Prevalence of neuropathic pain among patients suffering from chronic low back pain in Saudi Arabia

Ayman E. Hassan, *MD,* ***Hosny A. Saleh,*** *MD,* ***Yehia M. Baroudy,*** *MD,* ***Khalid I. Abdul-Rahman,*** *MD,* ***Marwan W. Najjar,*** *MD,* ***Manzor S. Kazi,*** *MD,* ***Mohamed A. El-Gazar,*** *MD,* ***Mohamed A. Hafez,*** *MD,* ***Mohamed A. Abdullah,*** *MD,* ***Yousef A. Abdul-Rahman,*** *MD,* ***Ehab A. Youseif,*** *MD.*

ABSTRACT

Objective: The aim of this study was to assess the prevalence of neuropathic pain among patients suffering from chronic low back pain using the Leeds assessment of neuropathic symptoms and signs (LANSS) pain scale.

Methods: This was a pilot study collected from 10 centers in the Middle East Region, with each center enrolling 10 patients between November 2004 and January 2004. In total, 100 patients with chronic low back pain were included in the study. The LANSS clinical assessment score was used to assess the presence of neuropathic pain. Patients with score $\geq$12 were considered to have neuropathic pain, while patients with score a < 12 were considered as having nociceptive pain.

Results: We found that 41% of the chronic low back pain patients had neuropathic pain and 59% had nociceptive pain.

Conclusion: The ability to identify neuropathic pain mechanisms should lead to individualized treatment resulting in improved pain control in this group of patients with chronic low back pain.

Saudi Med J 2004; Vol. 25 (12): 1986-1990

The natural history of acute low back pain (LBP) is one of gradual improvement and complete or nearly complete recovery in over 90% of patients within a month or 2 of onset of their pain; any treatment will seem to benefit patients with acute LBP. However, recurrences are common, affecting 40% of patients within 6 months, and approximately 10% of patients with acute LBP continue to develop chronic LBP.[1] Low back pain, persisting longer than 3 months, is usually called chronic, and it is well documented that patients on sick-leave because of LBP longer than 3 months have a slow and uncertain recovery rate.[2] Both nociceptive pain and neuropathic pain are commonly encountered. In most patients, nociceptive pain (for example, acute postoperative pain or pain associated with a fracture) may be adequately controlled with non steroid anti-inflammatory drugs (NSAIDs), opioid analgesics, or a combination of these.[3] Neuropathic pain is frequently a component of many conditions

From the Department of Neurology, Saudi German Hospital (Hassan), Department of Orthopedic Surgery, Ghassan N. Pharaon Hospital (Saleh), Department of Orthopedic Surgery, Bugshan Hospital (Baroudy), Department of Orthopedic Surgery, Dar El Shifa Hospital (Abdul-Rahman K), Department of Neurosurgery, Dr. Erfan & Bagedo Hospital (Najjar), Department of Orthopedic Surgery, New Jeddah National Hospital (Kazi), Department of Internal Medicine, Islam Polyclinic (El-Gazar), Department of Orthopedic Surgery, Soliman Fakih Hospital (Hafez), Department of Orthopedic Surgery, Al-Ansar Hospital (Abdullah), Department of Orthopedic Surgery, Abdul-Latif Jameel Rehabilitation Hospital (Abdul-Rahman Y), Medical Department, Pfizer Inc. (Youseif), Jeddah, *Kingdom of Saudi Arabia*.

Published simultaneously with special permission from Neurosciences.

