

# BMJ Open A cross-sectional assessment of the prevalence of multiple chronic conditions and medication use in a sample of community-dwelling adults with fibromyalgia in Olmsted County, Minnesota

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#### ABSTRACT

**Objectives:** The objective of this study was to evaluate the problem of multiple chronic conditions and polypharmacy in patients with fibromyalgia.

**Design:** Retrospective medical record review.

**Setting:** Olmsted County, Minnesota.

**Participants:** 1111 adults with fibromyalgia.

**Primary and secondary outcome measures:**

Number and type of chronic medical and psychiatric conditions, medication use.

**Results:** Medical record review demonstrated that greater than 50% of the sample had seven or more chronic conditions. Chronic joint pain/degenerative arthritis was the most frequent comorbidity (88.7%), followed by depression (75.1%), migraines/chronic headaches (62.4%) and anxiety (56.5%).

Approximately, 40% of patients were taking three or more medications for symptoms of fibromyalgia. Sleep aids were the most commonly prescribed medications in our sample (33.3%) followed by selective serotonin reuptake inhibitors (28.7%), opioids (22.4%) and serotonin norepinephrine reuptake inhibitors (21.0%).

**Conclusions:** The results of our study highlight the problem of multiple chronic conditions and high prevalence of polypharmacy in fibromyalgia. Clinicians who care for patients with fibromyalgia should take into consideration the presence of multiple chronic conditions when recommending medications.

#### INTRODUCTION

The presence of multiple chronic conditions is increasingly recognised as a challenge in the medical management of patients with chronic diseases including diabetes, heart disease, obesity and arthritis.<sup>1 2</sup> Although most healthcare systems are excellent at managing individual conditions, these systems are

#### Strengths and limitations of this study

- This is the first study to evaluate the presence of multiple chronic conditions in a large sample of community-dwelling adults with fibromyalgia.
- Notably, greater than 50% of our sample had seven or more chronic conditions.
- Given this was a community-sample in Olmsted County, Minnesota, the results of our study may not be generalisable to other samples of patients.
- Additionally, we did not include all possible medical and psychiatric conditions in this study.
- The results of our study highlight the problem of multiple chronic conditions in fibromyalgia and indicate that clinicians who care for patients with fibromyalgia should take into consideration the presence of multiple chronic conditions.

often ineffective in caring for patients with multiple chronic conditions. This is because the care of patients with multiple chronic conditions must simultaneously consider the inter-relationship of different conditions and the implication of medication choice on the patient's other conditions. This complicates medical evaluation, decision-making and management.<sup>3 4</sup> For example, the use of steroids to treat polymyalgia rheumatica in a patient who also has type II diabetes, hypertension and obesity requires more complex decision-making than is guided by singular protocols that are currently in use. A situation such as this is a common observation in clinical practice and is problematic as the percentage of patients with multiple chronic conditions is steadily increasing.<sup>5</sup>

Fibromyalgia is a chronic condition that is relatively common in clinical practice<sup>6 7</sup> and is associated with multiple chronic medical and

psychiatric conditions. A small body of literature has reported a high prevalence of headaches, irritable bowel syndrome, chronic fatigue, rheumatoid arthritis, systemic lupus erythematosus, osteoarthritis, sleep disorders, hypertension, type II diabetes, depression and anxiety<sup>8–12</sup> in fibromyalgia, but the majority of these papers focused on either medical or psychiatric conditions and/or disability. Furthermore, no publications to date have considered the cumulative burden of multiple chronic conditions in fibromyalgia. This is important because not only is fibromyalgia difficult to manage, but fibromyalgia in combination with other chronic medical and psychiatric conditions substantially amplifies a patient's symptom burden and complicates the medical management for healthcare providers. This is further complicated by the use of multiple medications (with multiple side effects) to manage pain and other symptoms in fibromyalgia, as many of the medications employed frequently contribute to or exacerbate existing comorbidities.<sup>13–15</sup>

Recognising the presence of multiple chronic conditions and the potential for polypharmacy may be one step towards improving the current, ineffective management of fibromyalgia. The objective of this report is to describe the proportion of patients with multiple chronic conditions and the proportion of patients using multiple medications related to fibromyalgia, in a cohort of community-dwelling adults with fibromyalgia in Olmsted County, Minnesota.

