

TRANSLATION AND VALIDATION OF BULGARIAN  
VERSION OF SCALE STANDARDIZED EVALUATION  
OF PAIN – NEUROPATHIC PAIN IN PATIENTS  
WITH PAINFUL DIABETIC POLYNEUROPATHY

Karina Atanasova-Ivanova<sup>1,2</sup>✉, Vasil Todorov<sup>1,2</sup>,  
Ivan Milanov<sup>1,2</sup>, Desislava Bogdanova<sup>1,2</sup>

Received on September 24, 2025

Accepted on October 28, 2025

**Abstract**

One of the main symptoms of diabetic polyneuropathy is pain. Specific scales have been developed that, in combination with neurophysiological methods, can help determine the type of pain. The scale “Standardized evaluation of pain” has shown high sensitivity and specificity to determine the essential characteristics of neuropathic pain. The aim of the study is to translate and validate a scale “Standardized evaluation of pain – neuropathic pain” in Bulgarian. High reliability of the questions of “Standardized evaluation of pain – neuropathic pain – BG” was established with Cronbach’s Alpha coefficient equal to 0.82. The questions in the Bulgarian version of “Standardized evaluation of pain – neuropathic pain – BG” are well defined. The validity and reliability of the scale have been confirmed. This gives us reason to recommend the use of the pain assessment scale in clinical practice in patients with diabetic polyneuropathy.

**Key words:** diabetic polyneuropathy, neuropathic pain, scale

**Introduction.** Diabetic polyneuropathy is a disease with a constantly increasing frequency. One of the main symptoms among patients is the appearance of pain. Pain is an unpleasant emotional state, a major cause of the deterioration of the quality of life of patients. According to the new definition of the IASP (International Association for the Study of Pain), it occurs because of a lesion or

disease of the somatosensory system [1]. Its diagnosis is a complex and difficult task because it is a subjective sensation and can be influenced by various factors. Specific scales have been developed that, in combination with neurophysiological methods, can help determine the type of pain – neuropathic and non-neuropathic pain syndromes [2]. Some of the most used scales are PainDETECT, LANSS, DN4, Neuropathic pain symptom inventory (NPSI), StEP – neuropathic pain. They are useful not only for distinguishing the type of pain but also for determining a specific sensory profile with various pain descriptions and qualities. However, patients reported symptoms may have some limitations due to their subjectivity and possibility of their influence from individual factors like expectation, comorbidities and emotional state.

In search of a better understanding of the pathophysiology of pain, BARON et al. [3] attempted at pain phenotyping. They used quantitative sensory testing (QST) and thus distinguished three clusters based on the sensory profile:

- Cluster 1 (sensory loss) – due to loss of function of large and small fibres combined with paradoxical heat sensations;
- Cluster 2 (thermal hyperalgesia) – preserved large and small fibre sensory functions in combination with heat and cold hyperalgesia;
- Cluster 3 (mechanical hyperalgesia) – loss of cold – and heat – sensitive small fibre function in combination with blunt pressure hyperalgesia, pin-prick hyperalgesia and marked dynamic mechanical allodynia.

StEP scale contains six questions about pain characteristics and ten elements for physical examination and was only validated in a group of patients with low back pain. Some of the items in the scale are also contained in screening tools for neuropathic pain such as DN4 or painDETECT. Also, it includes elements from QST but does not yield quantitative information about thresholds of sensory discrimination or pain. However, QST relies entirely on recording stimulus-evoked responses, it does not assess spontaneous pain or paresthesia, which are clinically relevant features of diabetic polyneuropathy phenotypes. Therefore, QST alone is not always sufficient to distinguish painful from painless neuropathies [4]. SCHOLZ et al. [5] used StEP scale to identify six subgroups of patients with distinct patterns of symptoms and signs in diabetic painful neuropathy, postherpetic neuralgia, and painful radiculopathy. Clusters C1 to C6 show signs of neuropathic pain, clusters C7 and C8 – of nociceptive pain. The only pain subtype represented in cluster C1 can be considered specific to patients with diabetic polyneuropathy. The sensory symptoms presented are deep pain, dysesthesia and numbness in a specific area. The ability of patients in this group to discriminate tactile and thermal stimuli was reduced. Physical examination revealed hyperalgesia to pricking, abnormal temporal summation to repetitive stimuli, and trophic changes. On the

other hand, the authors describe the presence of patients with diabetic polyneuropathy in clusters C2 and C4, which casts doubt on the claim of a specific pain subtype. The results of this study showed that a physical examination is essential for precise distinction between subgroups [5]. In contrast, other authors claim that the clinical examination can never prove any pain to be of neuropathic origin, it can only provide supporting evidence for altered function of the nervous system [6]. Attempts at pain phenotyping will make it possible to search for specific individual therapy for the corresponding phenotypic variant.

The aim of the study is to translate and validate a scale “Standardized evaluation of pain – neuropathic pain” in Bulgarian. Our second goal is to assess whether the scale can distinguish neuropathic from nociceptive pain in patients with diabetic polyneuropathy. We also try to find a specific pain phenotype in patients with painful diabetic polyneuropathy.

