Review

Epidemiology of chronic non-cancer pain in Europe: narrative review of prevalence, pain treatments and pain impact

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Abstract

Background:

Estimates on the epidemiology of chronic non-cancer pain vary widely throughout Europe. It is unclear whether this variation reflects true population differences or methodological factors. Such epidemiological information supports European decision makers in allocating healthcare resources.

Objective:

Pan-Europe epidemiological data about chronic non-cancer pain was obtained using systematic review principles in searching and summarising results.

Methods:

Multiple databases (MEDLINE, EMBASE, Cochrane Library, CRD Databases, and GIN) were systematically searched for primary studies containing epidemiological data on chronic non-cancer pain in Europe excluding studies that solely concerned migraines, headaches and pain associated with specific disease conditions. The studies were prioritised according to quality, recency and validity.

Main outcomes:

Eighteen research questions concerning aspects of chronic pain included: prevalence; incidence; pain treatments, control and compliance; treatment satisfaction; and quality of life and economic impacts.

Results:

The search yielded 16 619 references and 45 were relevant to Europe. Studies for each question were selected that provided the most recent, representative and valid data. There was a clear lack of studies concerning chronic non-cancer pain in Europe as a whole. The 1-month prevalence of moderate-to-severe non-cancer chronic pain was 19%. Chronic pain significantly impacted on patient-perceived health status, affected everyday activities including economic pursuits and personal relationships, and was significantly associated with depressive symptoms. The majority relied on drugs for pain control and NSAIDs were the most frequent drug choice. Despite pain medications, a large proportion had inadequate pain control.

Conclusion:

To the authors' knowledge this is the most comprehensive literature review on epidemiological data in this field. It is clear that chronic pain has a dramatic impact on European society. Since chronic non-cancer pain is treated differently from cancer-related pain, the lack of data in this area clearly underlines the need for decision makers in healthcare to gather further epidemiological data.

Introduction

Chronic pain represents a public health problem in Europe with an evident social and economic impact, although a paucity of reliable data about its

epidemiology hinders an accurate estimation of the burden of this condition. Prevalence estimates vary widely and typically range between 10 and 30% of an adult population, although studies have reported it as low as 2% and as high as 50%¹⁻³. This wide variation may reflect true differences between populations, but may also depend on how chronic pain is defined and the assessment methods used in epidemiological studies.

With respect to chronic non-cancer pain in Europe, reliable and valid epidemiological data are scarce; although, the pain relief treatments for cancer-related chronic pain are notably different than non-cancer pain⁴. The World Health Organization three-step ladder for pain relief has been used to successfully treat cancer-related pain but opioids still are considered controversial for those with chronic non-cancer pain because of concerns about efficacy, safety, addiction or abuse, and regulatory body disapproval⁴⁻⁶. Chronic non-cancer pain can include both nociceptive and neuropathic pain that may be affected by psychological and/or socio-environmental factors. Typical locations of chronic non-cancer pain include upper and lower back, head and neck, and joints. It is often reported to be more common in older age groups, lower income groups and among women⁷⁻¹⁰.

Information about the epidemiology of chronic non-cancer pain is important to help European decision and policy makers decide about health budgets and prioritisation, patient segmenting and budget fencing. As chronic non-cancer pain is an important medical and public health issue, there is a need for better understanding of the burden of disease and current treatment practice within Europe as a whole.

This study aimed to obtain epidemiological data about chronic non-cancer pain within Europe, while excluding studies exclusively about pain associated with migraines, headaches and specific disease conditions such as multiple sclerosis. The authors aimed to review the most relevant scientific literature, using the principles of systematic reviews in searching and critically summarising the findings. Studies were prioritised and selected according to relevance, recency and validity, rather than summarising the results of all studies that were identified.

Methods

This pan-Europe review was developed within the framework of a broader review about the epidemiology of chronic non-cancer pain within individual European countries. The aim was to review the scientific literature concerning the most recent epidemiological data on chronic pain in Europe as a whole using a systematic review methodology while following standardised processes and methods recommended by the Centre for Reviews and Dissemination¹¹.

A search strategy was designed to retrieve all relevant studies regardless of publication status or language. A series of terms related to the condition of interest were defined and their corresponding keywords combined in comprehensive strategies (available from authors) to search the following databases from 1995 to August 2009: MEDLINE, EMBASE, The Cochrane Library, CRD Databases (DARE, HTA, NHS EED), and the GIN database. Additionally, reference lists of those studies deemed relevant to the review were checked. Additional data were obtained by searching national statistic and health survey websites.

Primary studies or systematic reviews of studies providing epidemiological data about non-cancer chronic pain in Europe as a whole were considered for inclusion. Chronic pain was defined as a painful condition lasting at least 3 months or those chronic conditions associated with chronic pain; including musculoskeletal pain, neuropathic pain, fibromyalgia, osteoarthritis, and rheumatoid arthritis. Studies that solely concerned children or adolescents were excluded, as well as conditions such as migraine and headache, angina pectoris, cancer pain, or pain associated with specific disease conditions (e.g., multiple sclerosis).

After defining a list of clinical questions that addressed basic issues related to chronic pain (e.g., prevalence, incidence, treatment adequacy, compliance and satisfaction with treatment, economic impact and impact on quality of life), two authors independently inspected the retrieved references for eligibility and determined their relevance. Included studies were categorised to obtain a list of relevant studies per question and then the most relevant and representative were selected. The goal was to select studies where the methodology ensured that the sample population was representative of the current pan-European population. Therefore, preference was given to large surveys of the general population where the demographic characteristics of the sample were likely to be comparable to the target population. Preference was also given to recent surveys as the demographic, socioeconomic and psychological characteristics were more likely to represent a present-day European population than studies conducted, for example, 15 years ago. In short, studies were selected according to the following criteria: sample size, representativeness of the target population, recency, and methodological quality. One author assessed the methodological quality of each included study and a second checked the assessment for accuracy. Disagreements were resolved by consensus. This assessment was used for descriptive purposes, which allowed a transparent evaluation of the overall literature quality. A basic set of criteria related to potential sources of bias in observational studies: description of study design, eligibility criteria explicitness, sample representativeness of target population, adequate description of study outcomes, adequate description of statistical analysis including adjustments for confounders, adequate description of

Table 1. The following quality criteria were used for the assessment of the observational studies: (criteria to be answered with yes/no/unclear)²⁴.

