

Epidemiology of Fibromyalgia

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Chronic widespread pain, the cardinal symptom of fibromyalgia (FM), is common in the general population, with comparable prevalence rates of 7.3% to 12.9% across different countries. The prevalence of FM in the general population was reported to range from 0.5% to 5% and up to 15.7% in the clinic. The common association of FM with other rheumatic disorders, chronic viral infections, and systemic illnesses has been well documented in several studies. Up to 65% of patients with systemic lupus erythematosus meet the criteria for FM. FM is considered a member of the family of functional somatic syndromes. These syndromes are very common and share a similar phenomenology, epidemiologic characteristics, high rates of occurrence, a common pathogenesis, and similar management strategies. A high prevalence of FM was demonstrated among relatives of patients with FM and it may be attributed to genetic and environmental factors.

Introduction

The interest in chronic pain has increased considerably in the past decade. Evaluation of the prevalence of pain in populations has clinical and economic relevance. Pain often is associated with disability and is a major factor affecting quality of life. Chronic musculoskeletal pain is common in the general population, with a prevalence of 35% to 50% according to several studies from the United States and Western Europe [1–3].

Chronic widespread pain (CWP) is the cardinal symptom of fibromyalgia (FM) syndrome. It was given a standard definition by an American College of Rheumatology (ACR) committee [4]. This definition emphasized that axial pain was a constant feature and that pain had to be present in the upper and lower quadrants and the right and left sides of the body. Recent studies have reported that CWP is common in the general population and its prevalence (7.3% to 12.9%) is comparable in reports from the United States, UK, Canada, and Israel [5–9].

Fibromyalgia is an idiopathic, chronic pain syndrome defined by widespread nonarticular musculoskeletal pain

and generalized tender points [4,10]. A constellation of ancillary symptoms may be present, including headache, fatigue, sleep disturbances, irritable bowel syndrome (IBS), paresthesias, fluctuation of symptoms in response to changes in weather or stress level, and other manifestations. The prevalence of FM in the general population was estimated in the United States to be 2%; it affects women (3.4%) more frequently than men (0.5%) [11]. The prevalence of the syndrome increases with age (approximately 1% in women who are 18 to 29 years of age and approximately 7% in women who are 70 to 79 years of age). Clinical studies, including studies in specialty and general clinics, also have found FM to be common in countries worldwide [12•].

The purpose of this article is to review the epidemiology of CWP and FM in different settings.

Chronic Widespread Pain in the General Population

Pain complaints in general and CWP in particular are common in the community. The definition of CWP according to the 1990 ACR criteria [4] gave uniformity and standardization for comparing outcomes of prevalence studies around the world. This article focuses on studies using these criteria for the definition of CWP.

Epidemiologic studies reported comparable prevalence rates of CWP in the UK [6,7], Canada [8], Israel [9], United States [11], and Sweden [13]. These rates range from 7.3% to 12.9% (Table 1). Croft *et al.* [6] found a prevalence of 11.2% in a cross-sectional postal survey of 2034 adults in northern England. The symptom of pain was associated strongly with other somatic complaints and with measures of depression and anxiety [6]. Another study from the UK reported a similar prevalence rate of 13% [7]. It was suggested that psychologic distress is associated with CWP in addition to any effect on whether consultation is sought for symptoms [7]. Hunt *et al.* [14] used a more restrictive definition for CWP than the ACR criteria: the Manchester definition of CWP. This definition requires that any limb pain needs to have a minimum disturbance before it contributes to widespread pain. The latter is classified according to the ACR description. The point prevalence of Manchester-defined CWP was 4.7% and was associated with psychologic disturbance, fatigue, low levels of self-care, and with the reporting of other somatic symptoms [14]. Wolfe *et al.* [11] determined the distribution of pain groups in a random sample of 3006 patients in Wichita,

