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ORIGINAL ARTICLE

Functional neurological disorder is common in patients attending chronic pain clinics

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Abstract

Background and purpose: Chronic pain is a common comorbidity in those with functional neurological disorder (FND); however, the prevalence and characteristics of FND in those with chronic pain is unknown.

Methods: A retrospective electronic records review was made of consecutive new patients attending a chronic pain clinic of a regional service. Clinical features, medication for and outcome of chronic pain, any lifetime diagnoses of functional disorders, FND, and psychiatric disorders, and undiagnosed neurological symptoms were recorded.

Results: Of 190 patients attending the chronic pain clinic, 32 (17%) had a lifetime diagnosis of FND and an additional 11 (6%) had undiagnosed neurological symptoms. Pain patients with comorbid FND were more likely to have chronic primary pain (88% with FND, 44% without FND, $p < 0.0001$), widespread chronic primary pain (53%, 15%, $p < 0.00001$), and depression (84%, 52%, $p < 0.005$) and less likely to have a pain-precipitating event (19% vs. 56%, $p < 0.001$). However, there was no significant difference between these patients in opiate prescription, benzodiazepine prescription, or pain outcome.

Conclusions: This first study of FND in a chronic pain patient population found a remarkably high prevalence of FND (17%) and is possibly an underestimation. The size of the overlap indicates that FND and chronic pain research fields are likely to have a lot to learn from each other.

KEYWORDS
chronic pain, chronic primary pain, comorbidity, functional neurological disorder

INTRODUCTION

Chronic pain, defined as pain that lasts or recurs for >3 months [1], is a common comorbidity in patients with functional neurological disorder (FND). Patients suffering from functional limb weakness are more likely to experience comorbid chronic pain than other neurological disorders [2], and in one study chronic pain conditions were present in 47% of those with functional seizures [3]. Despite this recognized overlap, the prevalence and characteristics of FND in those with chronic pain are unknown.

This study aims to estimate (i) the prevalence of FND in patients seen at a chronic pain clinic; and (ii) how patients with chronic pain and comorbid FND differ from those without FND in terms of pain characteristics, psychiatric comorbidity, pain management, and pain outcome.

METHODS

Recruitment

A retrospective electronic record review of consecutive patients attending the Lothian chronic pain service from 1 August to 19 September 2019 was performed. The Lothian chronic pain service is a National Health Service (NHS) outpatient service that sees approximately 550 new and review patients per month with a team of eight consultant anaesthetists and five pain specialist nurses. Patients are referred to the service when pain has persisted for >12 weeks and cannot be managed sufficiently by primary care or other medical/surgical teams. The clinic does not routinely see patients with cancer-related pain or headaches and only sees patients aged >18 years.

Data were collected from September to November 2021 using NHS Lothian TRAK health records. TRAK is an electronic database of all secondary care contacts including records of all hospital admissions and specialist clinic appointments in NHS Lothian. It also includes prescribed medications and the results of investigations. Patients in Scotland receive the vast majority of their health care through the NHS and have low geographical mobility, meaning that this is a reliable database of secondary care contact. The mean follow-up period from clinic attendance to data sampling was 23 months. To ensure there was full medical information available, patients attending for nurse appointments, follow-up, or procedures alone were excluded. Ethical approval was obtained via the University of Edinburgh Medical School.

Measures

Information was obtained on patients' age, gender, chronic pain characteristics (duration of pain, pain-precipitating event [none, disease, injury, or surgery], and type of chronic pain [using International Classification of Diseases 11th Revision definitions [1] and clinic letter information]), pain management (medication at time of clinic attendance, decision to reduce opiate dose), and pain outcome (where improvement was defined as patient reported improvement recorded in follow-up letters).

To assess the prevalence of comorbidity, any past or current diagnoses of FND, psychiatric disorders, neurological disorders, and other functional disorders in the TRAK record, from its origin in 2008 to the sampling period of September to November 2021, were recorded. Patients with FND were defined as those where a consultant neurologist had given a diagnosis of FND at least once in their TRAK record (in most cases in clinic letters); in these records, consultant neurologists also specify the subtype of FND being diagnosed. In patients with both chronic pain and FND, the month of onset of chronic pain and month of the first functional neurological symptom were recorded to investigate their temporal relationship. Information was also obtained on all undiagnosed neurological symptoms, defined as neurological symptoms either recorded in TRAK notes but not assessed by a neurologist or seen by a neurologist but not given a diagnosis (where symptoms of diagnosed neurological comorbidities, such as epilepsy and stroke, were not included). The outcome of FND symptoms (where improvement was defined as patient-reported improvement recorded in neurology follow-up letters) was also recorded.