Criteria	Explanation: criterion is adequate if:
Adequate description of study design and setting	Authors reported study design, setting and period of study
Adequate description of eligibility criteria (incl. description of diagnostic criteria for chronic pain condition)	Authors reported inclusion/exclusion criteria with diagnostic criteria to confirm diagnosis or confirmation that the doctors' patients had chronic pain
Study population is representative of target population (sample size, sample selection, demographics)	Authors described how the sample size was arrived at and how the patients were selected and the demographics of the sample should be described as comparable to the target population. For surveys, an attempt should be made to compare non-responders to responders
Adequate description of outcomes (and how/how often measured), exposures, predictors	Authors describe how they measure the outcome and clear definitions are given for key terms
Adequate description of statistical methods (incl. description of potential confounders and effect modifiers and how they were dealt with)	Authors describe their statistical methods and describe potential confounders or effect modifiers and how they were dealt with
Adequate description of study participants	Authors provide more than just age and gender (pain duration, occupations, pain type, etc.)
Adequate description of losses to follow-up (for longitudinal studies), loss to follow-up less than 10% at 12 months or less than 25% for longer follow-up	Authors clearly describe the losses to follow-up or if the loss is <10% by 12 months and <25% for periods longer than 12 months. NA for cross sectional studies
Results reported as unadjusted and confounder-adjusted including precision	Authors report their results as unadjusted or confounder adjusted (or equivalent language – univariate, multivariate) and they provide precision (e.g., SE or SD, CIs). Authors should also indicate what confounders were adjusted for and why they were included

study participants, and handling of losses to follow up (Table 1). A study was assessed as high quality if the authors met all the criteria or missed only one criterion, medium quality if they missed two or three criteria and low quality if they missed four or more criteria. The aim was to give preference to medium to high quality studies that examined a large segment of the general European population although lower quality studies were included in the absence of higher quality studies.

Data were extracted to standardised forms and checked by a second author. The most relevant information was collected that contributed information to each of the defined clinical questions, and these data were registered in tables jointly with a study's quality details. The results were summarised from included studies classifying them by defined questions. Rather than a systematic exhaustive approach, this review employed a narrative method to synthesise the most relevant, reliable and recent epidemiologic studies about chronic pain in Europe.

As there was a dearth of studies that were relevant to chronic non-cancer pain, studies were included that explicitly or implicitly included those with chronic cancer-related pain. For clarity, the following terminology was employed: 'any chronic pain' included those with mild pain; 'general chronic pain' included those with cancer-related pain.

Results

From the 16619 references retrieved from the searches, 1056 full text articles were selected that were assessed in detail. From these, 45 primary studies were identified as

well as systematic reviews that provided potential relevant information about chronic pain in Europe as a whole. No studies were identified that reported chronic pain incidence or the economic impact of chronic pain from a healthcare system perspective for Europe (Table 2). There were few large studies that examined chronic pain within the general population of Europe and, as such, any identified study that reported relevant chronic pain outcomes for a pan-Europe population was included. Out of 45 identified publications, 12 primary studies were selected (Table 3). A list of the 33 excluded primary studies and systematic reviews, along with the reasons for exclusion, can be viewed in Table 4. The main reason for exclusion was that population samples included those with acute pain and chronic pain data were not reported separately.

Out of the 12 selected studies, only Alonso *et al.* (2004) was judged as high quality with representative results¹². For the remaining, five were judged to be medium quality and six as low quality primarily because of inadequate reporting of participant eligibility, participant characteristics, and statistical methodology (Table 3). The representativeness of the results from these 11 studies was assessed as unclear because authors did not compare their samples to target populations and/or participants were not compared to those who refused to participate.

Prevalence of chronic pain

Eight selected studies reported the prevalence of chronic pain in Europe although only Alonso *et al.* (2004) was judged as representative¹². A single study presented prevalence data on moderate-to-severe chronic non-cancer

Table 2. Number of identified and selected studies by research question.

Research question	Studies identified	Studies selected
What is the prevalence of chronic pain conditions in Europe?	10	8
What is the incidence of chronic pain conditions in Europe?	0	0
How many European chronic pain patients present for treatment?	4	2
What percentage of European chronic pain patients are untreated or inadequately treated?	1	1
How many European chronic pain sufferers have inadequate pain control?	2	2
How many European chronic pain patients get treated broken down by treatment?	4	2
What are the frequencies of drug (per WHO class), non-drug, and combined treatments in Europe?	4	2
What is the compliance of treated chronic pain patients in Europe?	1	1
What is patients' satisfaction about drug treatments in Europe?	2	2
In Europe, what is the impact of chronic pain on:		
Quality of life?	5	2
Activities of daily living?	3	3
Depression and other mental illness?	8	3
Isolation and helplessness?	2	2
In Europe, what is the economic impact of chronic pain:		
On the number of days off work?	4	3
On incapacity benefits?	1	1
From a societal perspective?	2	2
From a healthcare system perspective?	0	0
From a patient perspective?	2	2

pain reporting a 1-month prevalence estimate of 19% (Table 5)^{2,3}. For the prevalence of any general chronic pain, the most relevant estimate was a point prevalence of 17.1%⁷⁻⁹.

Other studies focused on specific pain conditions: they estimated a lifetime prevalence of 6% and 9% for upper and lower chronic back pain, respectively; a lifetime prevalence of 5% for chronic neck pain; a point prevalence of 13%, 6.7% and 2.9% for chronic widespread pain without fatigue, with fatigue and for fibromyalgia, respectively^{13,14}. The remaining studies that reported a prevalence estimate for specific pain conditions listed a range by country rather than a prevalence estimate for Europe as a whole (Table 5)^{10,12,15}.

