Prevalence, characteristics and clinical course of neuropathic pain in primary care patients consulting with low back-related leg pain

Sarah A Harrisson¹
Reuben Ogollah², Kate Dunn¹, Nadine Foster¹, Kika Konstantinou¹,³

¹Arthritis Research UK Primary Care Centre, Research Institute of Primary Care and Health Sciences, Keele University
²Nottingham Clinical Trials Unit, School of Medicine, University of Nottingham, QMC, Nottingham, NG7 2UH
³Haywood Academic Rheumatology Group, Haywood Hospital, Stoke-on-Trent, Staffordshire, UK, ST6 7AG.

Delivering high quality multidisciplinary research in primary care.
Neuropathic pain

“Pain arising as a direct consequence of a lesion or disease affecting the somatosensory system”

• Shooting, stabbing and electrical shock type pain

• Prevalence is between 7% and 10%

 Presence of neuropathic pain is thought to be associated with poor prognosis
Low back related leg pain (LBLP)

- Most common low back pain presentation
- Increased pain, disability and poorer quality of life
- LBLP may be diagnosed as sciatica

Sciatica is thought to be a neuropathic condition
Aims

To describe the prevalence, characteristics & clinical course of neuropathic LBLP in patients seeking treatment in primary care.
Data acquisition and methods

Large observational treatment cohort of patients consulting in primary care (ATLAS cohort), n=609

Mixed effect models to compare pain intensity over three-years between those with and those without neuropathic pain

Self-report questionnaires

Neuropathic pain
s-LANSS (0-24) Score ≥ 12

Clinical examination

MRI for research purposes

Pain intensity, 0 to 10 NRS (highest of mean leg or mean back pain)
Definitions of neuropathic pain

Hierarchical approach

Clinical examination

Case ascertainment tool

Possible neuropathic pain

Clinical diagnosis of sciatica

s-LANSS (0-24) Score ≥ 12

Probable neuropathic pain

Clinical diagnosis of sciatica with evidence of nerve root compression on MRI

Delivering high quality multidisciplinary research in primary care.
Prevalence of neuropathic pain

Clinical diagnosis of sciatica: Estimated prevalence 452 out of 609, 74%

Sciatica plus nerve root compression on MRI: Estimated prevalence 252 out of 554, 45%

s-LANSS Score ≥ 12: Estimated prevalence 293 out of 606, 48%

Prevalence of patients meeting all 3 criteria 23% (127 out of 551)
### Characteristics of patients with neuropathic pain compared to those without

<table>
<thead>
<tr>
<th>Univariable associations</th>
<th>Odds ratio (95% Confidence intervals)</th>
</tr>
</thead>
<tbody>
<tr>
<td>s-LANSS ≥ 12</td>
<td>1.79 (1.21, 2.64)</td>
</tr>
<tr>
<td></td>
<td>1.68 (1.06, 2.66)</td>
</tr>
<tr>
<td></td>
<td>1.56 (1.10, 2.23)</td>
</tr>
<tr>
<td></td>
<td>1.15 (1.04, 1.27)</td>
</tr>
<tr>
<td></td>
<td>2.15 (1.51, 3.06)</td>
</tr>
<tr>
<td></td>
<td>6.05 (4.18, 8.77)</td>
</tr>
<tr>
<td></td>
<td>1.08 (1.05, 1.11)</td>
</tr>
</tbody>
</table>

- **Currently smoking**: Odds of a patient presenting with neuropathic pain was 1.79 times higher in those who currently smoke compared to those who never smoked.
- **95% certainty that the true odds would be in the range 1.21 to 2.64 assuming there is no bias or confounding.**

- **Difficulties with sleep**: The odds of a patient presenting with neuropathic pain increased by 8% for every one unit increase in RMDQ.
- **95% certainty that the true odds would be in the range 5% to 11% assuming there is no bias or confounding.**

- **Back pain intensity, 0 to 10**: The odds of a patient presenting with neuropathic pain increased by 8% for every one unit increase in RMDQ.

- **Pain pattern (constant)**: The odds of a patient presenting with neuropathic pain increased by 8% for every one unit increase in RMDQ.

- **Pain quality (burning)**: The odds of a patient presenting with neuropathic pain increased by 8% for every one unit increase in RMDQ.

- **LBLP-related disability, RMDQ (0 to 23)**: The odds of a patient presenting with neuropathic pain increased by 8% for every one unit increase in RMDQ.