Statistics

Statistical analysis was performed using R studio version 1.2.5.0333. For group comparisons, we used the unpaired *t*-test for continuous variables and the chi-squared or Fisher exact test for categorical variables. Probability values of <0.05 were taken to be significant.

RESULTS

In total, 190 new patients were seen at the chronic pain service between 1 August and 19 September 2019 by eight anaesthetists in general pain clinics that neither solicit or specialize in FND. Demographic information can be seen in Table 1.

Clinical characteristics

Patients presented with either chronic primary pain (52%) or chronic secondary pain (48%; Table 1), with widespread (22%) and nonspecific back pain (18%) the most frequent types of chronic primary pain and neuropathic (20%) and musculoskeletal (17%) the most frequent types of chronic secondary pain. No pain-precipitating event was recorded in 51% of patients, whereas disease (25%), injury (14%), and surgery (11%) precipitated pain in the remainder of cases. The median duration of pain was 63 months (range = 3–480).

Functional comorbidity

At least one FND had been diagnosed in 32 (17%) patients. The most common FND diagnoses were functional limb weakness (8%), functional sensory disorder (8%), dissociative seizures (6%), functional cognitive disorder (5%), and functional movement disorder (4%). Of the 32 patients with FND and chronic pain, 19 (59%) developed chronic pain before their first FND symptom, six (19%) developed their first FND symptom before chronic pain, and seven (22%) developed chronic pain and their first FND symptom in the same month. The median time elapsing between the onset of chronic pain and the onset of FND was 61 months (range = 3–263). The median time elapsing between the onset of FND and chronic pain was 51.5 months (range = 2–324).

Undiagnosed neurological symptoms (seizures, weakness, memory problems, and sensory symptoms) were also analysed to explore whether some patients may have undiagnosed FND. Fourteen (7%) patients had undiagnosed neurological symptoms and three (2%)

TABLE 1 Demographics, clinical characteristics, comorbidity, and outcome of new patients attending a chronic pain service.

Characteristic	All, $N=190$, n (%)	With comorbid FND, $N=32$, n (%)	Without comorbid FND, $N=158$, n (%)	p
Sex, female	114 (60%)	24 (75%)	90 (57%)	NS
Age, mean years	52.8	44.2	54.5	NS
Clinical characteristics				
Chronic primary pain	98 (52%)	28 (88%)[a]	70 (44%)[a]	$p<0.0001$
Widespread pain	41 (22%)	17 (53%)[a]	24 (15%)[a]	$p<0.00001$
Nonspecific back pain	34 (18%)	9 (28%)	25 (16%)	NS
Chronic secondary pain	92 (48%)	4 (13%)[a]	88 (56%)[a]	$p<0.0001$
Neuropathic pain	38 (20%)	0 (0%)[a]	38 (24%)[a]	$p<0.01$
Musculoskeletal pain	33 (17%)	1 (3%)[a]	32 (20%)[a]	$p<0.05$
Pain-precipitating event	96 (51%)	6 (19%)[a]	88 (56%)[a]	$p<0.001$
Surgery precipitating pain	20 (11%)	0 (0%)[a]	20 (13%)[a]	$p<0.05$
Comorbidity				
Depression	109 (57%)	27 (84%)[a]	82 (52%)[a]	$p<0.005$
Anxiety	79 (42%)	19 (59%)[a]	60 (38%)[a]	$p<0.05$
Suicide attempt	23 (12%)	8 (25%)[a]	15 (9%)[a]	$p<0.05$
Neurological disease	24 (13%)	7 (22%)	17 (11%)	NS
Undiagnosed neurological symptoms	14 (7%)	3 (9%)	11 (7%)	NS
Management and outcome				
Opiates prescribed	132 (69%)	21 (66%)	111 (70%)	NS
Benzodiazepines prescribed	20 (11%)	5 (16%)	15 (9%)	NS
Pain improved	61 (32%)	8 (25%)	53 (34%)	NS

Note: Significance was calculated using *t*-test (for age), Fisher exact test (for surgery, suicide attempt, unexplained symptoms, and benzodiazepines), and chi-squared test (for the remainder).

Abbreviations: FND, functional neurological disorder; NS, not significant.

[a]Statistically significant.

already had lifetime FND diagnoses, but the remaining 11 (6%) had no history of FND.