The authors were unable to identify any study that reported the incidence of chronic pain conditions in Europe as a whole.

Impact of chronic pain

Seven selected studies, all with unclear representativeness, reported a considerable impact of chronic pain on aspects of quality of life. Chronic pain negatively affected overall patient perception of general health, interfered considerably with everyday activities as a function of pain severity, was associated with depressive symptoms, and dramatically and negatively affected relationships and interactions with others (Table 5). The results from five selected studies, all with unclear representativeness, also suggested that chronic pain had an economic impact on individuals, society and healthcare utilisation (Table 5)^{2,3,10,16,17}.

Impact of chronic pain on quality of life, activities of daily living and depression

In a majority of moderate-to-severe chronic non-cancer pain sufferers, pain severely affected daily activities including the ability to sleep, exercise, lift objects and do household chores and a substantial portion were less able or no longer able to maintain relationships with family and friends and were less able or no longer able to attend social functions^{2,3}. Those with any general chronic pain may be more likely to rate their health status as fair-to-poor compared to those not experiencing persistent pain¹⁵. There was a clear association between depressive symptoms and chronic pain that increased with the number of depressive symptoms^{7,8}. For those with pain due to knee arthrosis, a substantial proportion (22%) felt they were a burden to others and small percentage (5.1%) no longer wanted to see friends¹⁸.

Those with any general chronic neuropathic pain estimated that their overall health rating would improve dramatically if they were free of pain¹⁶. Similar statistically significant results were observed for subpopulations with trigeminal neuralgia, painful diabetic neuropathy and post-herpetic neuralgia^{16,19-21}. Interference with functioning and well-being also was significantly associated with increasing pain severity ($p \leq 0.001$).

Economic impact of chronic pain on individuals, society and healthcare utilisation

The mean number of work days lost due to moderate-to-severe chronic non-cancer pain in the last 6 months was 7.8 days and 22% had lost at least 10 work days^{2,3}.

Table 3. Details and methodological quality of selected studies.