- **Depression, HADS**: Normal: 1, Possible (mild) cases: 1.95 (1.29, 2.96), Probable (moderate/severe) cases: 4.14 (2.53, 6.78)

- **Anxiety, HADS**: Normal: 1, Possible (mild) cases: 1.66 (1.08, 2.54), Probable (moderate/severe) cases: 3.30 (2.22, 4.87)

95% certainty that the true odds would be in the range 5% to 11% assuming there is no bias or confounding.
### Characteristics of patients with neuropathic pain compared to those without

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Odds ratio (95% confidence intervals)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leg pain worse than back pain</td>
<td>1.13 (0.82, 1.56)</td>
</tr>
<tr>
<td>Presence of widespread pain</td>
<td>5.81 (3.71, 9.10)</td>
</tr>
<tr>
<td>Pain location</td>
<td>4.73 (3.30, 6.77)</td>
</tr>
<tr>
<td>Pain location</td>
<td></td>
</tr>
<tr>
<td>Pain in one leg</td>
<td>0.73 (0.50, 1.06)</td>
</tr>
<tr>
<td>Pain below the knee</td>
<td>3.35 (2.26, 4.79)</td>
</tr>
<tr>
<td>Pain below the knee</td>
<td>2.37 (1.57, 3.56)</td>
</tr>
<tr>
<td>Pain affecting the appearance of the skin</td>
<td>1.98 (1.38, 2.87)</td>
</tr>
<tr>
<td>Pain affecting the appearance of the skin</td>
<td>9.03 (6.00, 13.60)</td>
</tr>
<tr>
<td>Pain affecting the appearance of the skin</td>
<td>4.18 (2.74, 6.37)</td>
</tr>
<tr>
<td>Reduction in sensation to pin-prick*</td>
<td>1.64 (1.16, 2.33)</td>
</tr>
<tr>
<td>Reduction in sensation to pin-prick*</td>
<td>3.87 (2.43, 6.16)</td>
</tr>
<tr>
<td>Reduction in sensation to pin-prick*</td>
<td>12.19 (3.60, 41.4)</td>
</tr>
<tr>
<td>Reduction in sensation to pin-prick*</td>
<td>2.49 (1.35, 4.60)</td>
</tr>
<tr>
<td>Reduction in sensation to pin-prick*</td>
<td>29.33 (4.01, 214.78)</td>
</tr>
<tr>
<td>Reduction in sensation to pin-prick*</td>
<td>5.63 (3.22, 9.86)</td>
</tr>
<tr>
<td>The presence of an increased response to either non-painful or painful stimuli</td>
<td>2.75 (1.52, 4.97)</td>
</tr>
<tr>
<td>The presence of an increased response to either non-painful or painful stimuli</td>
<td>1.54 (0.78, 3.05)</td>
</tr>
<tr>
<td>The presence of an increased response to either non-painful or painful stimuli</td>
<td>0.95 (0.54, 1.68)</td>
</tr>
<tr>
<td>Neural tension</td>
<td>1.21 (0.87, 1.66)</td>
</tr>
<tr>
<td>Neural tension</td>
<td>33.60 (17.61, 64.10)</td>
</tr>
<tr>
<td>Neural tension</td>
<td>4.07 (2.84, 5.85)</td>
</tr>
<tr>
<td>Significant reduction or absence of lower limb reflex*</td>
<td>1.68 (1.06, 2.65)</td>
</tr>
<tr>
<td>Significant reduction or absence of lower limb reflex*</td>
<td>4.42 (2.09, 9.38)</td>
</tr>
<tr>
<td>Significant reduction or absence of lower limb reflex*</td>
<td>5.63 (3.22, 9.86)</td>
</tr>
<tr>
<td>Leg pain intensity, 0 to 10</td>
<td>1.95 (1.29, 2.96)</td>
</tr>
<tr>
<td>Leg pain intensity, 0 to 10</td>
<td>1.32 (1.21, 1.44)</td>
</tr>
<tr>
<td>Leg pain intensity, 0 to 10</td>
<td>1.29 (1.19, 1.40)</td>
</tr>
<tr>
<td>Pain self efficacy, PSEQ 0 to 60</td>
<td>0.97 (0.96, 0.98)</td>
</tr>
<tr>
<td>Pain self efficacy, PSEQ 0 to 60</td>
<td>0.98 (0.97, 0.997)</td>
</tr>
<tr>
<td>Pain self efficacy, PSEQ 0 to 60</td>
<td>0.98 (0.97, 0.99)</td>
</tr>
</tbody>
</table>

* Reference is to normal sensation to pin-prick or normal reflexes
Clinical course of patients with or without neuropathic pain

- **s-LANSS Score ≥ 12**
- **Clinical diagnosis of sciatica**
- **Sciatica with nerve root compression on MRI**

Pain intensity was measured as the highest of either leg or back pain intensity (mean of 0-10 NRS).