Table 1. The prevalence of chronic widespread pain in the general population

Study	Country	Patients, n	Women, %	Age range, years	Prevalence estimate, %		
					Overall	Female	Male
Croft <i>et al.</i> [6]	United Kingdom	2034	57.3	18–85	11.2	15.6	9.4
Macfarlane <i>et al.</i> [7]	United Kingdom	1953	57.2	18–65	12.9	14.7	10.5
White <i>et al.</i> [8]	Canada	3395	61.6	18+	7.3	N/A	N/A
Buskila <i>et al.</i> [9]	Israel	2210	60	18–86	9.9	14	3.3
Wolfe <i>et al.</i> [11]	United States	3006	N/A	18+	10.6	N/A	N/A
Bergman <i>et al.</i> [13]	Sweden	2425	52.7	20–74	11.4	15.3	7.5

N/A—nonapplicable.

Kansas. CWP was present in 10.6% and regional pain in 20.1%. In Canada, White *et al.* [8] reported a rate of 7.3%. A cross-sectional population survey of 2210 adults in Israel showed that 44% reported pain on the day of the interview [9]. The prevalence of CWP was estimated to be 9.9%; it was more frequent in women than in men and it increased with age. Patients with CWP reported frequent visits to their physician and increased use of analgesic medications. They were referred to specialists more frequently and tended to be hospitalized more often. The remarkable similarity among studies from different countries may suggest that CWP is a universal phenomenon that is unaffected by social and cultural differences. However, a few other studies reported lower prevalence rates of CWP in Pima Indians [15] and in southwest Sweden [16].

Fibromyalgia in the General Population

Throughout the past several years, numerous general population surveys were conducted to assess the prevalence of FM (Table 2). Prescott *et al.* [17] reported the results of a survey of 1219 Danish adults between the ages of 18 and 79 years. The estimated minimum prevalence of FM was 0.66%. Wolfe *et al.* [11] reported on the findings of a mailed survey of 3006 adults 18 years of age and older who were living in Wichita, Kansas. The age- and sex-adjusted prevalence of FM was estimated to be 2% overall (3.4% in women and 0.5% in men). Demographic and social characteristics associated with the presence of FM were female sex, being divorced, failure to complete high school, and low income. With regard to health services use and disability, a greater proportion of patients with FM versus those without it had visited a physician in the previous 6 months and had applied for disability benefits [11].

Farooqi and Gibson [18] compared the frequency of rheumatic symptoms (point prevalence), including fibromyalgia, among 1997 adults distributed evenly among three different sociodemographic communities in north Pakistan. FM affected 2.6%, 3.2%, and 0.1% of the rural, poor urban, and affluent urban adult population, respectively. Forseth *et al.* [19] found a rather high incidence of FM in a Norwegian population survey among women between the ages of 26 and 55 years. The calculated annual

incidence of FM was 58.3 per 100,000 [19]. Ethnic differences in the perception of widespread pain and different design of the studies may explain the various results.

White *et al.* [8] reported the results of a large community survey (3395 adults) screening for CWP. They identified a cohort of 100 cases of FM, yielding an overall age- and sex-adjusted prevalence of 3.3% (4.9% in women and 1.6% in men). The FM rates increased with age. Subjects with FM had more severe pain and fatigue, more symptoms, and worse overall health compared with patients who had CWP only [20].

The results of a study from Sweden indicated a low prevalence of FM within an urban and rural population, with dominance of middle-aged and older women. The prevalence of FM was estimated to be 1.3% at the most [16].

Fibromyalgia in the Clinic

In 1981, Epstein and Henke [21] reported that the prevalence of FM (known then as fibrositis) was 2% in university-based practices compared with 6% in community rheumatology practices. In contrast, patients with FM accounted for 16% of new patients seen in the first year in a rheumatology practice in the United States [22]. Today, FM is recognized as a common entity in the clinic in different countries. A high prevalence of FM was reported by rheumatologists in Mexico, Spain, Australia, and the United States, ranging from 10.2% to 15.7% [23–26]. White *et al.* [27] conducted a cross-sectional random mail survey among Canadian rheumatologists to determine the perceived proportion of FM among new consultations in the rheumatology practices relative to other rheumatologic disorders. FM was listed as one of the three most common diagnoses among new patients. Perceived incidence was not related to urban size or university affiliation. FM was the only rheumatologic disorder thought to have increased during the past 5 years [27]. The prevalence of FM was 4.4% with a female:male ratio of 9:1 in a register of Dutch rheumatologic practices [28].