Study Participating countries	Study characteristics Question relevance*	Methodological quality assessment
Alonso 2004 ¹² Observational survey Denmark, France, Germany, Italy, Netherlands (NL) Norway (plus United States and Japan)	Chronic pain condition Diabetes and arthritis Target population General adult population $n = 24\,936$; mean age 44.4 (SD 17.7) years; 47.8% men Question relevance: prevalence Chronic pain condition Pain due to knee arthrosis of predominantly moderate-to-severe intensity Pain assumed to be chronic Target population Patients consulting a physician for pain $n = 2\,623$ patients; mean age 60.3 years; 36.7% men Question relevance: isolation and hopelessness Chronic pain condition Any general chronic widespread pain with fatigue Any general chronic widespread pain without fatigue Fibromyalgia Chronic pain assumed Target population Youth and adult general population >15 years $n = 4\,517$; mean age 45 years; 48% men Question relevance: prevalence Chronic pain condition Moderate-to-severe chronic non-cancer pain lasting ≥ 6 months (1% reported cancer-related pain; 7% reported migraine pain) Target population Adult general population ≥ 18 years $n = 46\,394$ for prevalence outcome $n = 4\,839$ for all other outcomes; mean age 49.9 (SD 17.4) years; 44% men Question relevance: prevalence, percent untreated, percent treated, type and frequency of treatment, inadequate pain control, patient satisfaction, activities of daily living, isolation and hopelessness, days off work, and the economic costs to society and the individual Chronic pain condition Any general chronic pain. Chronic pain assumed (9.6% reported frequent or severe headaches). Target population Adult general population ≥ 18 years $n = 21\,425$ Question relevance: prevalence, depression, and days off work Chronic pain condition Any general chronic neck or back pain. Chronic not defined Target population Adult general population ≥ 18 years $n = 10\,516$ Question relevance: prevalence	High quality Representative Drawbacks: Inadequate description of eligibility criteria Low quality Representativeness unclear Drawbacks: Unclear description of study design & setting; inadequate description of: eligibility criteria; statistical methods; and results as confounder unadjusted or adjusted Low quality Representativeness unclear Drawbacks: Unclear description of: statistical methods; study participants; and results as confounder unadjusted or adjusted Low quality Representativeness unclear Drawbacks: Inadequate description of: eligibility criteria; statistical meth- ods; and results as confounder unadjusted or adjusted Medium quality Representativeness unclear Drawbacks: Unclear description of eligibility criteria; inadequate descrip- tion of study participants Medium quality Representativeness unclear Drawbacks: Unclear description of: losses to follow-up; inadequate description of eligibility criteria
Branco 2009 ¹⁴ Observational survey France, Italy, Spain, Portugal, and Germany	Chronic pain condition Any general chronic widespread pain with fatigue Any general chronic widespread pain without fatigue Fibromyalgia Chronic pain assumed Target population Youth and adult general population >15 years $n = 4\,517$; mean age 45 years; 48% men Question relevance: prevalence Chronic pain condition Moderate-to-severe chronic non-cancer pain lasting ≥ 6 months (1% reported cancer-related pain; 7% reported migraine pain) Target population Adult general population ≥ 18 years $n = 46\,394$ for prevalence outcome $n = 4\,839$ for all other outcomes; mean age 49.9 (SD 17.4) years; 44% men Question relevance: prevalence, percent untreated, percent treated, type and frequency of treatment, inadequate pain control, patient satisfaction, activities of daily living, isolation and hopelessness, days off work, and the economic costs to society and the individual Chronic pain condition Any general chronic pain. Chronic pain assumed (9.6% reported frequent or severe headaches). Target population Adult general population ≥ 18 years $n = 21\,425$ Question relevance: prevalence, depression, and days off work Chronic pain condition Any general chronic neck or back pain. Chronic not defined Target population Adult general population ≥ 18 years $n = 10\,516$ Question relevance: prevalence	High quality Representative Drawbacks: Inadequate description of eligibility criteria Low quality Representativeness unclear Drawbacks: Unclear description of study design & setting; inadequate description of: eligibility criteria; statistical methods; and results as confounder unadjusted or adjusted Low quality Representativeness unclear Drawbacks: Unclear description of: statistical methods; study participants; and results as confounder unadjusted or adjusted Low quality Representativeness unclear Drawbacks: Inadequate description of: eligibility criteria; statistical meth- ods; and results as confounder unadjusted or adjusted Medium quality Representativeness unclear Drawbacks: Unclear description of eligibility criteria; inadequate descrip- tion of study participants Medium quality Representativeness unclear Drawbacks: Unclear description of: losses to follow-up; inadequate description of eligibility criteria
Breivik 2006/Pain in Europe 2003 ^{2,3} Observational survey United Kingdom (UK), Ireland, France, Germany, Italy, Spain, Poland, Sweden, Norway, Denmark, Finland, NL, Belgium, Austria, Switzerland, and Israel	Chronic pain condition Any general chronic widespread pain with fatigue Any general chronic widespread pain without fatigue Fibromyalgia Chronic pain assumed Target population Youth and adult general population >15 years $n = 4\,517$; mean age 45 years; 48% men Question relevance: prevalence Chronic pain condition Moderate-to-severe chronic non-cancer pain lasting ≥ 6 months (1% reported cancer-related pain; 7% reported migraine pain) Target population Adult general population ≥ 18 years $n = 46\,394$ for prevalence outcome $n = 4\,839$ for all other outcomes; mean age 49.9 (SD 17.4) years; 44% men Question relevance: prevalence, percent untreated, percent treated, type and frequency of treatment, inadequate pain control, patient satisfaction, activities of daily living, isolation and hopelessness, days off work, and the economic costs to society and the individual Chronic pain condition Any general chronic pain. Chronic pain assumed (9.6% reported frequent or severe headaches). Target population Adult general population ≥ 18 years $n = 21\,425$ Question relevance: prevalence, depression, and days off work Chronic pain condition Any general chronic neck or back pain. Chronic not defined Target population Adult general population ≥ 18 years $n = 10\,516$ Question relevance: prevalence	High quality Representative Drawbacks: Inadequate description of eligibility criteria Low quality Representativeness unclear Drawbacks: Unclear description of study design & setting; inadequate description of: eligibility criteria; statistical methods; and results as confounder unadjusted or adjusted Low quality Representativeness unclear Drawbacks: Unclear description of: statistical methods; study participants; and results as confounder unadjusted or adjusted Low quality Representativeness unclear Drawbacks: Inadequate description of: eligibility criteria; statistical meth- ods; and results as confounder unadjusted or adjusted Medium quality Representativeness unclear Drawbacks: Unclear description of eligibility criteria; inadequate descrip- tion of study participants Medium quality Representativeness unclear Drawbacks: Unclear description of: losses to follow-up; inadequate description of eligibility criteria
Demyttenaere 2006 ¹⁰ Observational survey Belgium, France, Germany, Italy, the NL and Spain	Chronic pain condition Any general chronic pain. Chronic pain assumed (9.6% reported frequent or severe headaches). Target population Adult general population ≥ 18 years $n = 21\,425$ Question relevance: prevalence, depression, and days off work Chronic pain condition Any general chronic neck or back pain. Chronic not defined Target population Adult general population ≥ 18 years $n = 10\,516$ Question relevance: prevalence	High quality Representative Drawbacks: Inadequate description of eligibility criteria Low quality Representativeness unclear Drawbacks: Unclear description of study design & setting; inadequate description of: eligibility criteria; statistical methods; and results as confounder unadjusted or adjusted Low quality Representativeness unclear Drawbacks: Unclear description of: statistical methods; study participants; and results as confounder unadjusted or adjusted Low quality Representativeness unclear Drawbacks: Inadequate description of: eligibility criteria; statistical meth- ods; and results as confounder unadjusted or adjusted Medium quality Representativeness unclear Drawbacks: Unclear description of eligibility criteria; inadequate descrip- tion of study participants Medium quality Representativeness unclear Drawbacks: Unclear description of: losses to follow-up; inadequate description of eligibility criteria
Demyttenaere 2007 ²⁵ Observational survey Belgium, France, Germany, Italy, NL, Spain and Ukraine	Chronic pain condition Any general chronic neck or back pain. Chronic not defined Target population Adult general population ≥ 18 years $n = 10\,516$ Question relevance: prevalence	High quality Representative Drawbacks: Inadequate description of eligibility criteria Low quality Representativeness unclear Drawbacks: Unclear description of study design & setting; inadequate description of: eligibility criteria; statistical methods; and results as confounder unadjusted or adjusted Low quality Representativeness unclear Drawbacks: Unclear description of: statistical methods; study participants; and results as confounder unadjusted or adjusted Low quality Representativeness unclear Drawbacks: Inadequate description of: eligibility criteria; statistical meth- ods; and results as confounder unadjusted or adjusted Medium quality Representativeness unclear Drawbacks: Unclear description of eligibility criteria; inadequate descrip- tion of study participants Medium quality Representativeness unclear Drawbacks: Unclear description of: losses to follow-up; inadequate description of eligibility criteria

(continued)

Table 3. Continued.

