

# Neuropathic Pain During Common Lumboradiculalgia in Subsaharian Africa: Bicentric Study About 409 Patients.

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## Research article

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# Abstract

## Background:

Neuropathic pain is defined as pain caused by injury or disease of the somatosensory nervous system. Our purpose was to study the frequency of neuropathic pain among common lumboradiculalgia patients in subsaharian Africa patients.

## Methods:

This was a bicentric cross-sectional study from February 2015 to 30 July 2015 in the first center and then from February 2017 to 30 July 2017 in the second center, i.e. a duration of 6 months for each study site. All patients with a common lomboradiculalgie were included. DN4 questionnaire was used for the diagnosis of neuropathic pain.

## Results :

Four hundred and nine patients with common lumboradiculalgia were included. There were 278 females (67.97%) and 131 males (32.03%), for a sex ratio of 0.47. The average age was  $51.75 \pm 13.84$  years with extremes of 16 and 88 years. One hundred and seventy-five patients (42.8%) had NP. Statistical analysis showed a statistically significant association between the existence of NP and age over 60 years and the existence of radiculalgia.

## Conclusions:

Our study confirms the high frequency of neuropathic pain during common lumboradiculalgia. Age over 60 years and Poorly systematized radiculalgia were associated to NP.

## Background

Neuropathic pain (NP) is defined as pain caused by injury or disease of the somatosensory nervous system [1]. Several diagnostic tools have been developed, one of the most widely used for clinical and epidemiological studies is the DN4 questionnaire (Neuropathic Pain in 4 questions) [2]. The overall prevalence of chronic pain with neuropathic features is between 7% and 10% [3, 4]. In sub-Saharan Africa, a population-based study in Benin reported a 6.3% prevalence of NP [5]. Low back pain (LBP) is a cause of NP and the existence of radiculalgia appears to be statistically associated with the presence of NP [6, 7]. Many studies on NP in general and particularly during low back pain and lumboradiculalgia have been performed worldwide [3, 4, 6–9]. In sub-Saharan Africa, we have found two studies, carried out respectively by Ouédraogo et al in Ouagadougou (Burkina Faso) and Doualla et al in Douala (Cameroon) evaluated the frequency of neuropathic pain during LBP and lumboradiculalgia; they reported frequencies of 49.5% and 28.1% respectively [10, 11]. In order to minimize the biases related to the environment of the series, we conducted a new study in hospitals in Burkina Faso and Ivory Coast. The objective of this bicentric study was to evaluate the frequency of NP during common lumboradiculalgia.

## Methods

We performed a bicentric cross-sectional study from February 2015 to 30 July 2015 in Abidjan (Ivory Coast) and then from February 2017 to 30 July 2017 in Ouagadougou (Burkina Faso), a duration of 6 months for each study site. The rheumatology departments of the Cocody Teaching Hospital in Abidjan (26 beds) and the Bogodogo Teaching Hospital in Ouagadougou (33 beds) served as study frameworks. The population of the study consisted of any patient who consulted for a common lumboradiculalgia during the study period. Blood counts, sedimentation rate and C Reactive Protein were normal in all patients. A standard radiograph was taken in all patients. The CT and MRI scans were not systematic. The diagnosis of low back pain was retained in any patient with low back pain with pelvic, crural or sciatic irradiation. LBP or lumboradiculalgia associated with a traumatic, infectious, rheumatic or tumor etiology was excluded. NP was retained in patients with at least 4 items on the DN4 questionnaire [2]. Pain intensity was assessed on a visual analogue scale (VAS) rated at 10. Data were collected using an individual questionnaire administered by a rheumatologist to the patient, alone or with the assistance of a companion who provided translation if necessary. This interrogation was supplemented by a physical examination performed by the same doctor. In addition to the DN4 items, the questionnaire included sociodemographic data (age, gender, occupation, weight, height and body mass index (BMI)), clinical data (history of low back pain, duration of current episode, circumstances of onset, intensity of pain, type of low back pain, type of radiculalgia, spinal and root examination data), and paraclinical data. The results were analyzed using the Epi info 3.5.1 software. The Chi-square test was used for the comparisons of the variables. Any probability value ( $p$ ) less than 0.05 was considered statistically significant.