**Contingents and methods.** The participants in this study were 89 patients with pain and diabetic polyneuropathy who were hospitalized in MHATNP “St. Naum”, Sofia, Bulgaria. There was also a control group of 30 healthy subjects. Inclusion criteria were presence of pain and diabetes. Exclusion criteria were presence of polyneuropathy in different etiology rather than diabetic polyneuropathy. Fifty-one females and thirty-eight males were included with mean age  $67.66 \pm 10.42$  years. Mean age of control group was  $47.63 \pm 17.67$  years. All patients were informed of the purpose of the study and gave their consent to participate.

The validation of the scale was carried out in the following steps – bilingual translation, adaptation and assessment of reliability and validity. Descriptive statistics were used to calculate mean scores from the scale and demographic data. Reliability of “Standardized evaluation of pain – neuropathic pain – BG” was determined by Cronbach’s Alpha coefficient.

**Results.** English version of the scale “Standardized evaluation of pain – neuropathic pain” was translated into Bulgarian by three independent neurologists with very good knowledge of English. The translations were made independently of each other and after discussion, a version of the questionnaire was prepared, which was subjected to back-translation in English by a licensed translator. The resulting translation was compared with the original and discussed. No words or terms were identified that required major changes due to language incompatibility. All participants filled the scale “Standardized evaluation of pain – neuropathic pain – BG”. Bulgarian version of scale “Standardized evaluation of pain – neuropathic pain – BG” is semantically and structurally identical to the original English version. It contains six questions about pain characteristics – location, temporal characteristics, quality, pain evoked by activity or position, nonpainful sensation, and current pain. It also contains ten elements for physical examination – skin, touch, blunt pressure, brush movement, vibration, pinprick, warm and cold temperature, temporal summation and Lasègue’s test. Eighty-nine patients with pain and diabetic polyneuropathy participated in the study.

Table 1 presents the demographic and clinical characteristics of patients.

T a b l e 1

Demographic and clinical characteristics of patients

Gender	Male – 42.7 %, Female – 57.3 %
Age	67.66 ± 10.42 years
Duration of diabetes mellitus, average	8 years (standard deviation 6.94)
Duration of diabetic polyneuropathy, average	3 years (standard deviation 4.92)
Pain right now, average	5.00 (standard deviation 2.42)
Most severe pain, average	8.00 (standard deviation 2.72)
Presence of painless sensations	89.9 % of patients

Table 2 presents the most common characteristics of pain and their frequency in our group.

T a b l e 2

The most common characteristics of pain and their frequency

Burning	21.3%
Cramping	11.2%
Shooting	32.6%
Painful pins and needles	74.2%
Cold	22.5%
Like an electric shock	29.2%

Table 3 presents the most common sensory symptoms from physical examination and their frequency in patients with painful diabetic polyneuropathy.

T a b l e 3

The most common sensory symptoms and their frequency

Decreased sensation from the low-strength von Frey filament	46.1%
Decreased sensation from brush movement	15.7%
Decreased sensation from blunt pressure	15.7%
Decreased pinprick sensation	36%
Decreased vibration sense	65.2%
Decreased sensation to warm temperature	15.7%
Decreased sensation to cold temperature	30.3%
Positive Lasègue’s test	28.1%
Mechanical allodynia	4.7%

High reliability and respectability of the questions of “Standardized evaluation of pain – neuropathic pain – BG” was established with Cronbach’s Alpha coefficient of 82% in 36 variables (Cronbach’s coefficient  $\alpha = 0.822$ ) for all examined people. Cronbach’s alpha values range, with adequate internal consistency being considered at a value  $> 0.7$ . The items included in our study were for the

entire questionnaire: location, temporal characteristics, quality with 15 additional features, pain evoked by activity or position, nonpainful sensation, current pain. Also, questions from physical examination: skin with seven additional features, touch sensation, blunt pressure, brush movement, vibration, pinprick sensation, warm and cold temperature sensation, temporal summation and Lasègue's test.