Study Participating countries	Study characteristics	Question relevance*	Methodological quality assessment
Engbers 2005 ²² Longitudinal study Italy, Austria, Finland, Germany, Ireland, and NL	Chronic pain condition Any general chronic low back pain lasting ≥ 3 months Target population Patients consulting inpatient or outpatient rehabilitation facilities $n = 255$; mean age 47.9 (SD 12.6) years, 44.7% men Question relevance: quality of life, activities of daily living, depression, and incapacity benefits		Low quality Representativeness unclear Drawbacks: Inadequate description of: study design and setting; statistical methods; and results as confounder unadjusted or adjusted
Gureje 1998 ¹⁵ Observational survey Berlin, Germany; Ankara, Turkey; Paris, France; Mainz, Germany; Groningen, NL; Manchester, England; Verona, Italy; Athens, Greece	Chronic pain condition Any general chronic pain lasting ≥ 6 months (45.2% reported persistent headaches) Target population Adults (18–65 years) consulting primary care facilities $n = 2819$ patients Question relevance: prevalence and quality of life		Medium quality Representativeness unclear Drawbacks: Inadequate description of study participants
Health in EU 2007 ¹³ Observational survey EU 27	Chronic pain condition Any general chronic pain lasting ≥ 3 months that restricts daily activities (4% reported head pain) Target population Youth and adult general population ≥ 15 years $n = 25\,031$ Question relevance: prevalence		Low quality Representativeness unclear Drawbacks: Unclear description of eligibility criteria Inadequate description of: statistical methods; study participants; and results as confounder unadjusted or adjusted
McDermott 2006/Tölle 2006 <i>Pain Pract</i> / Tölle 2006 <i>J Diabetes</i> /Van Seventer 2006 ^{16,19–21} Observational survey France, Germany, Italy, the NL, Spain and the UK	Chronic pain condition Any general chronic neuropathic pain Any trigeminal neuralgia Any painful diabetic neuropathy Any post-herpetic neuralgia Chronic defined as pain lasting ≥ 3 months Target population Adults ≥ 18 years consulting at community-based physician practices Any general neuropathic pain: $n = 602$ patients; mean age 62.9 (SD 14.4) years; 50% men Trigeminal neuralgia subpopulation: $n = 82$ patients; mean age 62.7 (SD 15.8) years; 32.9% men Painful diabetic neuropathy subpopulation: $n = 140$; mean age 65.6 (SD 11.2) years; 58.3% men Post-herpetic neuralgia subpopulation: $n = 84$; mean age 71.0 (SD 12.8) years; 48% men Question relevance: how many consult, get treated, type/frequency of treatment, inadequate pain control, patient satisfaction, quality of life, activities of daily living, days off work, and economic costs to society/individual		Medium quality Representativeness unclear Drawbacks: Inadequate description of results as confounder unadjusted or adjusted
NHWS EU 2008 ¹⁷ Observational internet survey France, Germany, Italy, Spain and the UK	Chronic pain condition Moderate and severe nociceptive-only† pain in past month Moderate and severe neuropathic pain‡ in past month		Low quality Representativeness unclear Drawbacks:

Target population Adult general population ≥ 18 years $n = 11\,129$ with nociceptive-only pain; mean age 49 yrs $n = 762$ with neuropathic pain; mean age 56.4 yrs Question relevance: how many are treated and untreated, treatment compliance and healthcare utilisation Chronic pain condition Any general chronic pain lasting ≥ 6 months (7.6% reported headaches) Target population Youth and adult general population ≥ 15 years $n = 18\,980$; 48% men Question relevance: prevalence and depression	Unclear description of: study setting & design; statistical methods; and study participants Inadequate description of: eligibility criteria; outcomes; and results as confounder unadjusted or adjusted
Ohayon 2003/2004/2005 ⁷⁻⁹ Observational survey UK, Germany, Italy, Portugal, and Spain	Medium quality Representativeness unclear Drawbacks: Unclear description of statistical methods

*Refer to Table 2 for research questions.

†Nociceptive-only pain excluded neuropathic pain.

‡Neuropathic pain may or may not have included nociceptive pain.

Table 4. Excluded studies with the primary reason for exclusion.

Study	Primary* reason for exclusion
Primary studies	
Benevides 2000 ²⁶	Included acute pain population
Blozik 2007 ²⁷	No relevant outcomes
Crawford 2008 ²⁸	No relevant outcomes
Eriksen 1998 ²⁹	No relevant outcomes
Hansson 2000 ³⁰	No pan-Europe data
LeBoeuf-Yde 1996 ³¹	Included acute pain population
Lemmel 2002 ³²	Included acute pain population
O'Neill 2004 ³³	Included acute pain population
Raspe 2004 ³⁴	Included acute pain population
Simon 2008 ³⁵	Included acute pain population
Soldato 2007 ³⁶	Included acute pain population
Suurmeijer 2001 ³⁷	No pan-Europe data
Thomas 2005 ³⁸	Included acute pain population
Viller 1999 – abstract only ³⁹	No relevant outcomes
Viller 2000 – abstract only ⁴⁰	No relevant outcomes
Systematic reviews	
Barrett 2007 ⁴¹	USA data only
Bressler 1999 ⁴²	Included acute pain population
Dagenais 2008 ⁴³	Included acute pain population
Musculoskeletal Problems/ Funct Limit 2003 ⁴⁴	Included acute pain population
Fejer 2006 ⁴⁵	Included acute pain population
Fredriksson 1999 ⁴⁶	No pan-Europe data
Harrold 2009 ⁴⁷	No relevant outcomes
Hestbaek 2003 ⁴⁸	Included acute pain population
Jeffels 2003 ⁴⁹	Included acute pain population
Linton 2001 ⁵⁰	Included acute pain population
Loney 1999 ⁵¹	Included acute pain population
Luime 2004 ⁵²	Included acute pain population
Ospina 2002 ⁵³	No pan-Europe data
Rohling 1995 ⁵⁴	No pan-Europe data
Savelkou 2003 ⁵⁵	No relevant outcomes
Solomon 1997 ⁵⁶	Included acute pain population
Walker 2000 ⁵⁷	Included acute pain population

*Only the primary reason for exclusion is listed here. All the excluded studies had compound reasons for exclusion including: very small sample size; sample not representative of general population; and original studies published <1995.

Although 55% of this sample lost no work days at all, 26% stated that pain impacted on their employment in some way. Those with any general chronic pain lost on average 3.6 work days in the past 30 days and had lost a greater average number if they also had a major depressive disorder¹⁰. Only 52% of rehabilitation patients in Europe with any general chronic low back pain were working full or part time²². A total of 6.7% of this population sample were on sick leave although it was not apparent that chronic low back pain was the primary cause.

For those with any general chronic neuropathic pain, the mean number of work days lost in the previous four weeks was 5.5 days¹⁶. A majority (57.1%) stated that their pain had not impacted on their employment status.