Other functional disorders such as irritable bowel syndrome (IBS; 20%) and noncardiac chest pain (20%) were also common.

When comparing pain patients with comorbid FND ($n=32$) to those without comorbid FND ($n=158$), those with comorbid FND were more likely to suffer from chronic primary pain ($p<0.0001$) and widespread type chronic primary pain ($p<0.00001$), and less likely to suffer from secondary neuropathic ($p<0.01$) or secondary musculoskeletal pain ($p<0.05$; Table 1). Patients with comorbid FND were also significantly less likely to have a pain-precipitating event recorded ($p<0.001$) or surgery precipitating pain ($p<0.05$). Gender and age did not differ significantly between these groups.

Other comorbidity

Of the entire cohort of 190 patients, 109 (57%) had a lifetime diagnosis of depression, 79 (42%) had a lifetime diagnosis of anxiety, and 23 (12%) had attempted suicide recorded. Patients with comorbid FND experienced significantly greater psychiatric comorbidity, with a history of depression ($p<0.005$), anxiety ($p<0.05$), and suicide attempt ($p<0.05$) all more likely (Table 1).

Twenty-four (13%) patients had lifetime diagnoses of other neurological diseases, the commonest being epilepsy (4%) and stroke (3%). Rates of neurological comorbidity did not vary significantly between those with and without FND; however, the numbers of those with other neurological diseases may be too small to draw firm conclusions.

Management and outcome

Prior to clinic attendance, 132 (69%) patients were prescribed opiates and 20 (11%) patients were prescribed benzodiazepines. A decision was made to reduce opiates with the aim of stopping them in 21% of patients. The rates of prescribed opiates and benzodiazepines and the decision to reduce opiates did not differ significantly between patients with and without FND (Table 1).

Of the entire cohort of 190 patients, outcome was improvement in pain (32%), no improvement in pain (24%), unknown due to clinic discharge (33%), and unknown due to nonattendance at follow-up (11%). The presence of comorbid FND did not significantly affect outcome (Table 1). However, rates of improvement were significantly lower in patients with chronic primary pain when compared to patients with chronic secondary pain (23%, 41%, $p < 0.05$; Table 2).

For the 32 patients with comorbid chronic pain and FND, the improvement in their FND symptoms at neurological follow-up was analysed. Of the 32 patients with FND, functional neurological symptoms improved in 28%, did not improve in 25%, were unknown due to clinic discharge in 41%, and were unknown due to nonattendance at follow-up in 6%. Outcome of FND symptoms was not significantly different between FND patients with chronic primary pain and chronic secondary pain. However, the secondary pain group consisted of fewer than five patients and may be too small for firm conclusions to be drawn.

DISCUSSION

This retrospective electronic record review found that FND comorbidity is common in patients attending chronic pain clinics. A lifetime prevalence of 17% is much greater than the estimated prevalence of FND in the general population (0.05%) [4] and greater than the prevalence of typical FND in patients attending neurology outpatient clinics (5.4%) [5] and the prevalence of symptoms unexplained by disease in those with neurological disorders (11.9%) [6]. Furthermore, 17% is likely a minimum prevalence level, as the retrospective analysis did not include formal assessment for FND, an additional 6% had undiagnosed neurological symptoms, and records only went back to 2008.

Patients with FND were significantly more likely to have primary type chronic pain, especially widespread conditions like fibromyalgia, which is perhaps unsurprising given that chronic primary pain conditions have long been associated with other functional disorders such as IBS [7, 8]. This is the first study we are aware of to look at the prevalence of FND in a general chronic pain clinic. However, looking at things in reverse, chronic back pain is significantly more common in those with functional limb weakness (40%) than controls with neurological disease (16%) [2], and a history of chronic pain has been used to differentiate individuals with dissociative seizures from those with epilepsy [3, 9]. There are several explanations as to why FND and chronic pain, especially chronic primary pain, might be likely to co-occur. Chronic pain and FND share similar risk factors such as high rates of childhood adversity and comorbid psychiatric disorders that may predispose some patients to develop one or both [4, 10]. FND and chronic primary pain are likely to have shared mechanisms in the nervous system. For instance, both involve a failure in processing sensory inputs and increased self-directed attention [11, 12]. Some specific conditions such as functional motor/

TABLE 2 Demographics, comorbidity, and outcome of patients with chronic primary and chronic secondary pain significance calculated using *t*-test (for age) and chi-squared test (for the remainder).