- **Rapid improvement up to four months after baseline**
- **Clinical course of patients with neuropathic LBLP is worse than those without**
- **...but little improvement thereafter**
- **Clinical course of patients with neuropathic LBLP based on clinical diagnosis is similar to those without**
Key findings

• Neuropathic LBLP is common

• Characteristics of patients with neuropathic pain varied depending on the method used to define cases

• Clinical course of patients with neuropathic pain based on s-LANSS was worse compared to those without, but this was not the case for the other two definitions used
Given the evidence:

Sciatica is a neuropathic pain condition

Presence of neuropathic pain is associated with poor prognosis and depends on how cases of neuropathic pain are identified.
Implications of this research

Hierarchical approach

Possible neuropathic pain

Probable neuropathic pain

Usefulness of hierarchical approach for either research or in clinical practice is questionable?

Usefulness of s-LANSS in clinical practice may depend on matched treatment?
Prognosis of low back-related leg pain patients with neuropathic pain: clinical course and prognostic factors

Sarah A Harrisson\textsuperscript{1}
Reuben Ogollah\textsuperscript{2}, Kate Dunn\textsuperscript{1}, Nadine Foster\textsuperscript{1}, Kika Konstantinou\textsuperscript{1,3}

\textsuperscript{1}Arthritis Research UK Primary Care Centre, Research Institute of Primary Care and Health Sciences, Keele University
\textsuperscript{2}Nottingham Clinical Trials Unit, School of Medicine, University of Nottingham, QMC, Nottingham, NG7 2UH
\textsuperscript{3}Haywood Academic Rheumatology Group, Haywood Hospital, Stoke-on-Trent, Staffordshire, UK, ST6 7AG.

Delivering high quality multidisciplinary research in primary care.
Neuropathic low back related leg pain (LBLP)

“Pain arising as a direct consequence of a lesion or disease affecting the somatosensory system”

Most common low back pain presentation

Increased pain, disability and poorer quality of life
Prognosis of neuropathic LBLP

Neuropathic pain is thought to be persistent

Little evidence of prognosis of LBLP patients with neuropathic pain

Prognostic factors are characteristics of patients with a condition that are associated with a subsequent health outcome
Aims

To investigate the prognosis of neuropathic LBLP, in terms of clinical course and prognostic factor research.
Data acquisition

Large observational treatment cohort of patients consulting in primary care (ATLAS cohort), n=609

Neuropathic pain
s-LANSS (0-24) Score ≥ 12

Self-report questionnaires
Pain intensity, 0 to 10 NRS (highest of mean leg or mean back pain)

Clinical examination

MRI for research purposes
Methods

Outcome of interest
Persistent neuropathic pain (s-LANSS ≥ 12 at baseline and ≥ 12 at four months)

Clinical course

• Mixed effect models
• Pain intensity over three years
• Patients with persistent neuropathic pain vs those without

Prognostic factor research

• Choice of prognostic factors (self-report, clinical examination & MRI findings)
• Univariable and multivariable logistic regression
• Multiple imputation to account for missing data
Change in the presence of neuropathic pain

44% (72 out of 164) of LBLP with neuropathic pain at baseline had neuropathic pain at four months

Clinical course

Gradual improvement up to four months after baseline

Clinical course (pain intensity) of patients with persistent neuropathic LBLP is worse than those with non-persistent neuropathic pain

Bars indicate 95% confidence intervals

Pain intensity was measured as the highest of either leg or back pain intensity (mean of 0-10 NRS)
Prognosis of patients with neuropathic pain (n=164): prognostic factors