No study was identified that reported on the economic impact of chronic pain on healthcare systems in Europe. However, data from an European study on those with pain in the previous month may give insight into the relative healthcare utilisation by those with general chronic pain: for those who experienced moderate nociceptive-only and

Table 5. Prevalence, impact on quality of life, activities of daily living and depression, and economic impact of chronic pain in Europe.

Study Quality	Prevalence	Chronic pain outcome	Result
Moderate-to-severe chronic non-cancer pain			
Breivik 2006/Pain in Europe 2003 Low quality	In adults ≥ 18 years: 1-month prevalence 19%	Effect on daily activities: % no longer able or less able to carry out activity Effect on isolation: % no longer able or less able to carry out activity Work loss days lost in past 6 months Proportion who felt pain impacted employment	Sleep: 65% Exercise: 73% Lift: 72% Do chores: 54% Maintain relationships: 27% Attend social functions: 48% Mean: 7.8 days 22% lost ≤ 10 days 55% lost no days 26% had impact: <ul style="list-style-type: none"> 61% less able or no longer able to work outside of home 19% lost their job 16% changed job responsibilities
Any general chronic pain (may include mild pain and cancer pain)			
Ohayon 2003/2004/2005 Medium quality	In youths and adults 15–100 years: Point prevalence 17.1%	Those with depressive symptoms vs. those without	Those with depressive symptoms were significantly more likely to have: Chronic back pain (OR 2.3, 95% CI 2.0, 2.8; $p < 0.001$); Chronic limb pain (OR 2.3, 95% CI 2.0, 2.5; $p < 0.001$); and Chronic joint pain (OR 1.7, 95% CI 1.4, 2.1; $p < 0.001$)
Demyttenaere 2006 Medium quality	In adults ≥ 18 years: 12-month prevalence 29.34%	Mean number of work loss days in past 30 days	3.6 days; increasing to 9.4 days if pain suffer also had a major depressive episode
Health in EU 2007 Low quality	In youths and adults ≥ 15 years: Lifetime prevalence 25%	NR	NR
Gureje 1998 Medium quality	Presenting adults ≥ 18 years: 1-year prevalence range 17.3–38.5%; median 35%	General Health Questionnaire: % with fair to poor health status	More likely to rate health status as fair to poor compared to those without persistent pain. Significant ($p = 0.05$) in 3/8 health centres. Range: 8.3% (Athens) to 48.1% (Berlin)
Any general chronic neck or back pain (may include mild pain and cancer pain)			
Health in EU 2007 Low quality	In youths and adults ≥ 15 years: Lifetime prevalence 6%	NR	NR
Upper back Health in EU 2007 Low quality	In youths and adults ≥ 15 years: Lifetime prevalence 9%	NR	NR
Lower back Health in EU 2007 Low quality	In youths and adults ≥ 15 years: Lifetime prevalence 5%	NR	NR
Neck Demyttenaere 2007 Medium quality	In adults ≥ 18 years: 12-month prevalence range 14.7–29.6%; median 19.1%	NR	NR
Neck or back Engbers 2005 Low quality	NR	Proportion of rehabilitation patients who were working Proportion on sick leave	52% 6.7%
Chronic widespread pain (CWS) or fibromyalgia			
Branco 2009 Low quality	In youths and adults > 15 years: Point prevalence 13%	NR	NR
CWS without fatigue Branco 2009 Low quality	In youths and adults > 15 years: Point prevalence 6.7%	NR	NR
CWS with fatigue Branco 2009 Low quality	In youths and adults > 15 years: Point prevalence 2.9%	NR	NR
Fibromyalgia			
Any joint pain (may include mild pain)			
Alonso 2004 High quality	In adults ≥ 18 years: Point prevalence range 4.2–40.5%; median 12.5%	NR	NR
Arthritis			

(continued)

Table 5. Continued.

Study Quality	Prevalence	Chronic pain outcome	Result
Boccard & Gerbier 1996 Low quality Knee arthrosis pain	NR	Effect on isolation	5.1% no longer wanted to see friends 22% felt they were a burden to others
Diabetes Alonso 2004 High quality	In adults ≥ 18 years: Point prevalence range 2.3–5.3%; median 3.3%	NR	NR
Any chronic neuropathic pain (may include mild pain) McDermott 2006 Medium quality General neuropathic pain	NR	Effect on overall Global Health Rating* if completely free of pain Effect of pain intensity on EQ-5D Health State Valuation†: interference with functioning and well-being Mean number of work days lost in previous 4 weeks Proportion who felt pain impacted employment	Patients estimated overall health rating would improve by 21.7 points Increasing pain severity significantly associated with increasing interference ($p < 0.001$) 5.5 days 42.9% had impact: 16.4% had reduced work schedule time 30.2% lost work productivity at least 'a good bit of the time' 17.2% were disabled 9.4% were unemployed or retired early
Tölle 2006 <i>Pain Pract</i> Medium quality Subpopulation from McDermott 2006 with trigeminal neuralgia	NR	Effect on overall Global Health Rating* if completely free of pain Effect of pain intensity on EQ-5D Health State Valuation†: interference with functioning and well-being	Patients estimated overall health rating would improve from 60.2 ± 20.0 to 78.4 ± 22.7 ($p < 0.0001$) Increasing pain severity significantly associated with increasing interference ($p = 0.001$)
Tölle 2006 <i>J Diabetes</i> Medium quality Subpopulation from McDermott 2006 with painful diabetic neuropathy	NR	Effect on overall Global Health Rating* if completely free of pain Effect of pain intensity on EQ-5D Health State Valuation†: interference with functioning and well-being	Patients estimated overall health rating would improve from 49.9 ± 21.2 to 72.1 ± 20.6 ($p < 0.0001$) Increasing pain severity significantly associated with increasing interference ($p < 0.001$)
Van Seventer 2006 Medium quality Subpopulation from McDermott 2006 with post-herpetic neuralgia	NR	Effect on overall Global Health Rating* if completely free of pain Effect of pain intensity on EQ-5D Health State Valuation†: interference with functioning and well-being	Patients estimated overall health rating would improve from 61.7 ± 20.3 to 79.7 ± 19.8 ($p < 0.0001$) Increasing pain severity significantly associated with increasing interference ($p < 0.001$)
Moderate and severe nociceptive-only pain NHWS EU 2008 Low quality	NR	Proportion with moderate nociceptive-only pain who visited their healthcare provider in past 6 months Proportion with severe nociceptive-only pain who visited their healthcare provider in past 6 months	93% 96%
Moderate and severe neuropathic pain NHWS EU 2008 Low quality	NR	Proportion with moderate neuropathic pain who visited their healthcare provider in past 6 months Proportion with severe neuropathic pain who visited their healthcare provider in past 6 months	96% 100%

*Global Health Rating of 0 to 100 where 0 indicated worst possible health and 100 indicated perfect health.

