

# Worldwide Epidemiology of Fibromyalgia

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**Abstract** Studying the epidemiology of fibromyalgia (FM) is very important to understand the impact of this disorder on persons, families and society. The recent modified 2010 classification criteria of the American College of Rheumatology (ACR), without the need of tender points palpation, allows that larger and nationwide surveys may be done, worldwide. This article reviews the prevalence and incidence studies done in the general population, in several countries/continents, the prevalence of FM in special groups/settings, the association of FM with some sociodemographic characteristics of the population, and the comorbidity of FM with others disorders, especially with headaches.

**Keywords** Epidemiology · Prevalence · Fibromyalgia · Chronic widespread pain · Chronic pain · Headache

## Introduction

Chronic pain is one of the most frequent complaints in medical practice. The International Association for the Study of Pain (IASP) estimates that chronic pain, including musculoskeletal and joint pain, neck and back pain, cancer pain, trauma and post-surgical pain, and chronic headache, afflicts about 20 % (10–55 %) of the adult population, worldwide [1]. It is considered as a major social and economic burden to individuals, to families, and to society, with important physical and psychological consequences to sufferers [2].

Fibromyalgia (FM) is one of the main causes of chronic widespread pain (CWP). It represents a situation in which central nervous sensitization is manifested by CWP, which is

the cardinal symptom of FM, and generalized tender points (hyperalgesia) [3, 4]. Other associated symptoms may be present, including fatigue, sleep disturbances, difficulties with memory and concentration, irritable bowel syndrome, headache, depression. It is debatable if FM is a distinct clinical entity or part of spectrum of CWP [5]. There are still some physicians who deny the validity of this diagnosis, attributing the pain complaints as a manifestation of other clinical and/or psychiatric disorders.

In 1990, the American College of Rheumatology (ACR) published some criteria for the classification of CWP and FM [6]. The proposed criteria for FM were: CWP in combination with tenderness at 11 or more of 18 specific tender point sites. CWP was defined as pain for at least three months, in the axial skeleton plus pain in the left and the right side of the body, and pain above and below the waist. Ten years later (2010), the ACR introduced new preliminary diagnostic criteria [7•], which would also be suitable for use by primary care physicians, as it did not require tender points examination, referred by many as difficult to apply and to interpret. The examination of tender points was also an impediment for doing large, nationwide epidemiological studies on FM, as they required all subjects with CWP to be examined by specialists. In 2011, the same group published a modification of the 2010 ACR criteria [8••], developing a survey questionnaire for epidemiological and clinical studies, which allows easier future larger, nationwide surveys.

Epidemiological studies are important to better understand the extent of the problem in general populations or specific settings, in order to calculate the appropriated resources to provide adequate assistance to FM sufferers.

## Prevalence of Fibromyalgia

The prevalence of FM has been estimated in many studies in different settings, areas and countries, and on four continents: Africa, the Americas, Asia, and Europe. There was only one

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study in Africa, in Tunisia [9], and none in Oceania. The epidemiological studies in adults of the general populations are depicted in Table 1. The global mean prevalence of FM was 2.7 %, ranging from 0.4 % in Greece [26] to 9.3 % in Tunisia [9]. The mean rate was 3.1 % in the Americas, 2.5 % in Europe, and 1.7 % in Asia. In women, the mean prevalence was 4.2 % and in men 1.4 %, with a female-to-male ratio of 3:1. Most of these studies were done in some specific areas/towns/cities of the country; nationwide prevalence rates were only estimated in Canada [12], France [21, 22], Finland [23], Germany [24, 25], Israel [3], Italy [24], Portugal [24], and Spain [24, 28].

There were three recent studies using the 2010 ACR criteria for diagnosing FM, in the USA [14], in Germany [25], and in Thailand (Abstract) [19]. Although this new criteria has an increased sensibility and decreased specificity in relation to the 1990 ACR criteria, it seems that it does not result in higher prevalence rates of FM in epidemiological surveys [25].