Address correspondence and reprint request to: Dr. Ayman E. Hassan, Saudi German Hospital, PO Box 2550, Jeddah 21461, *Kingdom of Saudi Arabia*. Tel. +966 505629647. Fax. +966 (2) 6835874. E-mail: aymanehassan@hotmail.com

encountered in practice such as: painful diabetic neuropathy, complex regional pain syndromes [CRPS], radicular pain from herniated intervertebral disk or spinal stenosis, persistent radicular pain after spinal surgery, or peripheral nerve injury.[3] Specifically, the clinician must identify whether neuropathic pain-generating mechanisms exist in any given patient (defined as pain due to disturbance of function or pathological change in a nerve).[4] This is because the successful treatment of neuropathic pain relies on its early identification, an understanding of sustaining mechanisms and the use of alternative therapeutic approaches.[5] Frequently, NSAIDs do not provide relief, and adequate control requires medications directed specifically at neuropathic pain.[3] To date, a simple clinical tool has not been identified that distinguishes neuropathic symptoms and signs from those arising through nociceptive pain. The Leeds assessment of neuropathic symptoms and signs (LANSS) pain scale is based on analysis of sensory description (dysesthesia, autonomic, evoked pain, paroxysmal pain, thermal pain) and bedside examination of sensory dysfunction (allodynia and altered pin-prick threshold).[6] The LANSS pain scale can be used safely for discriminating between neuropathic and nociceptive pain.[7] This study aims to assess the prevalence of neuropathic pain among patients suffering from chronic low back pain using the LANSS pain scale in the Middle East Region.

Methods. This was a pilot study collected from 10 centers to assess the prevalence of neuropathic pain among patients suffering from chronic lower back pain in the Middle East region. Each center enrolled 10 cases, so the total number of the patients studied was 100 cases. Cases of chronic LBP were selected in each center at random. The date which the first patient underwent the study was November 2003 and the last was in January 2004. This study has no follow-up in the protocol. So, no drop out cases were expected. The data were collected, tabulated and analyzed; and final analytical statistics for all the collected data presented. The patients were divided into 2 groups: Group A (patients with nociceptive pain; namely, with LANSS score <12). Group B (patients with neuropathic pain; namely, with LANSS score $\geq$12). There were 41 cases (41%) with neuropathic pain and 59 cases (59%) with nociceptive pain. The age of the patients in the nociceptive group was 41.67$\pm$10.77 and in neuropathic group was 49.7$\pm$12.98. The LANSS clinical assessment score, which includes 5 questionnaires and sensory testing, was used to assess the presence of neuropathic pain. Patients with a score of $\geq$12 were considered to have neuropathic pain, while patients with a score of <12 were considered as having nociceptive pain. Age, sex, height and weight, social distribution, smoking habit, LBP duration, previous surgery for LBP, previous treatment, previous diagnosis of the causes, previous diagnostic procedures and type of diagnostic modalities and other concomitant diseases of each patient were studied. All the relevant data were recorded on an investigative report form. These data were transferred to IBM Card, using IBM-PC with statistical programs Microstat V-2 and the Statistical Package for Social Sciences for windows Version-10 to obtain: Descriptive statistics: 1. Mean (X). 2. Standard Deviation (+ SD). 3. Range (min.-max.). 4. Number and percent (used for qualitative data). Analytical statistics: Student's "t" test: to compare between 2 independent means. Chi-square test: Used for qualitative data. *P*-value for level of significance: $P>0.05$ = not significant. $P<0.05$ = significant and $P<0.001$ = highly significant. Data were graphically represented using the Harvard Graphics for Windows Program.

Results. The results showed that there was a difference between both groups regarding the age, being higher in the nociceptive group ($p<0.05$). In the nociceptive group there were 40 males versus 18 females (data missing on one patient in the nociceptive group), while in the neuropathic group there were 28 males versus 13 females. Statistical analysis shows no significant association between sex and type of pain ($p>0.05$). The height in nociceptive group was 165.07$\pm$12.59, while in neuropathic group was 167.27$\pm$10.29. There was no significant difference between both groups ($p>0.05$). The weight in the nociceptive group was 81.11$\pm$15.52, while in the neuropathic group was 83.01$\pm$13.55. There was no significant difference between both groups ($p>0.05$). **Table 1** shows the relation between smoking habit and type of pain. There is significant association between neuropathic pain, and smoking and nociceptive pain is associated with non-smokers. The duration of LBP in the nociceptive pain group was 2.13$\pm$1.69, while in the neuropathic pain group was 2.79$\pm$4.06 with no significant difference between both groups regarding LBP duration ($p>0.05$). Previous surgery for LBP was carried out in 12 cases out of 99 included cases (12.1%). The relation between previous surgery and type of pain is shown in **Table 1.** There was no significant association between previous surgery and type of pain. Diabetes was recorded in 24 cases, 16 of them had nociceptive pain and 8 had neuropathic pain. There was no statistically significant relation between diabetes and type of pain. Hypertension was recorded in 18 cases, 10 had nociceptive pain and 8 had neuropathic pain. There was no statistically significant relation between hypertension and type of pain.