†EQ-5D Health State Valuation utility scale of –0.59 to 1.00, with lower scores indicating a poorer quality of life.

NR – not reported or data not relevant to this review.

neuropathic pain in the previous month, respectively 93% and 96% visited their healthcare provider in the past 6 months¹⁷. For those with severe pain, the proportion was slightly higher at 96% and 100% respectively. In contrast, 84% of the general European adult population visited their healthcare provider in the past 6 months.

Chronic pain presentation, treatment, pain control and compliance with treatment

Three selected studies, all with unclear representativeness, reported on chronic pain presentation, treatment, pain control and treatment compliance (Table 6)^{2,3,16,17,19–21}.

Of those with moderate-to-severe chronic non-cancer pain, 87% had visited their doctor for their chronic pain condition at least once in the previous 6 months^{2,3}. A total of 69% said they currently were being treated for their pain whereas 31% stated they were not being treated in any way. Approximately 78% had taken prescription pain medication at some point and 52% were currently taking prescription pain medication at the time of interview. Of those taking prescription pain medication, 40% felt their pain was controlled inadequately, 41% felt their medication was somewhat effective and 15% felt their medication was not very or not at all effective. Patient satisfaction with treatment included factors such as treatment effectiveness, tolerance and side-effects. For those with moderate-to-severe chronic non-cancer pain, 60% were satisfied with their pain treatment whereas 40% were not.

For those with any general chronic neuropathic pain, 76% had seen a physician and 28% had telephone consultations at least once in the past month for their pain¹⁶. In all, 49% had visited a pain specialist at some point and 93% had received at least one prescription pain medication. Patient perceived effectiveness of prescription pain medication (either extremely or very effective) ranged from 27 to 42%^{19–21}. For those with chronic painful diabetic neuropathy, 47% were somewhat satisfied with their prescription medication²⁰. Compliance with prescription pain medication (i.e., took medication all or most of the time) ranged from 85% in those with post-herpetic neuralgia to 94% in those with trigeminal neuralgia^{19–21}.

For those who experienced moderate pain in the past month (nociceptive-only or neuropathic pain), the proportions that were taking prescription pain medication, were untreated for their pain and were satisfied with their prescription pain medication appeared to be similar to that reported for moderate-to-severe chronic non-cancer pain (Table 6)^{2,3,17}. Good or complete treatment compliance (i.e., answered 'no' to at least 3 out of 4 questions concerning compliance) ranged from 59% to 77%.

No study was identified that examined the levels of inadequate chronic pain treatment in Europe (i.e., the proportion whose treatment did not meet the accepted standard for their chronic pain condition).

The most frequent WHO class drug treatments prescribed to patients with chronic pain in Europe were NSAIDs (43–44%) and opioids (22.4–23%) (Table 6)^{2,3}. Those with any general chronic neuropathic pain also were frequently prescribed anti-epileptics (50.7%) and anti-depressants (28.7%) among other non-standard pain medication^{16,19–21}. The most frequent non-drug pain treatment tried by those with moderate-to-severe general chronic pain was massage (30%) followed by physical therapy (21%) and acupuncture (13%)^{2,3}.

Discussion

To the authors' knowledge, this is the most comprehensive epidemiological literature review in this field for Europe as a whole. The most representative, recent and valid studies published about chronic non-cancer pain were identified and appraised, including data from the main collaborative research projects within Europe^{7–9,13,16,19–21}. It was found that, despite considerable chronic pain data for individual European countries, there were few pan-European sources. Only one source reported broadly on chronic non-cancer pain, in that less than 1% of the study population reported their pain as cancer-related^{2,3}.

The 1-month prevalence of moderate-to-severe non-cancer pain in adults was estimated at 19%^{2,3}. Given that the European Union population reached 501 064 212 individuals in January 2010, this projects to 80 million Europeans who suffer from moderate-to-severe chronic non-cancer pain²³.

Pain clearly impacted on the daily activities, employment and number of work days lost for chronic non-cancer pain sufferers in Europe^{2,3,10,16}. For those with any general chronic pain, pain affected quality of life and was significantly associated with anxiety and depression^{7–9,15,16,19–21}. Sufferers regularly used healthcare resources although a high portion appeared to be not be treated in any way^{2,3,16,19–21}. Inadequate pain control was commonly reported along with dissatisfaction with pain treatments, which predominantly included NSAIDs. For chronic neuropathic pain, treatment compliance was reportedly high despite patient-perceived ineffectiveness.

Limitations of this review

The data used in this review came from large population surveys of multiple European countries and were adjusted for the age and sex of the respondents. Despite these strengths, only one study explicitly compared their population sample with the general adult population¹².

Table 6. Presentation, treatment and frequency of treatments prescribed to chronic pain patients in Europe.