The prevalence of FM was also estimated in specific populations or settings. In women, the rates were 10.5 % in Arendal, Norway (20 to 49 years) [31] and 3.6 % in Trabzon, Turkey (20 to 64 years) [32]. In Mexican school children, aged 9–15 years, the prevalence was 1.2 % [33]. In elderly

**Table 1** Prevalence of fibromyalgia in the general population

Country	Author	Case definition	N	Age range (y)	Prevalence (%)		
					Overall	Female	Male
<b>Africa</b>							
Tunisia	Guermazi [9]	LFESSQ	1,000	≥15	9.3	–	–
<b>Americas</b>							
Brazil	Senna [10]	COPCORD	3,038	≥16	2.5	3.9	0.1
Canada	White [11]	1990 ACR	3,395	≥18	3.3	4.9	1.6
Canada	McNally [12]	Self-reported	131,535	≥12	1.1	1.8	0.3
USA	Wolfe [13]	1990 ACR	3,006	≥18	2.2	3.4	0.5
USA	Vincent [14]	2010 ACR	3,410	≥21	6.4	7.7	4.9
<b>Asia</b>							
Bangladesh	Haq [15]	COPCORD	5,211	≥15	3.6	6.2	0.9
China	Scudds [16]	1990 ACR	1,467	–	0.8	–	–
Israel	Ablin [3]	LFESSQ + 1990 ACR	1,019	≥18	2.0	2.8	1.1
Malaysia	Veerapen [17]	COPCORD	2,594	≥15	0.9	1.5	0.2
Pakistan	Farooqi [18]	COPCORD	1,997	≥15	2.1	–	–
Thailand	Prateepavanich [19]	2010 ACR	1,000	–	0.6	–	–
<b>Europe</b>							
Denmark	Prescott [20]	1990 ACR	1,219	18–79	0.7	–	–
France	Bannwarth [21]	LFESSQ + 1990 ACR	1,014	≥15	1.4	2.0	0.7
France	Perrot [22]	LFESSQ + 1990 ACR	3,081	≥18	1.6	–	–
Finland	Mäkelä [23]	Yunus criteria	7,217	≥30	0.75	1.0	0.5
Germany	Branco [24]	LFESSQ + 1990 ACR	1,002	≥15	3.2	3.9	2.5
Germany	Wolfe [25]	2010 ACR	2,445	≥14	2.1	2.4	1.8
Greece	Andrianakos [26]	1990 ACR	8,740	≥19	0.4	–	–
Italy	Salaffi [27]	1990 ACR	2,155	≥18	2.2	–	–
Italy	Branco [24]	LFESSQ + 1990 ACR	1,000	≥15	3.7	5.5	1.6
Portugal	Branco [24]	LFESSQ + 1990 ACR	500	≥15	3.6	5.2	1.8
Spain	Branco [24]	LFESSQ + 1990 ACR	1,001	≥15	2.3	3.3	1.3
Spain	Mas [28]	1990 ACR	2,192	≥20	2.4	4.2	0.2
Sweden	Lindell [29]	1990 ACR	2,425	20–74	1.3	2.4	0.0
Turkey	Turhanoglu [30]	1990 ACR	600	–	8.8	12.5	5.1
Mean					2.7	4.1	1.4

LFESSQ London Fibromyalgia Epidemiology Study Screening Questionnaire; COPCORD Community Oriented Program for the Control of Rheumatic Diseases; ACR American College of Rheumatology

subjects, 65 years or older, in São Paulo, Brazil, a rate of 5.5 % was found [34]. In hospitalized patients of a primary care unit of Seoul, South Korea, the rate was 1.7 % [35]. Gallinaro et al. [36] found a 10.4 % prevalence of FM in metalworkers without repetitive strain injuries, and 58.8 % in those with this condition. Among textile workers in Denizli, Turkey, the rate was 7.3 % (9.0 % in females and 0.8 % in males) [37]. In hospital workers in Japan, the rate was 2.0 % in women and 0.5 % in men [38]. In the Amish community of London, Ontario, Canada, the rate was 7.3 % (10.4 % in females and 3.7 % in males) [39]. In a low socioeconomic status population in Embu, São Paulo, Brazil, assisted by the public primary health care system, the rate was 4.4 % [40]. In patients of 16 general practices of Marche, Italy, the rate 2.2 % [27], and in patients of a health insurance company in Germany, the rate was 0.4 % of women and 0.05 % of men [41].

