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*, Korhan Barış BAYRAM*, Özlem YOLER*, Hikmet KOÇYILGI*

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

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 Istanbul Low Back Pain Disability Index (ILBPD). 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 component. We also found the frequency of neuropathic pain according to all neuropathic pain scales was significant correlated with the scores of ILBPD (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 mechanism-targeted treatment methods.

Keywords: Chronic low back pain; neuropathic pain

ÖZET Amacı: Kronik bel ağrısi, nosiseptif ve nöropatik ağrı oluşum mekanizmalarının bir kombinasyonu ile karakterizedir. Çalışmanın amacı farklı nöropatik ağrı skalarlarını kullanılan kronik bel ağrı hastalarda nöropatik ağrı bileşenini belirlemek ve bel ağrısi ile fiziksel yetersizlik arasındaki iliğiğini değerlendirilmektir. Gereç ve Yöntemler: Çalışma kronik bel ağrıısı 102 hasta ile yürütüldü. Hastaların klinik ve demografik verileri ile ilgili olarak değerlendirildi. Nöropatik ağrı komponentleri ve ağrı şiddetini LANSS Ağrı Skalası (The Leeds Assessment of Neuropathic Pain Signs and Symptoms), PAIN/DETECT, DN4 skala (Doulou Neuropathique 4 Questions) ve 10 cm lik vızıuel analoj skala (VAS) ile; fiziksel yetersizliği Istanbul Bel Ağrısı Disabiliteli İndeksi ile değerlendirildi. Bulgular: Hastaların yaş ortalaması 44,70±11,98 idi. LANSS kullanıldığında %23,5 hasta, baskın olarak nöropatik ağrı ile bireşeni gösterdi. Ayrıca nöropatik ağrı skaleri PAIN-DETECT’te %18,6 ve DN4’te %35,3 olarak bulundu. Tüm nöropatik ağrı skalarlarına göre nöropatik ağrıın varlığı, İstanbul Bel Ağrısı Disabiliteli İndeksi skorları ile anlamalı olarak ilişkili idi (p<0,05). Sonuç: Nosiseptif ağrı, akut bel ağrıında daha belirgin iken, kronik durumlarda nöropatik bileşen daha belirginleşir. Kronik bel ağrısının altında yatan mekanizmaları tanımlamak önemlidir. Bel ağrıları hastalarda ağrının kronikliği ve hastalığın ilerlendisine ancak uygunsuz ve erken mekanizma hedefli tedavi yöntemleri ile önlenebilir.

Anahtar Kelimeler: kronik bel ağrısi; 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. 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.
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. Treatment strategies consist of bed rest, lumbar supports, exercise, manipulation, mobilization, massage, acupuncture, cognitive therapy, low back school, and physical therapy modalities. However, good evidence has been found only for psychological interventions (cognitive-behavioral therapy and progressive relaxation), exercise, spinal mobilization, interdisciplinary rehabilitation, and functional restoration. 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 lumbosacral radicular pain has been accepted as the most common neuropathic pain syndrome. 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. 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.

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.

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.

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.
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 Istanbul Low Back Pain scale are examined there was a statistically significant difference between the groups in terms of BMI, VAS and Istanbul 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.

### RESULTS

**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                 |    |     |         |         |
| Lumbar Strain            | 3  | 2.9  |         |         |
| Spondylolisthesis         | 30 | 29.4 |         |         |
| Discopathy               | 49 | 48.0 |         |         |
| Myofascial Pain           | 6  | 5.9  |         |         |
| Visual Analog Scale-pain  | 6.47±1.89 | 2-10 |
| Istanbul Low Back Pain Disability Index | 26.63±18.84 | 0-81 |

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

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. 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.

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. Hassan et al., in their research with 100 patients with chronic LBP have detected the neuropathic component in 41%.

In a study conducted with a large population of 1134 patients, El Sissi et al. have diagnosed neuropathic pain in 628 (55.4%) patients. 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.

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

|                      | LANSS |       |       | DN4 |       |       | Istanbul Low Back Pain Scale |       |
|----------------------|-------|-------|-------|-----|-------|-------|-----------------------------|-------|
|                      | r     | p     | r     | p   | r     | p     | r                           | p     |
| Age                  | 0.020 | 0.845**| 0.009 | 0.932**| -0.017 | 0.885**| 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.
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. El Sissi et al. have found that female gender was more related to neuropathic pain by 2% which indicated significance. 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.

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, NPS, NPS and that it is an easily applicable questionnaire that allows early diagnosis and proper treatment in their multicenter study with 8000 patients. Morso et al. have detected neuropathic pain in 19.3% of 145 patients according to PainDETECT. 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. Haliloğlu et al. have used the DN4 scale in 108 patients and shown neuropathic pain in 42 (38.9%) of them. 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. Morso et al. have shown a significant correlation between Roland-Morris Disability scores and PainDETECT scores in 145 patients. Similarly, we also revealed that the presence of neuropathic pain was associated with more physical disability.

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 Haliloğlu 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. Attal et al. have recruited 132 patients and shown that neuropathic pain is not associated with gender and pain duration.

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.

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