Soft tissue syndromes were the most common rheumatic diagnoses among Gulf War veterans who were referred for rheumatology consultations [29]. Seventeen

Table 2. The prevalence of fibromyalgia in the general population

Study	Country	Patients, <i>n</i>	Age range, years	Prevalence estimate, %		
				Overall	Female	Male
White <i>et al.</i> [8]	Canada	3395	18+	3.3	4.9	1.6
Wolfe <i>et al.</i> [11]	United States	3006	18+	2	3.4	0.5
Lindell <i>et al.</i> [16]	Sweden	2425	20–74	1.3	2.4	0
Prescott <i>et al.</i> [17]	Denmark	1219	18–79	0.66	1.25	N/A
Farooqi and Gibson [18]	Pakistan	1997	15+	1.5	N/A	N/A

N/A—nonapplicable.

percent of Gulf War veterans were diagnosed with FM. It is suggested that stress may partly explain this high frequency. Escalante and Fishbach [30] evaluated the first 145 patients with unexplained symptoms self-attributed to their participation in the Gulf War who were referred to a rheumatology clinic for evaluation of their rheumatic complaints. Widespread body pain was present in 65.1% of the veterans. The most common diagnosis was FM, which was present in 49 patients (33.8%). It was concluded that widespread pain and FM are common in these patients and their health-related quality of life is poor.

Fibromyalgia in Hospitalized and Institutionalized Patients

Data on the prevalence of chronic musculoskeletal pain complaints in hospitalized patients are sparse. One study estimated the prevalence of FM to be only 7.5% in a hospital setting in Germany [31]. In another study in England, which investigated how often the locomotor system is omitted from routine medical records, FM was found in 5% of the hospitalized patients [32].

Buskila *et al.* [33•] estimated the prevalence of musculoskeletal pain and FM in 522 patients hospitalized on internal medicine wards. Sixty-two percent of the patients reported pain, 36% reported chronic regional pain, 21% reported chronic widespread pain, and 5% reported transient pain. Fifteen percent of all of the patients had FM, most of whom (91%) were women. The prevalence of CWP and FM in women increased with age. Sleep problems, headache, and fatigue were highly prevalent, especially among those with CWP. Patients with CWP reported more visits to family physicians (6.2 visits per year) and more frequent use of drugs. They also were referred more frequently to rheumatologists and reported more hospitalizations [33•]. The authors have assessed (unpublished data) the prevalence of CWP and FM in two geriatric populations: community ($n = 153$) and institutions ($n = 147$). Approximately 74% of the patients were women and the mean age was 79 years. Thirty-six percent of the community subjects (who lived in their own home) and 40% of the institutionalized patients reported CWP; FM was found in 5.9% and 8.8%, respectively.

Fibromyalgia and Associated Conditions

The common association of FM with other rheumatic disorders, infections, and systemic illnesses has been well documented in several studies (Table 3). Up to 65% of rheumatology clinic patients with systemic lupus erythematosus (SLE) met the ACR criteria for FM [34]. Forty percent of 75 patients with SLE had coexistent FM, which adversely affected their quality of life [35]. Fifty-seven percent of the patients with rheumatoid arthritis and 24% of those with psoriatic arthritis were found to have FM [36]. In another study, 40% of male patients with osteoarthritis and 55% of female patients with osteoarthritis fulfilled the criteria for FM [37]. Ten of 108 patients (9.2%) with Behçet's disease were diagnosed with FM [38]. In contrast to patients without FM, patients with FM had mild to moderate disease activity. Several papers provided evidence for the association of soft tissue rheumatism/FM and joint hypermobility [39–41].