### Incidence of Fibromyalgia

The incidence of FM has been estimated in two studies. Forseth et al. [42] found an incidence in females, aged 20–49 years, living in Arendal, Norway, of 5.83 new cases per 1,000 person–years. Weir et al. [43] reported an incidence rate of 6.88 new cases per 1,000 person–years for males and 11.28 new cases per 1,000 person–years for females, from a health insurance claims database.

### Association of Fibromyalgia with Some Sociodemographic Variables

Many studies have shown that the prevalence of FM is higher either at the middle age (30 to 50 years) [10, 28, 37] or after

50 years of age [3, 12, 13, 23, 24•, 25•, 29, 30, 32]. White et al. [11] reported a peak prevalence in men in middle age, and in women the prevalence increasing steadily with age. The study of Vincent et al. [14•] was the only one that contrasted to the trend of increasing prevalence of FM with older ages; they described a higher rate in young ages (21 to 39 years).

All papers that studied the association of FM with the education level of subjects reported higher prevalence rates of this entity in low educated patients [11, 21, 23, 28, 32]. The same pattern was seen with socioeconomic status: the lower the household income, the higher the FM prevalence rate [11, 12, 28, 32, 37].

Regarding marital status, there was no consensus in the literature. Topbas et al. [32] found that FM was more frequent in widowed patients, Cobankara et al. [37] in married people, and White et al. [11] in divorced ones.

There was also a discrepancy about living in rural or urban areas. McNally et al. [12] in Canada, Mas et al. [8••] in Spain, and Hag et al. [15] in Bangladesh, all reported higher rates of FM in rural areas, whereas Turhanoglu et al. [30], in Turkey, found a higher prevalence in the urban population.

The association of FM with body weight was only mentioned by McNally et al. [12], with higher FM prevalence in obese women.

### Fibromyalgia Comorbidity

The EPIFFAC Study [44], in Spain, reported that 84 % of patients with FM have one or more comorbid diseases: 67 % have other musculoskeletal conditions, 35 % psychological disorders, 27 % gastrointestinal disorders, 23.5 % cardiovascular disorders, and 19 % endocrinological disorders.

**Table 2** Prevalence of fibromyalgia in patients with some types of headache

Author	N	Type of headache	Prevalence of fibromyalgia (%)	Setting	Country
Peres [48]	101	Transformed migraine	35.6	Headache clinic	Brazil
Ifergane [49]	92	Episodic migraine	17.4	Headache clinic	Israel
de Tommaso [50]	217	Primary headaches	36.4	Headache center	Italy
		Migraine	28.5		
		TTH	59.0		
de Tommaso [51•]	849	Primary headaches	19.6	Pain clinic	Italy
		Migraine	17.8		
		TTH	35.1		
Tietjen [52]	1,413	Migraine	6.9	Headache clinics	USA
Tietjen [53]	223	Migraine	11.7	Headache clinic	USA
Le [54•]	8,044	Migraine	1.2	Twins cohort	Denmark
		Migraine with aura	2.1		
		Migraine without aura	0.6		
Küçüksen [55]	118	Migraine	31.4	Headache clinic	Turkey

In hospitalized patients in the USA, the most common comorbidities when FM was the primary diagnosis were: non-specific chest pain, mood disorders, and spondylosis/intervertebral disc disorders/other back problems; with FM as a secondary diagnosis, the most common primary diagnoses were: essential hypertension, disorders of lipid metabolism, coronary atherosclerosis/other heart diseases, and mental disorders [45].