Presentation, study quality	Chronic pain outcome	Result	Estimation of frequency of treatments	
			Drug treatment	Non-drug treatment
Moderate-to-severe chronic non-cancer pain				
Breivik 2006/Pain in Europe 2003 Low quality	Proportion who had visited their doctor at least once in previous 6 months	16% visited doctor once 60% visited doctor 2–9 times 11% visited doctor ≥ 10 times 69% were treated	NSAID: 44% Opioids (weak/strong): 23%/5% Paracetamol: 18% COX 2 inhibitors: 6%	30% massage 21% physical therapy 13% acupuncture 10% ointments/creams 9% heat 8% exercise 5% nerve stimulation 4% relaxation therapy 3% diet/special foods 3% cold 3% herbal supplements 2% therapy/counselling
	Proportion treated for their pain in any way	31% not treated in any way 52% currently took prescription pain drugs		
	Proportion who took prescription medication	78% had taken prescription pain drugs at some point 40% had inadequate pain control 41% felt medication was 'some-what' effective		
	Proportion with inadequate pain control with prescription pain medication	15% felt medication was 'not very' or 'not at all' effective 60% satisfied with pain treatment 40% not satisfied		
	Proportion satisfied with pain treatment			
Any general chronic neuropathic pain				
McDermott 2006 Medium quality	Proportion who consulted for pain in previous month	76% had seen a physician 28% had telephone consultations 49%	NSAID/COX 2 inhibitors: 43% Opioids: 22.4% Anti-epileptics: 50.7% Antidepressants: 28.7% Sedatives/hypnotics: 15.1%	NR
	Proportion who consulted a pain specialist at some point	93%		
	Proportion who had received at least one prescription medication for pain	42%	NSAID/COX 2 inhibitors: 24.7% Opioids: 14.3% Anti-epileptics: 55.5% Antidepressants: 26% Sedatives/hypnotics: 13%	NR
	Proportion who felt their pain medication was extremely or very effective	94%	NSAID/COX 2 inhibitors: 62.5% Opioids: 16.4% Anti-epileptics: 55.5% Antidepressants: 32.8% Sedatives/hypnotics: 12.5%	NR
	Compliance with prescription pain medication (i.e., took medication all or most of the time)	27%		
Tölle 2006 <i>J Diabetes</i> Medium quality	Proportion who felt their pain medication was extremely or very effective	22% were dissatisfied, 16% were neutral 47% were somewhat satisfied 93%		
	Sub-population with painful diabetic neuropathy from McDermott 2006			
Moderate nociceptive-only pain				
Van Seventer 2006 Medium quality	Proportion who felt their pain medication was extremely or very effective	39%	NSAID/COX 2 inhibitors: 33.3% Opioids: 20.2% Anti-epileptics: 2.4% Antidepressants: 26.2% Sedatives/hypnotics: 32.1%	NR
	Sub-population with post-herpetic neuralgia from McDermott 2006	85%		
NHWS EU 2008 Low quality	Proportion taking prescription pain medication	33.7%	NR	NR

(continued)

Table 6. Continued.

Presentation, study quality	Chronic pain outcome	Result	Estimation of frequency of treatments	
			Drug treatment	Non-drug treatment
Severe nociceptive-only pain NHWS EU 2008 Low quality	Proportion untreated for pain	24%		
	Good or complete treatment compliance*	59%		
	Patient satisfaction with prescription pain medication	40%		
	Proportion who had used (proportion who discontinued) prescription pain medication	91% (24%)	NR	NR
	Proportion taking prescription pain medication	69.4%		
	Proportion untreated for pain	12%		
Moderate neuropathic pain NHWS EU 2008 Low quality	Good or complete treatment compliance*	66%		
	Patient satisfaction with prescription pain medication	37%		
	Proportion taking prescription pain medication	53.4%	NR	NR
	Proportion untreated for pain	18.6%		
	Good or complete treatment compliance*	69%		
	Patient satisfaction with prescription pain medication	47%		
Severe neuropathic pain NHWS EU 2008 Low quality	Proportion who had used (proportion who discontinued) prescription pain medication	96% (10%)	NR	NR
	Proportion taking prescription pain medication	86%		
	Proportion untreated for pain	9.9%		
	Good or complete treatment compliance*	77%		
	Patient satisfaction with prescription pain medication	40%		

*Complete treatment compliance: respondents answered 'no' to all 4 questions.

Good treatment compliance: respondents answered 'no' to 3 out of 4 questions.

Compliance questions: Do you ever forget to take your medicine; Are you careless at times about taking your medicine; When you feel better do you sometimes stop taking your medicine; and Sometimes if you feel worse when you take the medicine, do you stop taking it?

NR – not reported or data not relevant to this review.

As such, the representativeness of the above results cannot be assured. Another major shortcoming for the majority of included studies was a lack of statistical comparison with any other population sample: it was not clear whether the impact of chronic pain was any different than acute/sub-acute pain or the absence of pain.

Studies were excluded that solely concerned migraines or headaches because, while they can persist over long time periods and some could be considered chronic pain, a large proportion would be highly intermittent and probably should be considered acute. Studies concerning specific disease conditions that have associated pain (e.g., multiple sclerosis) were also excluded. With these exclusions in mind, the authors acknowledge that the true prevalence of chronic non-cancer pain may be underestimated in this review. However, studies that examined chronic pain as a broad category did not exclude those with migraines or headache, so these data should be considered inclusive^{2,3,8-10,13,15}.

Conclusion

Despite the lack of high quality studies, the above data clearly underlines the need for healthcare decision makers in Europe to gather further epidemiological data related to chronic non-cancer pain and chronic pain in general. The present review has identified some gaps in the literature: reliable estimates for the prevalence and incidence of chronic pain in Europe are lacking and no identified study reported the cost of chronic non-cancer pain in accepted economic terms (e.g., QALYs) or the cost from the healthcare perspective for Europe as a whole.

The variability in the collected data, most notably for prevalence, shows an inconsistency in defining chronic pain and measuring its impact. As well, cancer-related and non-cancer chronic pain typically require different treatment approaches and, as such, these populations should be studied separately. Finally, the measurements of impact, both on quality of life and economic outcomes, should be placed in context such that chronic pain populations are compared to either the general population or other pain sufferers.

The outcome of these efforts should be a reliable source of epidemiological data to define the burden of the disease within Europe. To achieve this objective, the roles of European healthcare research agencies, governments and public funders are of paramount importance. New research on this field could focus on the clinical questions that remain to be answered, including prioritising research with a higher impact on public health, and funding research projects with high scientific quality.

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