## Results

### Characteristics of the study population

Four hundred and nine patients with common lumboradiculalgia were included. There were 278 females (67.97%) and 131 males (32.03%), for a sex ratio of 0.47. The average age was  $51.75 \pm 13.84$  years with extremes of 16 and 88 years. Two frequency peaks were observed between 40 and 50 years and then between 60 and 70 years. Figure 1 shows the distribution of patients by age group. According to occupation, housewives, traders and office workers were the most represented with 120 (29.34%), 110 (26.90%) and 76 (18.60%) respectively. The mean BMI was  $26.86 \pm 4.83$  kg/m<sup>2</sup> with extremes of 17.15 and 44.14 kg/m<sup>2</sup>. Two hundred and forty-four patients (61.6%) were overweight (BMI  $\geq 25$  kg/m<sup>2</sup>). The lumbar history, mode of symptom onset, age of onset and type of radiculalgia were summarized in Table 1. Spinal stiffness was observed in 396 patients (96.8%) and radiculalgia in 249 patients (60.9%). CT and MRI scans were performed on 132 (32.3%) and 11 (2.7%) patients respectively (Table 2).

Table 1  
Patient History and Functional Signs

	<b>Features</b>	<b>Number</b>	<b>Percent</b>
Background(n = 409)	Chronic low back pain	312	76,3
	No previous history	87	21,3
	Spinal Anesthesia	5	1,2
	Lumbar Surgery	3	0,7
	Lumbar Trauma	2	0,5
Start mode (n = 344)	Progressive	289	84
	Brutal	55	16
Age of pain (n = 409)	Acute	39	9,53
	Subacute	62	15,16
	Chronic	308	75,31
Type of radiculalgia (n = 409)	Sciatica L5	122	29,83
	Poorly systematized sciatica	120	29,34
	Sciatica S1	104	25,43
	Poorly systematized crural	40	9,78
	Crural L4	23	5,62
Intensity of pain (VAS)(n = 361)	7-10	294	81,5
	4-6	64	17,7
	1-3	03	0,8

Table 2  
Frequency of radiological lesions in patients\*.

	Number	Percent
Discarthrosis	355	86,8
Lombarthrosis	287	70,2
Facet joint osteoarthritis (FJOA)	132	32,3
Disc protrusion	59	14,4
Herniated disc	46	11,2
Spondylolisthesis by FJOA	44	10,8
Scoliosis	38	9,3
Hyperlordosis	35	8,6
Isthmic lysis without listhesis	21	5,1
Spondylolisthesis by isthmic lysis	16	3,9
Lombalisation of S1	10	2,4
Osteoporotic vertebral collapse	6	1,5
Transverse mega-apophysis of L5	05	1,2
Sacralization of L5	02	0,5
*a patient could have multiple radiographic lesions		

## Frequency and factors associated with neuropathic pain

One hundred and seventy-five patients had NP, a frequency of 42.8%. The mean number of DN4 items per patient was  $4.23 \pm 0.4$  with extremes of 4 and 6 items (Table 3). Statistical analysis showed a statistically significant association between the existence of NP and age over 60 years and the existence of radiculalgia. The association between NP and patient's socio-demographic and clinical variables is summarized in Table 4. Zygophyseal arthritis and protrusive disc disease were statistically associated with the existence of NP as shown in Table 5.

Table 3  
Frequency of DN4 patient items\*

	Number	Percent
Burn	316	77,3
Tingling	214	52,3
Electric shocks	129	31,5
Numbness	125	30,6
Picks	124	30,3
Itching	85	20,8
Hypoesthesia with tact	62	15,2
Hypoesthesia with stinging	46	11,2
Painful cold	35	8,6
Painful rubbing	24	5,9
*a patient could have had several items.		

Table 4  
Socio-demographic, clinical factors and neuropathic pain.