Wolfe et al. [46], in the USA, reported a significant association of FM with: hypertension, other cardiovascular conditions, depression, diabetes, lung diseases, asthma, liver diseases, neurological diseases, thyroid diseases, gastrointestinal disorders, mental illnesses, renal diseases, severe allergies, genitourinary disorders. FM patients have stronger comorbidity with these disorders than patients with rheumatoid arthritis.

Weir et al. [43], in a large health insurance database, in the USA, described that patients with FM were two to seven times more likely to have one or more of the following comorbid conditions: depression, anxiety, headache, irritable bowel syndrome, chronic fatigue syndrome, systemic lupus erythematosus, and rheumatoid arthritis. In Germany, in a statutory health insurance company, 51.9 % of patients with FM were diagnosed with a comorbid depression as well [41].

There is an overlap in the symptomatology and also disease comorbidity among some "functional" conditions, including FM, chronic headache, chronic fatigue syndrome, low back pain, irritable bowel syndrome, temporomandibular joint disorders, major depression, anxiety, panic attack, post-traumatic stress disorder [47].

The prevalence of FM in patients with some types of headache is shown in Table 2. FM is highly prevalent both in migraineurs, with episodic and chronic forms, as well as in patients with tension type headache (TTH). Schur et al. [47] have shown that twins with chronic TTH have 6.6 times more FM than those without it, and patients with FM have 5.0 times more chronic TTH—a bidirectional association. Aaron et al. [56] found five patients (22.7 %) with chronic TTH out of 22 with FM. Marcus et al. [57], reported that 76 out of 100 patients with FM had headaches; 32 had migraines, 18 TTH, 16 combined migraine and TTH, 4 post-traumatic headache, and 6 probable analgesic overuse headache. 84 % of the patients with FM + headache described important or severe impact from their head pain. Ravindran et al. [58] stated that there is a strong association between FM and chronic fatigue syndrome + migraine without aura (47.4 %).

## Conclusion

The global prevalence of FM, in 26 studies worldwide, is 2.7 %. FM is more prevalent in women, in patients over 50 years of age, in subjects with low education level, with

low socioeconomic status, living in rural areas, and possibly in obese women.

FM is comorbid with many diseases, usually called "functional" disorders, such as chronic fatigue syndrome, irritable bowel syndrome, depression, anxiety, panic attacks, and post-traumatic stress disorder.

The association of FM with headache is significant, including episodic and chronic migraine and chronic TTH.

It is desirable and important to have more nationwide epidemiological studies on FM, especially outside of Europe, to have a better view of the prevalence of this disorder worldwide, and to measure the burden of FM on persons, families and society.

## Compliance with Ethics Guidelines

**Conflict of Interest** Dr. Luiz Paulo Queiroz reported no potential conflicts of interest relevant to this article.

**Human and Animal Rights and Informed Consent** This article does not contain any studies with human or animal subjects performed by any of the authors.

## References

Papers of particular interest, published recently, have been highlighted as:

- Of importance
  - Of great importance
1. Harstall C, Ospina M. How prevalent is chronic pain? Pain Clinical Updates [Internet]. 2003, 11:1–4. Available at <http://www.iasp-pain.org/AM/AMTemplate.cfm?Section=Home&CONTENTID=7594&TEMPLATE=/CM/ContentDisplay.cfm&SECTION=Home>. Accessed April 2013.
  2. Azevedo L, Costa-Pereira A, Mendonça L, et al. Epidemiology of chronic pain: a population-based nationwide study on its prevalence, characteristics and associated disability in Portugal. *J Pain*. 2012;13:773–83.
  3. Ablin J, Oren A, Cohen S, et al. Prevalence of fibromyalgia in the Israeli population: a population-based study to estimate the prevalence of fibromyalgia in the Israeli population using the London Fibromyalgia Epidemiology Study Screening Questionnaire (LFESSQ). *Clin Exp Rheumatol*. 2012;30 Suppl 74:39–43.
  4. Neumann L, Buskila D. Epidemiology of fibromyalgia. *Curr Pain Headache Rep*. 2003;7:362–8.
  5. White K, Harth M. Classification, epidemiology, and natural history of fibromyalgia. *Curr Pain Headache Rep*. 2001;5:320–9.
  6. Wolfe F, Smythe HA, Yunus M, et al. The American College of Rheumatology 1990 criteria for the classification of fibromyalgia. *Arthritis Rheum*. 1990;33:160–72.
  7. • Wolfe F, Clauw D, Fitzcharles M, et al. The American College of Rheumatology preliminary diagnostic criteria for fibromyalgia and measurement of symptom severity. *Arthritis Care Res*. 2010;62:600–10. *A change in the concept of FM, excluding tender points sites palpation as an essential diagnostic criterion to make this diagnosis.*
  8. •• Wolfe F, Clauw D, Fitzcharles M, et al. Fibromyalgia criteria and severity scales for clinical and epidemiological studies: a