Fibromyalgia was documented in 30 of 113 (27%) patients with inflammatory bowel disease, specifically in 42% of patients with Crohn's disease and 19% with ulcerative colitis versus 0% in the control subjects [42].

Women with hyperprolactinemia [43] and thyroid disease [44] appear to have a significantly increased risk for FM. Seventy-one percent of women with hyperprolactinemia had FM compared with only 4.5% of normoprolactinemic women examined in a fertility unit [43].

Increased prevalence of FM was reported in HIV [36] and hepatitis C virus (HCV) [45] infections. Twenty-nine percent of 51 patients with HIV had FM that was associated with myalgia and arthralgia, but not with age, duration of HIV infection, or stage of HIV disease [36]. Sixteen percent of patients with HCV (mostly women) had FM; however, the highest prevalence of FM, 24%, was observed in the group of patients with advanced HCV liver disease [45].

Fibromyalgia was diagnosed after physical trauma in 21.6% of 102 patients with neck injury versus 1.7% of 59 patients with lower extremity fractures [46]. A 3-year follow-up of 78 cases of the neck injury cohort has demonstrated that 60% of those who had FM still suffered from it 3 years later [47].

Table 3. The prevalence of fibromyalgia in associated conditions

Condition	Study	Patients with fibromyalgia, %
Systemic lupus erythematosus	Romano [34]	65
Systemic lupus erythematosus	Abu-Shakra <i>et al.</i> [35]	40
Rheumatoid arthritis	Buskila <i>et al.</i> [36]	57
Psoriatic arthritis	Buskila <i>et al.</i> [36]	24
HIV infection	Buskila <i>et al.</i> [36]	29
Inflammatory bowel disease	Buskila <i>et al.</i> [42]	27
Hyperprolactinemia	Buskila <i>et al.</i> [43]	71
Hepatitis C virus infection	Buskila <i>et al.</i> [45]	16
Irritable bowel syndrome	Veale <i>et al.</i> [52]	70
Irritable bowel syndrome	Sperber <i>et al.</i> [53]	32
Chronic fatigue syndrome	Goldenberg <i>et al.</i> [54]	70

Fibromyalgia: A Member of the Family of Functional Somatic Syndromes

The term functional somatic syndrome has been applied to several related syndromes that are characterized more by symptoms, suffering, and disability than by disease-specific demonstrable abnormalities of structure or function [48]. They include FM, chronic fatigue syndrome (CFS), IBS, multiple chemical sensitivity, chronic whiplash, migraine headaches, and irritable urinary bladder [49]. These syndromes share a similar phenomenology, high rates of co-occurrence, similar epidemiologic characteristics, common pathogenesis, and similar management strategies [48,49].

Estimates of the prevalence of IBS in patients with FM range from 30% to 35% [50,51] to as high as 70% [52]. Sperber *et al.* [53] have conducted complementary studies of the prevalence of FM in patients with IBS and matched control subjects, of IBS in patients with FM, and the implications of concomitant IBS and FM on health-related quality of life. In the IBS study, 31.6% of the IBS patients and 4.2% of the control subjects had FM. Statistically significant differences were found among the study groups in terms of global well being, sleep disturbance, physician visits, pain, anxiety, and global severity index, with patients with IBS and FM having the worst results. Patients with IBS had significantly more tender points than the control subjects. In the FM study, 32% of 100 FM patients had IBS. Patients with both disorders had significantly worse scores for physical functioning and quality of life [53].

A high frequency of FM was documented in patients with chronic fatigue seen in a primary care practice [54]. Seventy percent of patients with chronic fatigue had persistent diffuse musculoskeletal pain and the results of their tender point examinations were similar to those with FM [54]. Patients with CFS and FM frequently reported symptoms compatible with multiple chemical sensitivities (MCS). Likewise, 70% of patients with FM and 30% of those with MCS met the criteria for CFS [55]. In another study, 33 of 60 patients with FM met criteria for MCS [56]. Clauw *et al.* [57] reported that interstitial cystitis (IC) and

FM have significant overlap symptomatology and that patients with IC display diffusely increased pain, which also is seen in FM.