Table 1 - Smoking habit and low back surgery in studies cases.

Smoking/Previous surgery	Neuropathic pain	Nociceptive pain	*p* value
Smoking			<0.05*
Still smoking	18	13	
Ex-smoker	4	18	
Non-smoker	18	28	
Missing data	1		
Total	**41**	**59**	
Back surgery			>0.05**
Lower back surgery	6	6	
No surgery	35	52	
Missing data		1	
Total	**41**	**59**	

*Significant, **Non significant

Table 2 - Number of patients and type of pain in the 2 groups.

LANSS Scale	Neuropathic pain (N=41) LANSS ≥ 12	Nociceptive pain (N=59) LANSS < 12	Chi-square & significance
Dysesthesia	40	37	16.58*
Autonomic	10	2	10-102*
Evoked pain	29	18	15.711*
Paroxysmal pain	34	39	3.47*
Thermal	18	19	1.42**
Allodynia	30	5	47.5*
Altered PPT	28	28	4.26*

*Significant, **Non significant, PPT - pressure pain threshold
LANSS - Leeds assessment of neuropathic symptoms and signs

Table 3 - Comparison between type of pain in the 2 groups.

LANSS Scale	Neuropathic pain LANSS ≥ 12 Mean ± SD	Nociceptive pain LANSS < 12 Mean ± SD	T test & significance
Dysesthesia	4.9±0.8	3.1±2.4	4.522*
Autonomic	1.2±2.2	0.16±0.91	3.319*
Evoked pain	2.1±0.8	0.9±1.4	4.27*
Paroxysmal pain	1.7±0.8	1.3±0.9	1.87**
Thermal	0.4±0.5	0.3±0.5	1.1888**
Allodynia	3.7±2.2	2.2±1.3	9.419*
Altered PPT	2.04±1.4	1.4±1.5	9.419*
Total			13.67*

*Significant, **Non significant, PPT - pressure pain threshold
LANSS - Leeds assessment of neuropathic symptoms and signs

Table 2 shows the number and type of pain in the 2 groups, and **Table 3** is a compairson between the types of pain. Both tables demonstrate that dysesthesia, autonomic, evoked pain, allodynia and altered PPT were significantly higher in the neuropathic group.

Discussion. Pain occurs upon normal activation of different areas of the nervous system. When a painful stimulus is applied it is called acute pain and can almost be called "normal pain." Chronic pain is when the pain persists for over 3 months, as the nervous system, over time, becomes more suited and facilitated towards pain transmission. Although acute pain represents normal activation of the normal nociceptors, to activate the process, as well as normal information processing to the brain, chronic pain represents a change in the functional anatomy of the nervous system. Most patients with chronic pain have a mixed type of presentation instead of one of the extremes.[8] Pain perception is a subjective experience, most commonly generated by activation of peripheral nociceptors. In LBP, free nerve endings have been demonstrated to be present in facet joints, discs, ligaments, nerve roots themselves, and muscles.[9] Traditionally, neuropathic LBP has been correlated with radiculopathy only. The problem with this limited view is that it ignores aggravation of neural structures other than the nerve root via peripheral and central mechanisms.[10] In 1993, Olmarker et al[11] demonstrated a significant reduction of spinal nerve root-conduction velocity and degeneration of the nerve fibers after epidural application of nucleus pulposus (NP) in pigs. The NP has been shown to increase nerve fiber discharges, attract inflammatory cells, induce increased intraneural capillary permeability, and influence intraneural blood flow. These findings suggest that inflammatory substances from a disc herniation, degenerated discs, or from other closely related tissue in the spine (?facet joint arthrosis) may influence the nerve roots and dorsal root ganglion (DRG) in the pain process. The biochemical and mechanical components also may act together to increase the negative effects on nerve roots.