- modification of the ACR Preliminary Diagnostic Criteria for Fibromyalgia. *J Rheumatol.* 2011;38:1113–22. *A revision of the 2010 diagnostic criteria, developing a survey questionnaire for epidemiological and clinical studies.*
9. Guerhazi M, Ghroubi S, Sellami M, et al. Fibromyalgia prevalence in Tunisia. *Tunis Med.* 2008;86:806–11.
  10. Senna E, De Barros A, Silva E, et al. Prevalence of rheumatic diseases in Brazil: a study using the COPCORD approach. *J Rheumatol.* 2004;31:594–7.
  11. White K, Speechley M, Harth M, Ostbye T. The London fibromyalgia epidemiology study: the prevalence of fibromyalgia syndrome in London, Ontario. *J Rheumatol.* 1999;26:1570–6.
  12. McNally J, Matheson D, Bakowsky V. The epidemiology of self-reported fibromyalgia in Canada. *Chronic Dis Can.* 2006;27:9–16.
  13. Wolfe F, Ross K, Anderson J, et al. The prevalence and characteristics of fibromyalgia in the general population. *Arthritis Rheum.* 1995;38:19–28.
  14. • Vincent A, Lahr B, Wolfe F, et al. Prevalence of fibromyalgia: a population-based study in Olmsted county, Minnesota, utilizing the Rochester epidemiology project. *Arthritis Care Res.* 2013;65:786–92. *A recent epidemiological study, using the 2010 ACR diagnostic criteria for FM.*
  15. Haq S, Darmawan J, Islam M, et al. Prevalence of rheumatic diseases and associated outcomes in rural and urban communities in Bangladesh: a COPCORD study. *J Rheumatol.* 2005;32:348–53.
  16. Scudds R, Li E, Scudds R. The prevalence of fibromyalgia syndrome in Chinese people in Hong Kong. *J Musculoskelet Pain.* 2006;14:3–11.
  17. Veerapen K, Wigley R, Valkenburg H. Musculoskeletal pain in Malaysia: a COPCORD survey. *J Rheumatol.* 2007;34:207–13.
  18. Farooqi A, Gibson T. Prevalence of the major rheumatic disorders in the adult population of north Pakistan. *Rheumatology.* 1998;37:491–5.
  19. Prateepavanich P, Petcharapiruch S, Leartsakulpanitch J. Estimating the prevalence of fibromyalgia and its impacts on health in thais: a community-survey in Bangkok, Thailand [Abstract]. *Value in Health.* 2012;15:A678.
  20. Prescott E, Kjølner M, Jacobsen S, et al. Fibromyalgia in the adult Danish population: I. A prevalence study. *Scand J Rheumatol.* 1993;22:233–7.
  21. Bannwarth B, Blotman F, Roué-Le Lay K, et al. Fibromyalgia syndrome in the general population of France: a prevalence study. *Joint Bone Spine.* 2009;76:184–7.
  22. • Perrot S, Vicaut E, Servant D, Ravaud P. Prevalence of fibromyalgia in France: a multi-step study research combining national screening and clinical confirmation: the DEFI study (Determination of Epidemiology of Fibromyalgia). *BMC Musculoskelet Disord.* 2011;12:224–32. *A nationwide epidemiological study of FM in France.*
  23. Mäkelä M, Heliövaara M. Prevalence of primary fibromyalgia in the Finnish population. *BMJ.* 1991;303:216–9.
  24. • Branco J, Bannwarth B, Failde I, et al. Prevalence of fibromyalgia: a survey in five European countries. *Semin Arthritis Rheum.* 2010;39:448–53. *A large, nationwide epidemiological study of FM in France, Germany, Italy, Portugal, and Spain.*
  25. • Wolfe F, Brähler E, Hinz A, Häuser W. Fibromyalgia prevalence, somatic symptom reporting, and the dimensionality of polysymptomatic distress: results from a survey of the general population. *Arthritis Care Res.* 2013;65:777–85. *A large, nationwide epidemiological study of FM in Germany, using the 2010 ACR diagnostic criteria for FM.*
  26. Andrianakos A, Trontzas P, Christoyannis F, et al. Prevalence of rheumatic diseases in Greece: a cross-sectional population based epidemiological study. The ESORDIG Study. *J Rheumatol.* 2003;30:1589–601.
  27. Salaffi F, De Angelis R, Grassi W, et al. Prevalence of musculoskeletal conditions in an Italian population sample: results of a regional community-based study. I. The MAPPING study. *Clin Exp Rheumatol.* 2005;23:819–28.