## MATERIALS AND METHODS

This cross-sectional study utilised a sample of patients identified via the Rochester Epidemiology Project (REP) and previously described.<sup>7</sup> On identification of eligible patients, detailed medical record review was conducted to assess the presence of medical and psychiatric conditions as outlined below.

### The REP

The REP is a unique resource that indexes the medical records of all residents who receive care in Olmsted County, Minnesota. In Olmsted County, all medical care is provided by two medical facilities: Mayo Clinic and Olmsted Medical Center. Each institution uses a unit (or dossier) medical record system, whereby data from an individual (eg, demographics, diagnoses and billing records) are assembled in one place and are made available for approved research studies under the umbrella of the REP.<sup>16–17</sup> The majority of residents receive care at more than one institution, resulting in multiple records to be reviewed for each person. The REP maintains an index of the diagnostic codes obtained from all of the participating providers. The REP diagnostic index includes diagnostic codes from the International Classification of Diseases (HICDA) for conditions identified by physicians during office visits or hospital stays. This index can be searched to identify groups of patients with a particular condition of interest in the Olmsted

County population. This is a unique resource that captures virtually the entire Olmsted County population<sup>18</sup> and allows for comprehensive medical record review.

### Participants and procedure

In this study, we utilised the REP to identify patients with fibromyalgia. To do so, we used the REP diagnostic index to retrieve a list of all Olmsted County residents aged 21 years and older who had received a diagnosis of fibromyalgia (HICDA code 07893-21-3 or ICD-9 code 729.1 (myalgia, myositis, fibromyositis, or fibromyalgia)) between 1 January 2005 and 31 December 2009. Since these codes are not specific to fibromyalgia and include other diagnoses such as myalgia and myositis, individual medical records of all of the patients retrieved in this search were reviewed to confirm a diagnosis of fibromyalgia by a healthcare provider. Of the 3410 patients identified, 86 declined authorisation for medical record review. Medical records were reviewed to evaluate the presence of a number of medical and psychiatric comorbidities most commonly reported in patients with fibromyalgia.<sup>8–12</sup> These included degenerative joint disease/arthritis, rheumatoid arthritis, systemic lupus erythematosus, plantar fasciitis, migraines/chronic headaches, temporomandibular joint disorder, chronic pelvic pain, endometriosis, irritable bowel, irritable bladder, anxiety, depression, dysthymia, bipolar disorder, insomnia, restless legs syndrome and metabolic syndrome. Given the retrospective nature of this study and the limited variables available to define metabolic syndrome, for the purpose of this study, metabolic syndrome was defined as the presence of two of more of the following: body mass index (BMI) greater than 30, diabetes mellitus type II, hypertension and hyperlipidaemia. Information regarding use of medications related to fibromyalgia was also abstracted as of the reference date (31 December 2012). These included serotonin norepinephrine reuptake inhibitors (SNRIs),  $\alpha$ -2- $\delta$  ligands, tricyclic antidepressants, selective serotonin reuptake inhibitors (SSRIs), opioids, tramadol, skeletal muscle relaxants, benzodiazepines, sleep aids and other psychiatric medications. Sleep aids included zolpidem, zaleplon, eszopiclone, trazodone and melatonin. Other psychiatric medications included lithium, monoamine oxidase inhibitors, antipsychotics, bupropion, lamotrigine and tetracyclic antidepressants.

### Statistical analysis

Descriptive statistics were calculated from demographic variables and recorded as means and SDs. The total number of patients with each chronic condition was determined and reported as per cent of the total sample. Similarly, the use of medications in each class as documented in the medical record was reported as per cent of the total sample. In order to determine the number of patients with multiple conditions, a total number of chronic conditions was determined for each patient. This process was repeated with medications.