The goal of clinical assessment of neuropathic pain in this special group of patients with chronic LBP is to achieve diagnosis of pain, to identify underlying causes, comorbid conditions, to evaluate functional status (activity levels), set goals and develop targeted treatment plans. Effective pharmacotherapy can be approached via an understanding of peripheral concepts such as neurogenic spread of chronic inflammatory pain, peripheral hyperalgesia and allodynia, highly activated sodium channels and ectopic neural triggering. Ultimately, the central effects of these peripheral processes on the development and

maintenance of wind-up pain play a critical role in pharmacotherapeutic interventional strategies.

How many patients suffering from low back pain have a direct involvement of the spinal nerve root/DRG is unknown, but, overall, only 10-15% of patients LBP receive a specific diagnosis. The complexity of the nervous system and pain modulation mechanisms, however, theoretically also may involve the spinal nerve roots/DRG indirectly in patients with unspecific chronic LBP conditions.[9]

In our study we found that 42.9% of the patients with chronic LBP had disc prolapse, 31.6% had facet joints arthrosis, 14.3% had spinal canal stenosis, 2% had spinal deformity, traumatic and unknown causes, 4.1% had other causes (muscle spasm, mechanical and post-laminectomy syndrome). We used the LANSS pain scale to detect the percentage of patients suffering from neuropathic pain and nociceptive pain in patients with chronic LBP. We found 41% of the patients had neuropathic pain and 59% had nociceptive pain. If we excluded patients with diabetes mellitus who are prone to various peripheral and radicular affections, and patients with allodynia from the neuropathic group, which suggests a possible neuropathic or radicular affection, there are still 10 patients out of 54 (18.5%) with a neuropathic type of pain with the symptom based diagnosis of chronic LBP without symptoms or signs of radiculopathy. The age of the patients studied was significantly higher ($p<0.05$) in patients with nociceptive pain compared to patients with neuropathic pain. However, there was no significant difference between the 2 groups regarding sex, height and weight, LBP duration and the presence of diabetes, hypertension and previous surgery. Age has been shown to be associated more consistently with mechanical LBP than sex. Sciatica (pain that radiates down one or both legs) usually is reported in persons aged 40-59 years. Women aged $\geq$60 years also report more low back symptoms.[12-14]

Borenstein[13] found no published information to suggest that race is a factor in the incidence of mechanical LBP. Though, in our series we found an association between neuropathic pain and Caucasian race and nociceptive pain with other races, and a significant association between neuropathic pain and smoking.

In our study, the LANSS pain scale detected dysesthesia in 40 out of 41 in the neuropathic group compared to 37 out 59 in the nociceptive group with high significance ($p<0.05$). We also detected autonomic pain in 10 in the neuropathic group and 2 in the nociceptive group, evoked pain was detected in 29 of the neuropathic group and 18 of the nociceptive group, paroxysmal pain was detected in 34 of the neuropathic group and 39 of nociceptive group with significant difference ($p<0.05$), while thermal pain was detected in 18 of the neuropathic group and 19 of the nociceptive with no significant differences.