  28. Mas A, Carmona L, Valverde M, et al. Prevalence and impact of fibromyalgia on function and quality of life in individuals from the general population: results from a nationwide study in Spain. *Clin Exp Rheumatol.* 2008;2:519–26.
  29. Lindell L, Bergman S, Petersson I, et al. Prevalence of fibromyalgia and chronic widespread pain. *Scand J Prim Health Care.* 2000;18:149–53.
  30. Turhanoglu A, Yilmaz S, Kaya S, et al. The epidemiological aspects of fibromyalgia syndrome in adults living in turkey: a population based study. *J Musculoskelet Pain.* 2008;16:141–7.
  31. Forseth K, Gran J. The prevalence of fibromyalgia among women aged 20–49 years in Arendal, Norway. *Scand J Rheumatol.* 1992;21:74–8.
  32. Topbas M, Cakirbay H, Gulec H, et al. The prevalence of fibromyalgia in women aged 20–64 in Turkey. *Scand J Rheumatol.* 2005;34:140–4.
  33. Clark P, Burgos-Vargas R, Medina-Palma C, et al. Prevalence of fibromyalgia in children: a clinical study of Mexican children. *J Rheumatol.* 1998;25:2009–14.
  34. Barsante Santos A, Schulze Burti J, Lopes J, et al. Prevalence of fibromyalgia and chronic widespread pain in community-dwelling elderly subjects living in São Paulo, Brazil. *Maturitas.* 2010;67:251–5.
  35. Kim C, Kim H, Kim J. Prevalence of chronic widespread pain and fibromyalgia syndrome: a Korean hospital-based study. *Rheumatol Int.* 2012;32:3435–42.
  36. Gallinaro A, Feldman D, Natour J. An evaluation of the association between fibromyalgia and repetitive strain injuries in metalworkers of an industry in Guarulhos, Brazil. *Joint Bone Spine.* 2001;68:59–64.
  37. Cobankara V, Unal U, Kaya A, et al. The prevalence of fibromyalgia among textile workers in the city of Denizli in Turkey. *Int J Rheum Dis.* 2011;14:390–4.
  38. Toda K. The prevalence of fibromyalgia in Japanese workers. *Scand J Rheumatol.* 2007;36:140–4.
  39. White K, Thompson J. Fibromyalgia syndrome in an Amish community: a controlled study to determine disease and symptom prevalence. *J Rheumatol.* 2003;30:1835–40.
  40. Assumpção A, Cavalcante A, Capela C, et al. Prevalence of fibromyalgia in a low socioeconomic status population. *BMC Musculoskelet Disord.* 2009;10:64–70.
  41. Sauer K, Kemper C, Glaeske G. Fibromyalgia syndrome: prevalence, pharmacological and non-pharmacological interventions in outpatient health care. An analysis of statutory health insurance data. *Joint Bone Spine.* 2011;78:80–4.
  42. Forseth K, Gran J, Husby G. A population study of the incidence of fibromyalgia among women aged 26–55 yr. *Rheumatology.* 1997;36:1318–23.
  43. Weir P, Harlan G, Nkoy F, et al. The incidence of fibromyalgia and its associated comorbidities: a population-based retrospective cohort study based on International Classification of Diseases, 9th Revision codes. *J Clin Rheumatol.* 2006;12:124–8.
  44. Castells X, Coscolla R, Sunyol R, et al. “ESTUDI EPIFFAC” Impacto Familiar, Socio-Laboral y Económico de Padecer Fibromialgia. Available at [www.universidadpacientes.org/dolor/docs/estudio\\_epiffac.pdf](http://www.universidadpacientes.org/dolor/docs/estudio_epiffac.pdf). Accessed April 2013
  45. Haviland M, Banta J, Przekop P. Fibromyalgia: prevalence, course, and co-morbidities in hospitalized patients in the United States, 1999–2007. *Clin Exp Rheumatol.* 2011;29 Suppl 69:S79–87.
  46. Wolfe F, Michaud K, Li T, Katz R. Chronic conditions and health problems in rheumatic diseases: comparisons with rheumatoid arthritis, noninflammatory rheumatic disorders, systemic lupus erythematosus, and fibromyalgia. *J Rheumatol.* 2010;37:305–15.
  47. Schur E, Olarte M, Sullivan P, Buchwald D. Feeling bad in more ways than one: comorbidity patterns of medically unexplained and psychiatric conditions. *J Gen Intern Med.* 2007;22:818–21.
  48. Peres M, Young W, Kaup A, et al. Fibromyalgia is common in patients with transformed migraine. *Neurology.* 2001;57:1326–8.