All participants provided consent for use of their medical records for research.

## RESULTS

A total of 1111 patients had a diagnosis of fibromyalgia confirmed via medical record review. Patients in this cohort had a mean age of 59.4 (SD 14.2) and a mean BMI of 30.8 (SD 7.7). As expected based on the prevalence of fibromyalgia in the general population,<sup>6,7</sup> the majority of our sample was female (93.7%). The average duration of fibromyalgia, based on the date diagnosis first appeared in the medical record, was 11.1 years (SD 6.0).

Greater than 50% of the sample had seven or more chronic conditions (figure 1A). Chronic joint pain/degenerative arthritis was the most frequent comorbidity (88.7%), followed by depression (75.1%), migraines/chronic headaches (62.4%) and anxiety (56.5%). Of the sample, 50.5% met criteria for metabolic syndrome. A list of all medical and psychiatric conditions abstracted is reported in table 1.

Medication use is also reported in table 1. Approximately, 40% of patients were taking three or more medications for symptoms of fibromyalgia (figure 1B). Sleep aids were the most commonly prescribed medications in our sample (33.3%) followed by SSRIs (28.7%), opioids (22.4%) and SNRIs (21.0%). Overall, 31.4% of our sample was taking either tramadol or an opioid.

We also evaluated conditions that co-occurred most frequently and medications that were used most frequently together, as reported in table 2.

The conditions that most commonly occurred together were chronic joint pain/degenerative arthritis and depression (67.4%), followed by chronic joint pain/degenerative arthritis and migraines/chronic headaches (56.5%), and chronic joint pain/degenerative arthritis and anxiety (51.2%). The medications that were used most frequently together were sleep aids and SSRIs (11.7%), sleep aids and opioids (9.3%), and sleep aids and other psychiatric medications (9.1%).

## DISCUSSION

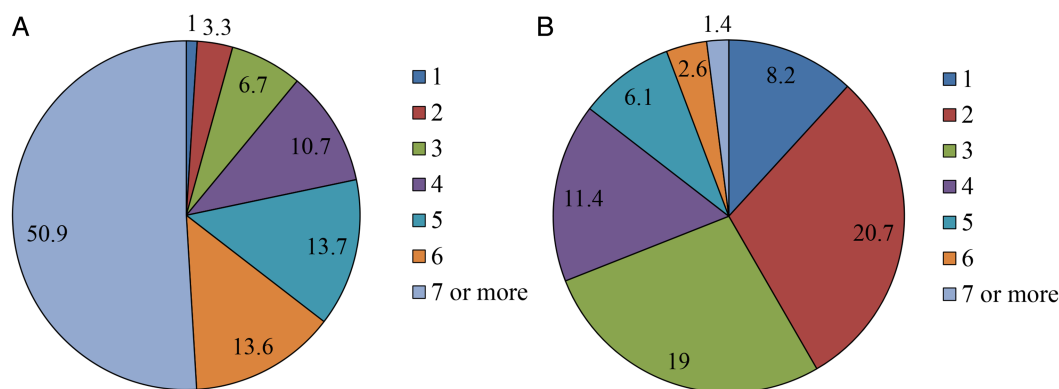
The results of our study highlight the problem of multiple chronic conditions in fibromyalgia. Notably, greater than 50% of our sample had seven or more chronic