The authors have reported [58••] that 57% of 77 FM patients had clinically significant levels of post-traumatic stress disorder (PTSD). The prevalence of PTSD among the FM patients in this study was significantly higher than in the general population. These results are similar to those reported by Sherman *et al.* [59] who showed that 56% of FM patients reported PTSD-like symptoms.

Clauw [60••] has reviewed the issue of FM-associated syndromes using the term chronic multisymptom illnesses. This term was coined by the Centers for Disease Control and Prevention to describe patients with multiple chronic somatic symptoms [61]. It was demonstrated again that CM, such as FM, are extremely common and the hallmark of these syndromes include non-nociceptive pain, fatigue, memory difficulties, and dysfunction of visceral organs [60••].

Fibromyalgia in Relatives of Patients with Fibromyalgia

Several studies have addressed the frequency of FM in families of patients with FM. Roizenblatt *et al.* [62] observed 34 children with FM and found that 71% of their mothers had undiagnosed FM. Yunus *et al.* [63] observed 37 multicasé families with FM with at least two affected first-degree relatives and found that 74% of the probands' siblings, 53% of children, and 30% of parents had FM.

Buskila *et al.* [64] studied the familial occurrences of FM in 58 offspring from 20 complete nuclear families ascertained through affected mothers with FM. Twenty-eight percent (16 of 58) were found to have FM. The male:female ratio among those affected was 0.8 compared with 1.5 in the whole study group. Because psychological and familial factors were not different in children with and without FM, it was suggested that the high occurrence of this syndrome may be attributed to genetic factors [64]. The authors further observed [65] 30 female patients with

FM and 117 of their close relatives (parents, brothers, sisters, children, and husbands). The prevalence of FM among blood relatives of patients with FM was 26% and 19% among their husbands. FM prevalence in male relatives was 14% and 41% in female relatives. It was suggested that the higher prevalence of FM among these relatives could be attributed to genetic and environmental factors [65]. The quality of life and physical functioning of these relatives were found to be impaired, especially in female relatives and those with undiagnosed FM [66].

Juvenile Fibromyalgia

Relative to the volume of literature on FM in adults, less work has been published concerning children. The prevalence of FM was assessed in 338 children between the ages of 9 and 15 years (179 boys and 159 girls) in Israel [67]. Twenty-one of 338 (6.2%) were found to have FM. Clark *et al.* [68] reported that the prevalence of FM in school children in Mexico reached 1.2%, which is five-fold lower than the previous report from Israel [67]. It was hypothesized that this variance may result from racial and socio-cultural differences between populations and from differences in methodologic approach. Buskila *et al.* [69] found that tenderness thresholds varied across three ethnic groups in Israel. Israeli-born Jewish children were less tender than Bedouin Arab children, who in turn were less tender than Ethiopian Jewish children. Buskila *et al.* [67] found a favorable outcome of FM in children. Eleven of 15 children (73%) who had been diagnosed initially with FM [67] had ceased to fulfill the FM criteria 30 months later [70].

Conclusions

The establishment of the 1990 ACR criteria for the classification of FM [4] provided uniformity that is particularly important for epidemiologic studies and clinical trials. These criteria prompted extensive research on the prevalence of FM in different clinical settings, populations, and cultures. It was found that FM is common in countries worldwide in the general population, in the clinic, and in associated conditions. The prevalence of CWP, the cardinal symptom of FM, was found to range from 7.3% to 12.9%, with comparable rates in the United States, Canada, UK, Sweden, and Israel.

Fibromyalgia is considered to be part of the functional syndrome spectrum. These syndromes, such as FM, CFS, and IBS are very common in the general population and their hallmarks include pain, fatigue, cognitive problems, and dysfunction of visceral organs. FM is more common in relatives of patients with FM; this may suggest the contribution of genetic and environmental factors.

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