<table>
<thead>
<tr>
<th>Prognostic factor</th>
<th>OR (95% CI)</th>
<th>OR (95% CI)†</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>1.01 (0.99, 1.03)</td>
<td>1.01 (0.98, 1.03)</td>
</tr>
<tr>
<td><strong>Female sex</strong></td>
<td>0.85 (0.47, 1.52)</td>
<td>0.94 (0.50, 1.76)</td>
</tr>
<tr>
<td><strong>Socio-economic status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher managerial, administrative and professional occupations</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Intermediate occupations</td>
<td>0.99 (0.39, 2.49)</td>
<td>0.94 (0.50, 1.76)</td>
</tr>
<tr>
<td>Routine and manual occupations</td>
<td>1.10 (0.47, 2.60)</td>
<td>1.02 (0.58, 2.08)</td>
</tr>
<tr>
<td>Never worked and long-term unemployed</td>
<td>1.28 (0.35, 4.66)</td>
<td>1.12 (0.37, 4.25)</td>
</tr>
<tr>
<td><strong>Leg pain intensity (0-10)</strong></td>
<td>1.10 (0.97, 1.25)</td>
<td>1.02 (0.88, 1.19)</td>
</tr>
<tr>
<td><strong>Pain below the knee</strong></td>
<td>1.22 (0.60, 2.50)</td>
<td>1.02 (0.88, 1.19)</td>
</tr>
<tr>
<td><strong>Duration of leg pain symptoms in current episode</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 6 weeks</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6 to 12 weeks</td>
<td>0.82 (0.39, 1.74)</td>
<td>0.82 (0.37, 1.78)</td>
</tr>
<tr>
<td>&gt; 3 months</td>
<td>1.21 (0.65, 2.28)</td>
<td>1.12 (0.58, 2.18)</td>
</tr>
<tr>
<td><strong>PSEQ (0-60)</strong></td>
<td>0.98 (0.96, 0.998)</td>
<td>0.98 (0.96, 1.00)</td>
</tr>
<tr>
<td><strong>Reduction or loss of sensation to pin-prick</strong></td>
<td>1.06 (0.61, 1.83)</td>
<td>1.06 (0.58, 2.04)</td>
</tr>
<tr>
<td><strong>Presence of pins and needles</strong></td>
<td>1.26 (0.68, 2.33)</td>
<td>1.26 (0.68, 2.33)</td>
</tr>
<tr>
<td><strong>Clinical diagnosis of sciatica</strong></td>
<td>0.75 (0.38, 1.49)</td>
<td>0.75 (0.38, 1.49)</td>
</tr>
<tr>
<td><strong>Evidence of nerve root compression on MRI</strong></td>
<td>1.40 (0.80, 2.45)</td>
<td>1.40 (0.80, 2.45)</td>
</tr>
</tbody>
</table>

* Persistent neuropathic pain based on s-LANSS ≥12 at baseline and at four months
† Multiply-imputed data was used to account for missing data

**Prognosis of patients with neuropathic pain (n=164):**

- Associated with poor prognosis in broader LBP populations
- Consistently associated with 3 definitions of neuropathic pain at baseline
- Used to identify cases of neuropathic pain
Key findings

• Presence of neuropathic pain changes over time

• Clinical course of patients with persistent neuropathic LBLP was worse compared to those with non-persistent neuropathic pain

• No evidence that prognostic factors used to define neuropathic pain were associated with persistent neuropathic pain at four months
Implications of this research

Neuropathic LBLP is not always persistent

Presence of neuropathic pain may change as the severity of a LBLP episode abates.

Patients with neuropathic pain should be treated, at first the same as the broader group of LBP patients.

Imaging is indicated only when result may change clinical management.

Delivering high quality multidisciplinary research in primary care.
Acknowledgements

During the period in which this work was undertaken Sarah Harrisson was supported by a National Institute for Health Research (NIHR) Clinical Doctoral Fellowship provided by an NIHR Research Professorship awarded to Nadine Foster (NIHR-RP-011-015). Nadine Foster is also an NIHR Senior Investigator. Kika Konstantinou is supported by a Higher Education Funding Council for England/ NIHR Senior Clinical Lectureship. The views expressed in this publication are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health.

A training course in methods attended by Sarah Harrisson was supported by an Education and Continued Professional Development (level 2) award by The Musculoskeletal Association of Chartered Physiotherapists (MACP) in June 2016.

Contact: s.a.harrisson@keele.ac.uk
Thank you

Delivering high quality multidisciplinary research in primary care.