**Table 1** Co-occurring medical conditions and prescription medications among fibromyalgia patients

Characteristic	N (%)
<b>Medical conditions</b>	
Chronic joint pain/degenerative arthritis	986 (88.7)
Migraines/chronic headaches	693 (62.4)
Hyperlipidaemia	562 (51.3)
Obesity (BMI >30)	519 (48.0)
Hypertension	508 (46.2)
Irritable bowel	361 (32.5)
Plantar fasciitis	276 (24.8)
Diabetes mellitus, type II	196 (17.9)
Temporomandibular joint disorder	193 (17.4)
Chronic pelvic pain	170 (15.3)
Endometriosis (confirmed, females only)	91 (8.2)
Rheumatoid arthritis	59 (5.3)
Irritable bladder	44 (4.0)
Systemic lupus erythematosus	17 (1.5)
<b>Mental health conditions</b>	
Depression	834 (75.1)
Anxiety	628 (56.5)
Dysthymia	216 (19.4)
Bipolar disorder	65 (5.9)
<b>Sleep conditions</b>	
Insomnia	562 (50.6)
Restless legs syndrome	225 (20.3)
<b>Medications</b>	
Sleep aids	370 (33.3)
SSRI	319 (28.7)
Opioids	249 (22.4)
SNRI	233 (21.0)
$\alpha$ -2- $\delta$ ligands	215 (19.4)
Benzodiazepines	214 (19.3)
Other psychiatric medications*	206 (18.5)
Tricyclic antidepressants	190 (17.1)
Tramadol	174 (15.7)
Skeletal muscle relaxants	167 (15.0)

\*Other psychiatric medications include lithium, monoamine oxidase inhibitors, antipsychotics, bupropion, lamotrigine and tetracyclic antidepressants.  
BMI, body mass index; SNRI, serotonin norepinephrine reuptake inhibitor; SSRI, selective serotonin reuptake inhibitor.

conditions and the most frequent of those were other pain disorders (chronic joint pain/degenerative arthritis



**Figure 1** Pie charts demonstrating the percentage of patients with fibromyalgia who have multiple comorbidities (panel A) and the percentage of patients who are taking multiple medications (panel B).

**Table 2** Most common combinations of conditions and medications in patients with fibromyalgia

Condition 1	Condition 2	N (%)
Chronic joint pain/degenerative arthritis	Depression	749 (67.4)
Chronic joint pain/degenerative arthritis	Chronic headaches/migraines	628 (56.5)
Chronic joint pain/degenerative arthritis	Anxiety	569 (51.2)
Depression	Anxiety	560 (50.4)
Depression	Chronic headaches/migraines	553 (49.8)
Chronic joint pain/degenerative arthritis	Insomnia	524 (47.2)
Chronic joint pain/degenerative arthritis	Obesity (BMI >30)	467 (43.2)
Chronic joint pain/degenerative arthritis	Hypertension	473 (43.0)
Medication 1	Medication 2	
Sleep aids	SSRI	130 (11.7)
Sleep aids	Opioids	103 (9.3)
Sleep aids	Other psychiatric medications*	101 (9.1)
Sleep aids	SNRI	97 (8.7)
Sleep aids	$\alpha$ -2- $\delta$ ligands	92 (8.3)
Opioids	SSRI	88 (7.9)
Sleep aids	Tramadol	85 (7.7)
Sleep aids	Benzodiazepines	80 (7.2)

\*Other psychiatric medications include lithium, monoamine oxidase inhibitors, antipsychotics, bupropion, lamotrigine and tetracyclic antidepressants.

BMI, body mass index; SNRI, serotonin norepinephrine reuptake inhibitor; SSRI, selective serotonin reuptake inhibitor.

and migraines/chronic headaches), depression and anxiety. Given that the presence of unrefreshing sleep is included in the 2010 fibromyalgia diagnostic criteria,<sup>19</sup> it was not surprising that a high percentage (over 50%) of our sample had a diagnosis of insomnia. While a high prevalence of obesity in fibromyalgia has been previously reported<sup>20–22</sup> and is present in our sample, we did not expect to observe so many cases of hypertension, hyperlipidaemia and diabetes mellitus that resulted in over 50% of our sample meeting criteria for metabolic syndrome. Our results add to the growing body of evidence regarding the importance of considering the cumulative burden of multiple chronic conditions in fibromyalgia.