Bennett[6] reported in his study that the development of the LANSS pain scale enabled clarification of the relative contributions of neuropathic symptoms to the diagnostic process. Dysesthesia symptoms have been the most discriminatory, while paroxysmal and thermal have been the least. This is because dysesthesia has been relatively common in neuropathic pain, but relatively rare in nociceptive pain. Paroxysmal symptoms, while still frequently found in neuropathic pain, are also common in nociceptive pain. Also, he found that the relative frequencies of neuropathic descriptions when presented in symptom groupings are similar to each other. The finding of sensory dysfunction in the nociceptive group could be explained by incorrect clinical diagnosis, but this is also likely to reflect the fact that sensory dysfunction is a recognized association of nociceptive pain.[15]

It is interesting to conjecture that there are more similarities than differences between pain types. Perhaps some authors[16,17] are right to state that the nociceptive/neuropathic divide is an oversimplification of complex processes. These studies support a more flexible model: chronic pain with variations in neuropathic expression.[6]

Evaluation of a large number of patients with chronic LBP using the LANSS pain scale will allow understanding of the different pain mechanisms of LBP and improve quantitative data collection for future therapeutic trials.

References

1. Deyo RA, Weinstein JN. Low Back Pain. ***N Engl J Med*** 2001; 344: 363-370.
2. Andersson GB. Epidemiological features of chronic low-back pain. ***Lancet*** 1999; 354: 581-585.
3. Rosenquist RW. Advances in therapeutics and diagnostics: Gabapentin. ***J Am Acad Orthop Surg*** 2002; 10: 153-156.
4. Merskey H, Bogduk N. Classification of chronic pain: pain syndrome and definition of pain terms. 2nd ed. Seattle (WA): IASP Press; 1994.
5. Bennett GJ. Chronic pain due to peripheral nerve damage: an overview. In: Fields HL, Liebeskind JC, editors. Progress in pain research and management, Vol.1. Seattle (WA): IASP Press; 1994a. p. 201-223.
6. Bennett M. The LANSS Pain Scale. The Leeds assessment of neuropathic symptoms and signs. ***Pain*** 2001; 92: 147-157.
7. Yucel A, Senocak ME, Kocasoy OE, Cimen A, Ertas M. The validation study: results of the LANSS PAIN SCALE in Turkey. ***J Pain*** 2004 2004; 5: 427-432.
8. Argoff CE. Managing neuropathic pain: New approaches for today's clinical practice. Medscape 2003. Available from: http://www.medscape.com/viewprogram/2361.
9. Cavanaugh JM, Ozakatay AC, Yamashita T, Avramov A, Getchell TV, King AI. Mechanisms of low back pain: a neurophysiologic and neuroanatomic study. ***Clin Orthop*** 1997; 335: 166-180.
10. Kawakami, M. Anatomy, Biochemistry and Physiology of Low Back Pain. In: White A, Schofferman L editors. Spine Care. St Louis (MO); Mosby: 1995. p. 84-103

11. Olmarker K, Rydevik B, Nordborg C. Autologous nucleus pulpous induces neurophysiologic and histologic changes in porcine cauda equine nerve roots. ***Spine*** 1993; 18: 1425-1432.
12. Sizer PS Jr, Matthijs O, Phelps V. Influence of age on the development of pathology. ***Curr Rev Pain*** 2000; 4: 362-373.
13. Borenstein D. Epidemiology, etiology, diagnostic evaluation, and treatment of low back pain. ***Curr Opin Rheumatol*** 1996; 8: 124-129.
14. Bigos SJ, Boyer OR, Braen GR. Acute Low Back Problems in Adults. Clinical Practice Guideline, Quick Reference Guide Number 14. Public Health Agency, Agency for Health Care Policy and Research. Rockville (MD): Department of Health and Human Services; 1994.
15. Hansson P, Lindblom U. Quantitative evaluation of sensory disturbances accompanying focal or referred nociceptive pain. In: Vecchiet L, Albe-Fessard D, Lindblom U, Giamberardino MA, editors. New trends in referred pain and hyperalgesia. Amsterdam (NE): Elsevier; 1993. p. 251-258.
16. Wall PD. Introduction. In: Wall PD, Melzack R, editors. Textbook of pain. 2nd ed. Edinburgh (UK): Churchill Livingstone Press; 1989. p. 1-18.
17. Besson JM, Chaouch A. Peripheral and spinal mechanisms of nociception. ***Physiol Rev*** 1987; 67: 67-186.