	NP+		NP-		<i>P</i>
	N	%	N	%	
Female gender	124	44,6	154	55,4	0,14
Age > 60 years old	64	51,6	60	48,4	0,00
Housewife	53	44,2	67	55,8	0,34
Overweight	109	44,7	135	55,3	0,18
History of chronic low back pain	132	42,9	176	57,1	0,48
Sciatica	154	44,5	192	55,5	0,05
Severe pain	135	45,9	159	54,1	0,05
Lumbar stiffness	174	43,9	222	56,1	0,00
Poorly systematized radiculalgia	127	51	122	49	0,00
NP+: Presence of neuropathic pain ; NP- = no neuropathic pain ; N = number					

Table 5  
Radiological lesions and neuropathic pain

	NP+		NP-		P
	N	%	N	%	
Discarthrosis	156	43,9	199	56,1	0,11
Lombarthrosis	138	48,1	149	51,9	0,00
Facet joint Osteoarthritis (FJOa)	72	54,5	60	45,5	0,00
Disc protrusion	34	57,6	25	42,4	0,00
Herniated disc	24	52,2	22	47,8	0,08
Spondylolisthesis by FJOa	24	54,5	20	45,5	0,05
Scoliosis	19	50	19	50	0,17
Lumbar Hyperlordosis	16	45,7	19	54,3	0,35
Isthmic Lysis	07	33,3	14	66,7	0,19
Lombalisation of S1	06	60	04	40	0,14
Spondylolisthesis by isthmic lysis	05	31,3	11	68,7	0,17
Osteoporotic compaction	04	66,7	02	33,3	0,13
Transverse mega-apophysis of L5	03	60	02	40	0,23
NP+: Presence of neuropathic pain ; NP- : no neuropathic pain ; N : number					

## Discussion

The frequency of NP was 42.8% during the common lumboradiculalgia. Age over 60 years, spinal stiffness and radiculalgia were statistically associated with NP. In terms of imaging, lumbar osteoarthritis, disc protrusion and posterior interapophyseal osteoarthritis were also significantly associated with neuropathic pain.

Any interpretation of these results must take into account the limitations and biases of our study. As CT and MRI scans were not systematic, other types of disc or degenerative lesions (herniated disc, disc protrusion, posterior interapophyseal osteoarthritis) or inflammatory lesions (spondylodiscitis) may have been overlooked in our study. The absence of a biological inflammatory syndrome in the C Reactive Protein and the sedimentation rate was intended to minimize these cases.

The average age of the patients was  $51.75 \pm 13.84$  years. This is comparable to the data in the literature [11, 13]. Our series was dominated by housewives and shopkeepers. Although low back pain affects 70% of the working-age population, the predominance of housewives and shopkeepers may be due to a

selection bias with regard to the proportion of this socio-professional category in African populations [14]. The household activities of housewives and the predominantly informal nature of trade in our context could also explain these results.

The frequency of NP was 42.8%. This frequency is higher than the 28.1% reported by Douala et al. in Cameroon [11]. However, it is comparable to the results previously reported in Burkina Faso and Kaki et al in Saudi Arabia, which were 49.5% and 54.7% respectively [8, 10]. According to two meta-analyses published in 2017, the frequency of LBP varies between 19 and 80% during low back pain and lumboradiculalgia [4, 6]. This significant variation in the frequency of LBP in common low back pain and lumboradiculalgia could be explained by the diversity of study methods, the heterogeneity of the study populations, and especially the multitude of languages in which the DN4 questionnaire is translated and administered.

Age over 60 years seems to predispose to the presence of NP during common lumboradiculalgia ( $p < 0.01$ ). Adoukonou et al also reported that advanced age was associated with neuropathic pain [5]. In our series, the history of chronic low back pain was not statistically associated with LBP ( $p = 0.48$ ). Some studies have shown that both acute and chronic low back pain are not associated with LBP [4, 6]. The existence of radiculalgia was statistically associated with the presence of NP ( $p < 0.01$ ). This could be explained by the fact that radiculalgia is the clinical expression of nerve root pain. Etiologically, facet joint osteoarthritis and protrusive disc disease were statistically associated with NP ( $p < 0.01$ ). During lumboradiculalgia, functional alterations of the nerve roots may result from compressions corresponding to significant reductions in the spinal canal [15]. Ductal narrowing by disc protrusion, intracanal osteophytes, and hypertrophy of the yellow ligaments frequently associated with facet joint osteoarthritis could explain this association. Our study did not find a significant association between disc herniation and NP ( $p = 0.08$ ). Symptomatic disc herniation is generally associated with a biochemical inflammatory phenomenon and therefore rather responsible for pain due to excess nociception; also, the natural evolution of a disc herniation is marked by the improvement of clinical symptoms but also a decrease in volume, or even disappearance of the hernia in more than half of the cases [15]. Only 20 to 40% of radiological disc herniations are symptomatic according to the literature [15, 16]. The excess weight found in our study (61.6%) and frequently associated with low back pain and lumboradiculalgia does not seem to be statistically related to the occurrence of LBP.