The presence of other pain conditions and anxiety and depressive disorders can contribute to the overall symptom burden in individual patients with fibromyalgia. Having fibromyalgia, in itself, is challenging for patients, due to the lack of effective management modalities. When this problem is exacerbated by the presence of other pain disorders, the burden of pain to a patient with fibromyalgia is increased. Further complicating this is the high prevalence of depression and anxiety in fibromyalgia, which can amplify fibromyalgia symptoms and make it difficult to sort out causal relationships. For example, in order to effectively manage insomnia, it would be useful to determine whether the insomnia results from depression or sleep disturbance from pain. If clinical management of fibromyalgia is to be most effective, evaluations should also take into consideration the assessment and management of multiple chronic conditions that also influence a patient's overall symptom burden.

Another important finding in our study was the high prevalence of the use of multiple medications in

fibromyalgia. Although pain, anxiety and depression were the most common chronic conditions, sleep aids were the most commonly prescribed medications in our sample. This may be reflective of the bidirectional relationship of sleep with pain, anxiety and depression. Additionally, greater than 40% of the sample were prescribed three or more medications for fibromyalgia management, and interestingly, greater than 10% were prescribed five or more medications for symptom management. This is concerning in that although these medications may have therapeutic effects, the side effects of these medications could contribute to worsening comorbidity. For example, SNRIs that are Food and Drug Administration (FDA) approved for fibromyalgia have both weight gain and increased blood pressure as side effects.<sup>13 15</sup> Although the use of these medications to lower pain and improve mood in fibromyalgia may be appropriate, their use could exacerbate other chronic conditions such as hypertension and obesity. Also, increased weight, through its physical effects on joints, could worsen chronic joint pain/degenerative arthritis. Interestingly, a large percentage of patients were using opioids (22.4%), despite the lack of definitive data supporting their use in fibromyalgia. This indicates the challenge of effectively managing chronic pain in this population. A large percentage of patients were also using benzodiazepines (19.3%), although it was unclear whether they were prescribed for anxiety, sleep or both. The use of sedating medications such as opioids and benzodiazepines in patients with fibromyalgia with sleep disorders (eg, sleep disordered breathing) could be problematic. Therefore, the influence of multiple medications on a patient's multiple chronic conditions should be considered prior to prescribing.

A recent paper by Rocca *et al*<sup>23</sup> provides estimates of the prevalence of five of the chronic conditions also assessed in our study in general population of Olmsted County. Among those aged 50–69 years in the general population, the prevalence of arthritis, hyperlipidaemia, hypertension, diabetes and depression was 13.2–22.2%, 33.2–50.6%, 23.8–42.9%, 15.9–26.6% and 12.0–14.5%, respectively. Except for diabetes, these conditions appear to be more common in our sample of patients with fibromyalgia.

This study was unique in that use of the REP allowed us conduct exhaustive medical record review in a large sample of community-dwelling adults with fibromyalgia. However, the results of our study may not be generalisable to other samples of patients with very different characteristics. Additionally, as we were primarily interested in evaluating the presence of chronic medical conditions that were commonly observed in the clinical care of patients with fibromyalgia, we did not include all possible medical and psychiatric conditions in this study. Another limitation is that 86 of the 3410 patients originally identified did not provide authorisation for researchers to use their medical records, and therefore could not be included in the medical record review, which is a potential source of bias. Despite these potential limitations, this report of multiple chronic conditions and medication use in a community-dwelling sample of patients with fibromyalgia adds substantially to the literature.

To conclude, multiple chronic conditions and the use of multiple medications are highly prevalent in patients with fibromyalgia and pose a unique challenge to the management of this condition. Clinicians who care for patients with fibromyalgia should take into consideration the presence of multiple chronic conditions when recommending medications. Furthermore, properly addressing these multiple chronic conditions may mitigate the patient's overall illness burden.

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**Contributors** AV, MOW and JLSS were involved in conception and design. AV, MOW, SJM, KMA and JLSS were involved in acquisition, analysis or interpretation of data, and drafting the work or revising it critically for important intellectual content, and final approval of the version to be published. AV, MOW, SJM, KMA and JLSS were in agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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**Competing interests** None.

**Ethics approval** Mayo Clinic Institutional Review Board.

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**Data sharing statement** No additional data are available.

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