**Discussion.** Scholz et al. [5] developed StEP to reveal sensory deficits and determine the essential characteristics of neuropathic pain. The scale is validated in patients with low back pain with high sensitivity (92%; 95% confidence interval [CI]) and specificity (97%; 95% CI). In the Ukrainian version of scale, the internal consistency was confirmed with Cronbach's alpha coefficient equal to 0.987 [7]. Using the questionnaire, the authors revealed the presence of neuropathic pain in 55.1% of patients with ankylosing spondylitis. Our study confirms the high reliability of scale to detect neuropathic pain. SCHOLZ et al. [4] found that stinging or pins and needles were the most common characterizations of pain associated with diabetic polyneuropathy. Patients with painful forms described pain located both in the skin and deeper. Intermittent episodes of spontaneous or stimulus-dependent pain were more common than continuous pain. Burning pain, which is elicited by the activation of heat-sensitive C fibres, was reported by 64% of the patients. This form was less common in a subgroup of patients with clinically intact small-fibre function. Paresthesia occurred in almost all patients with painful diabetic polyneuropathy, from which tingling was the predominant type. Authors claim that numbness is typically associated with a deficit in touch sensitivity. Physical tests revealed indeed a decreased detection of mechanical stimuli in most patients but in some of them no touch deficit was found. The detection of brush movement was reduced in 39% of patients with pain in comparison in 5% of patients without pain. Painful responses to light mechanical stimulation showed good correlation with the history of mechanical allodynia. In our study the most common characterization of pain was painful pins and needles in 74.2%, while 71.9% of patients describe superficial pain. Almost similar was the temporal characteristics of pain in our cohort with a small prevalence of intermittent episodes – 46.1% with intermittent pain compared to 44.9% with continuous pain. A high percentage of people have nonpainful sensation like tingling – 89.9% like in the English version of the scale. Physical examination shows decreased response to stimulation with the low-strength von Frey filament in 46.1% of people. The response to blunt pressure and brush movement are decreased with the same percentage of people – 15.7%. Pinprick sensation decreased in 36% of people. Decreased vibration sense was established in 65.2% of patients. The response to cold temperature was reduced by half compared to that to warm temperature. In a validation study, the authors claim that the response to pinprick, straight-leg-raising test, and vibration combined had an empirical positive predictive value of 93% for painful diabetic polyneuropathy [5]. Using the scale, the presence of accompanying low back pain in our study was identified in 25 patients. Its utiliza-

tion can differentiate neuropathic from mixed pain such as back pain. In this way treatment response can be assessed and examined for possible relationships with the clinical phenotype. Baron et al. [3] claim that patients with different pain phenotypes respond well to variance types of treatment. Cluster 1 (sensory loss) patients from their cohort are more sensitive to oral opioids. Cluster 2 (thermal hyperalgesia) patients respond better to botulinum toxin, oxcarbazepine and 8% capsaicin patches. Cluster 3 (mechanical hyperalgesia) patients respond better to pregabalin and lidocaine patches. In our study, patients were treated with an anticonvulsant, and we cannot draw comparative data with the effect of other medications. More in-depth studies should be done.

**Conclusion.** The results of the study show that the questions in the Bulgarian version of “Standardized evaluation of pain – neuropathic pain – BG” are well defined. The validity and reliability of the scale have been confirmed. This gives us reason to recommend the use of the pain assessment scale in clinical practice in patients with diabetic polyneuropathy.

## REFERENCES

- [1] JENSEN T. S., R. BARON, M. HAANPÄÄ et al. (2011) A new definition of neuropathic pain, *Pain*, **152**(10), 2204–2205, <https://doi.org/10.1016/j.pain.2011.06.017>.
- [2] BARON R., M. FÖRSTER, A. BINDER (2012) Subgrouping of patients with neuropathic pain according to pain-related sensory abnormalities: a first step to a stratified treatment approach, *Lancet Neurol.*, **11**, 999–1005, [https://doi.org/10.1016/S1474-4422\(12\)70189-8](https://doi.org/10.1016/S1474-4422(12)70189-8).
- [3] BARON R., C. MAIER, N. ATTAL et al. (2017) Peripheral neuropathic pain: a mechanism-related organizing principle based on sensory profiles, *Pain*, **158**(2), 261–272, <https://doi.org/10.1097/j.pain.0000000000000753>.
- [4] SCHOLZ J., J. P. RATHMELL, W. S. DAVID et al. (2016) A standardized clinical evaluation of phenotypic diversity in diabetic polyneuropathy, *Pain*, **157**(10), 2297–2308, <https://doi.org/10.1097/j.pain.0000000000000648>.
- [5] SCHOLZ J., R. J. MANNION, D. E. HORD et al. (2009) A novel tool for the assessment of pain: validation in low back pain, *PLoS Med.*, **6**(4), e1000047, <https://doi.org/10.1371/journal.pmed.1000047>.
- [6] HAANPÄÄ M., N. ATTAL, M. BACKONJA et al. (2011) NeuPSIG guidelines on neuropathic pain assessment, *Pain*, **152**(1), 14–27, <https://doi.org/10.1016/j.pain.2010.07.031>.
- [7] KEDYK I., Y. SHAL KOVSKYI, I. SHAPOVAL, M. STANISLAVCHUK (2022) Cross-cultural adaptation and validation of the Ukrainian version of the Standardized Evaluation of Pain (StEP) – a tool for assessing neuropathic pain in the lower back in patients with ankylosing spondylitis, *Ukraïns’kij Nevroloģičnij Žurnal*, **3–4**, 39–48, <https://doi.org/10.30978/unj2022-3-39>.

<sup>1</sup>*Department of Neurology, Medical Faculty, Medical University, Sofia*

<sup>2</sup>*Multiprofile Hospital for Active Treatment in Neurology and Psychiatry “St. Naum”,  
1 Lyuben Rusev St, 1113 Sofia, Bulgaria*

*e-mails: karyatanasova92@gmail.com, v\_todorov\_1986@abv.bg,  
milanovivan54@gmail.com, dessislava\_bogdanova@abv.bg*