## Conclusions

Our study confirms the high frequency of neuropathic pain during common lumboradiculalgia. Burning sensation, tingling, electric shocks and tingling were the most common neuropathic features found. A statistically significant association was found between NP and age over 60 years, the existence of radiculalgia, osteoarthritis of the posterior joints and disc protrusion. The wide variety of languages spoken by patients and the difficulties in translating the DN4 questionnaire into these languages may have influenced our results. A validation study of the DN4 questionnaire in our national languages may allow for a more accurate assessment of NP during the LBP.

## Abbreviations

NP: Neuropathic pain; LBP: Low back pain; CT: Computed tomography; MRI: Magnetic resonance imaging; DN4: Neuropathic Pain in 4 points; VAS: Visual analogue scale; BMI: Body mass index; FJOa : Facet joint Osteoarthritis

## Declarations

### Ethics approval and consent to participate :

This study was approved by the institutional ethics committee (establishment medical council) of University Hospital of Bogodogo and University Hospital of Cocody. All participants gave their written consent.

### Consent for publication :

Not applicable

### Funding :

Not applicable

### Availability of data and materials :

Not applicable

### Authors' contributions :

KF, OB, EE and OD-D realized the conception of the study. TWSJ and DM performed the design of the study. SC, CA and NIP Analyzed and interpreted the data. KF and OD-D wrote the manuscript. All authors read and approved the final manuscript.

### Competing interests :

The authors declare that they have no competing interests.

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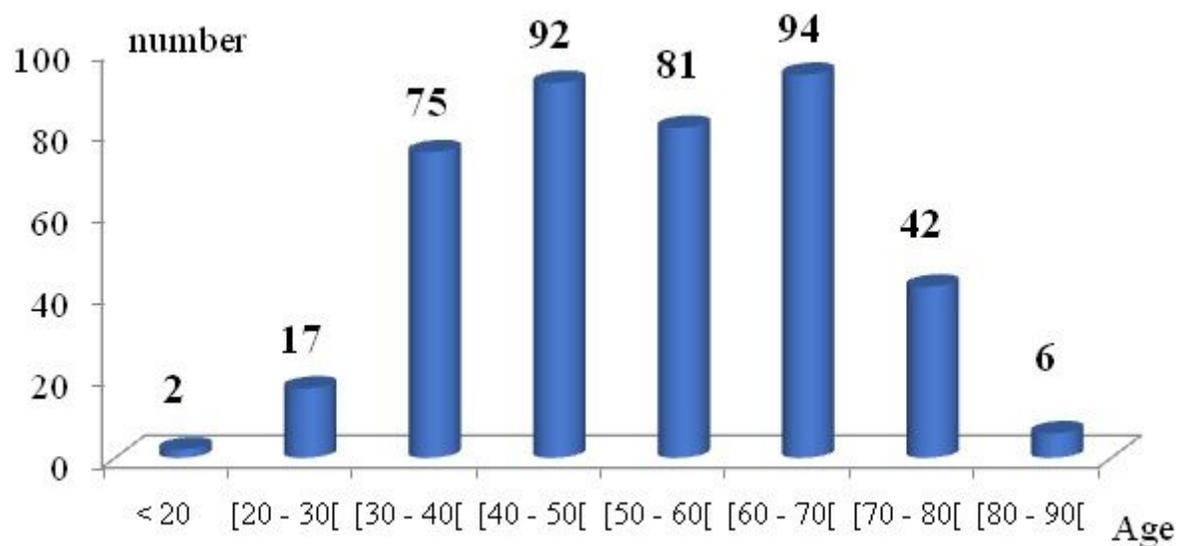
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## Figures



**Figure 1**

Distribution of patients by age