
15. Backonja M. Defining neuropathic pain. Anesth Analg. 2003;97:785-90. [Crossref] [PubMed]
16. Kaki AM, El-Yaski AZ, Youseif E. Identifying neuropathic pain among patients with chronic low-back pain: use of the Leeds Assessment of Neuropathic Symptoms and Signs pain scale. Reg Anesth Pain Med. 2005;30:422-8. [Crossref] [PubMed]
17. Hassan AE, Saleh HA, Baroudy YM, et al. Prevalence of neuropathic pain among patients suffering from chronic low back pain in Saudi Arabia. Saudi Med J. 2004;25:1986-90. [PubMed]
18. El Sissi W, Arnaout A, Chaarani MW, et al. Prevalence of neuropathic pain among patients with chronic low-back pain in the Arabian gulf region assessed using the leeds assessment of neuropathic symptoms and signs pain scale. J Intern Med Res 2010;38:2135-45. [Crossref] [PubMed]
19. Morsø L, Kent PM, Albert HB. Are self-reported pain characteristics, classified using the painDETECT questionnaire, predictive of outcome in people with low back pain and associated leg pain? Clin J Pain. 2011;27:535-41. [Crossref] [PubMed]
20. Beith ID, Kamp A, Kanyon J, et al. Identifying neuropathic back and leg pain: a cross-sectional study. Pain. 2011;152:1511-6. [Crossref] [PubMed]
21. Walsh J, Rabey MI, Hall TM. Agreement and correlation between the self-report leeds assessment of neuropathic symptoms and signs and Douleur Neuropathique 4 Questions neuropathic pain screening tools in subjects with low back-related leg pain. J Manipulative Physiol Ther. 2012;35:196-202. [Crossref] [PubMed]
22. Haliloğlu S. Kronik bel ağrısının nöropatik komponenti. Yeni Tıp Dergisi. 2013;30:148-51.
23. Attal N, Perrot S, Fermanian J, et al. The neuropathic components of chronic low back pain: a prospective multicenter study using the DN4 questionnaire. J Pain. 2011;12:1080-7. [Crossref] [PubMed]