49. Ifergane G, Buskila D, Simishshely N, et al. Prevalence of fibromyalgia syndrome in migraine patients. *Cephalalgia*. 2006;26:451–6.
50. de Tommaso M, Sardaro M, Serpino C, et al. Fibromyalgia comorbidity in primary headaches. *Cephalalgia*. 2009;29:453–64.
51. • de Tommaso M, Federici A, Serpino C, et al. Clinical features of headache patients with fibromyalgia comorbidity. *J Headache Pain*. 2011;12:629–38. *A large study about the association of some primary headaches with FM.*
52. Tietjen G, Brandes J, Peterlin B, et al. Allodynia in migraine: association with comorbid pain conditions. *Headache*. 2009;49:1333–44.
53. Tietjen G, Herial N, Hardgrove J, et al. Migraine comorbidity constellations. *Headache*. 2007;47:857–65.
54. • Le H, Tfelt-Hansen P, Russell M, et al. Co-morbidity of migraine with somatic disease in a large population-based study. *Cephalalgia*. 2011;31:43–64. *A large study of the migraine comorbidity, including FM, in twin cohort of Denmark.*
55. Küçükşen S, Genç E, Yilmaz H, et al. The prevalence of fibromyalgia and its relation with headache characteristics in episodic migraine. *Clin Rheumatol* 2013 Feb 27, Epub ahead of print.
56. Aaron L, Burke M, Buchwald D. Overlapping conditions among patients with chronic fatigue syndrome, fibromyalgia, and temporomandibular disorder. *Arch Intern Med*. 2000;160:221–7.
57. Marcus D, Bernstein C, Rudy T. Fibromyalgia and headache: an epidemiological study supporting migraine as part of the fibromyalgia syndrome. *Clin Rheumatol*. 2005;24:595–601.
58. Ravindran M, Zheng Y, Timbol C, et al. Migraine headaches in chronic fatigue syndrome (CFS): comparison of two prospective cross-sectional studies. *BMC Neurol*. 2011;11:30–8.