Characteristic	All, $N = 190$, *n* (%)	With chronic primary pain, $N = 98$, *n* (%)	With chronic secondary pain, $N = 92$, *n* (%)	*p*
Sex, female	114 (60%)	68 (69%)[a]	46 (50%)[a]	$p < 0.01$
Age, mean years	52.8	48.9	56.9	NS
Comorbidity				
FND	32 (17%)	28 (29%)[a]	4 (4%)[a]	$p < 0.00005$
Depression	109 (57%)	63 (64%)	46 (50%)	NS
Anxiety	79 (42%)	48 (49%)[a]	31 (34%)[a]	$p < 0.05$
Suicide attempt	23 (12%)	15 (15%)	8 (9%)	NS
Neurological disease	24 (13%)	11 (11%)	13 (14%)	NS
Unexplained neurological symptoms	14 (7%)	10 (10%)	4 (4%)	NS
Management and outcome				
Opiates prescribed	132 (69%)	67 (68%)	65 (71%)	NS
Benzodiazepines prescribed	20 (11%)	13 (13%)	7 (8%)	NS
Pain improved	61 (32%)	23 (23%)[a]	38 (41%)[a]	$p < 0.05$
Pain not improved	46 (24%)	33 (34%)[a]	13 (14%)[a]	$p < 0.005$

Abbreviations: FND, functional neurological disorder; NS, not significant.

[a]Statistically significant.

sensory disorder and chronic regional pain syndrome have overlapping clinical features, and similar mechanistic understanding and treatments [13].

Furthermore, this study found pain patients with comorbid FND had even greater levels of psychiatric comorbidity than other pain patients, with 84% having a lifetime diagnosis of depression and 25% having attempted suicide. This is perhaps unsurprising, given that psychiatric comorbidity is common in patients with FND [14], but it highlights the high symptom burden and functional impairment these patients are likely to experience.

This study found that patients with chronic pain and comorbid FND have similar opiate and benzodiazepine use and outcome to those without FND. This finding suggests that current chronic pain clinic intervention is no different for patients with FND than for those without. In contrast, previous research has found that patients with FND and comorbid chronic pain have worse FND outcomes than FND patients without comorbid chronic pain [15].

Among the patients with comorbid chronic pain and FND, it was interesting to note the group of seven (22%) patients whose pain and functional neurological symptoms arose within the same month. FND is known to be triggered by physical events such as migraine and injury, as well as movement or physical exercise, emotional triggers, and visual, tactile, and auditory stimuli [16]. Although these numbers may be too small for analysis, it would be interesting to further explore the temporal relationship between chronic pain and FND.

Across the entire patient cohort, there was a high rate of opiate use, with 69% of patients prescribed opiates. This is in keeping with higher rates of opiate use in Scotland compared to other countries [17], although similar rates of opiate prescription have been found in patients with chronic musculoskeletal pain managed in primary care throughout the UK (59%) [18]. High rates of opiate prescription on initial pain management assessment are perhaps expected in those patients who have required referral to a specialist pain clinic when the majority of patients with chronic pain are managed in general practice.

Limitations

This study was limited by a sample of patients from one chronic pain service. Thus, the findings may not be generalizable to other chronic pain clinics or patients with chronic pain managed in primary care. FND research has been taking place in Lothian for >20 years, so it is likely that the diagnosis is more commonly made in the population studied than in other regions. Comparison of patients with and without FND may have been limited by the small size of the FND patient group and unknown pain and FND outcomes.

CONCLUSIONS

The prevalence of FND in patients attending a new chronic pain clinic appointment was 17%. The comorbidity of chronic pain in FND patients is well documented, but because chronic pain is much more common, we consider this figure to be surprisingly high. Future research examining patients with chronic pain for signs of FND and prospective studies may find the prevalence is even higher. Patients with chronic pain and comorbid FND are likely to have chronic primary pain conditions, which signals the need to study potential shared mechanisms and investigate whether this relationship is bidirectional. Given that we found 17% of patients in chronic pain clinics have comorbid FND, those working in chronic pain clinics should have an awareness of the clinical features and diagnostic criteria of FND. Contrary to expectation, patients with chronic pain and FND had similar outcomes to those without it. The presence of FND should not, therefore, be seen as a barrier to referral to a chronic pain clinic.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interest.

DATA AVAILABILITY STATEMENT

Patient permission was not sought for data repository but ethically approved studies requesting data access would be considered by the research team.

ETHICS STATEMENT

Ethical approval was obtained via University of Edinburgh Medical School, and the study was performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

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