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Today's Fibromyalgia

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Today's Fibromyalgia

Abstract

Fibromyalgia is a chronic musculoskeletal disorder which results in widespread pain, fatigue, cognitive difficulties, and emotional distress (CDC, 2017). It is also associated with abnormal pain processing. About 2% of US adults have Fibromyalgia, and the disease is more common in middle-aged women, particularly those who have other illnesses like Lupus or Rheumatoid Arthritis (CDC, 2017). The exact cause of the disease is unknown, but it is likely a combination of genetics, infections and physical and emotional trauma. Since the exact cause of Fibromyalgia is unknown, treatment options vary. Medication, stress management techniques and an exercise plan are all examples of treatments used for Fibromyalgia. Treatment is important due to the negative impact Fibromyalgia has on life functioning. Fibromyalgia research has progressed in recent years as more clinicians put definitive diagnostic measures in place, researchers investigated various theories on causes and they have continued to explore new treatment options.

Keywords

musculoskeletal disorder, chronic pain, fatigue

Disciplines

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Comments

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Today's Fibromyalgia

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Introduction

Fibromyalgia is a chronic musculoskeletal disorder which results in widespread pain, fatigue, cognitive difficulties, and emotional distress (CDC, 2017). It is also associated with abnormal pain processing. About 2% of US adults have Fibromyalgia, and the disease is more common in middle-aged women, particularly those who have other illnesses like Lupus or Rheumatoid Arthritis (CDC, 2017). The exact cause of the disease is unknown, but it is likely a combination of genetics, infections and physical and emotional trauma. Since the exact cause of Fibromyalgia is unknown, treatment options vary. Medication, stress management techniques and an exercise plan are all examples of treatments used for Fibromyalgia. Treatment is important due to the negative impact Fibromyalgia has on life functioning. Fibromyalgia research has progressed in recent years as more clinicians put definitive diagnostic measures in place, researchers investigated various theories on causes and they have continued to explore new treatment options.

Symptoms

Fibromyalgia is a chronic disorder which includes the main symptoms of widespread pain, fatigue, cognitive difficulties and other symptoms (Carvalho et al., 2018). Widespread pain is a main symptom in Fibromyalgia patients, and higher pain values were found in Fibromyalgia patients (Galvez-Sanchez et al., 2018; Barbero, Fernandez-de-las-Penas, Palacios-Cena, Cescon, & Fall, 2017). Researchers found Fibromyalgia patients' pain threshold and pain tolerance were lower than a control group (Galvez-Sanchez et al., 2018). Additionally, the study found that the increase in intensity of subjective pain with ascending pressure stimuli was greater in Fibromyalgia patients. In another study, through the use of pain drawings, researchers found that

a larger pain extent resulted in higher pain intensity, and patients with widespread pain had more pain with cold stimuli for their tibialis anterior muscle (Barbero et al., 2017). Fibromyalgia patients are more sensitive to pressure stimuli and pain has a major impact on daily functioning.

Fatigue and problems with sleep are very prevalent in Fibromyalgia (Cervilla et al., 2019; Wagner, Dibonaventura, Chandran, & Cappelleri, 2012). One study found that 63.05% of people suffering from Fibromyalgia reported at least two sleep problems (Wagner et al., 2012). Patients complain of not sleeping through the night, nighttime restlessness, involuntary leg movement and waking up unrefreshed (Cervilla et al., 2019). In a study investigating Lupus and Fibromyalgia, researchers investigated the prevalence of sleep problems and the relationship between sleep quality and Fibromyalgia symptoms (Cervilla et al., 2019). Researchers found that patients with Fibromyalgia had worse sleep quality, more fatigue and more pain than the control group. Patients with Fibromyalgia specifically had issues with sleep duration, sleep efficiency and latency, which is the amount of time it takes to fall asleep. Additionally, researchers found that as latency increased, pain intensity increased as well.

In addition to pain and fatigue, patients with Fibromyalgia also have cognitive difficulties. In one study, participants completed various cognitive tasks which measured their visuospatial memory, verbal memory, planning and organizational abilities, processing speed, attention and cognitive flexibility (Galvez-Sanchez et al., 2018). They found that increasing subjective pain intensity ratings correlated with poor performance on cognitive tasks in Fibromyalgia patients, especially visual memory and verbal memory. This research indicates a possible connection between nociceptive sensitization and cognitive impairments in Fibromyalgia (Galvez-Sanchez et al., 2018). Another study found patients with Chronic Fatigue

Syndrome and Fibromyalgia had more cognitive difficulties than patients with just Chronic Fatigue Syndrome (Schmaling & Bettterton, 2016). This shows that Fibromyalgia results in cognitive difficulties, specifically visual and verbal memory . Research shows that Fibromyalgia has a negative impact on cognitive functioning and particularly interferes with visual and verbal memory (Galvez-Sanchez et al., 2018; Schmaling & Bettterton, 2016).

In addition to the common symptoms associated with Fibromyalgia, patients often have comorbid conditions. Anxiety and depression are both very prevalent in Fibromyalgia patients (Angarita-Osorio et al., 2019). In one study, they put participants into two groups: Fibromyalgia patients with high daily functioning and patients with low daily functioning (Angarita-Osorio et al., 2019). The participants also completed a scale which measured catastrophic consequences of pain which are related to mental illnesses like anxiety and depression. Specifically, it focused on rumination (putting extreme focus on the symptoms of one's distress which in this case is pain), magnification (magnifying the threat of the pain) and helplessness (the perception that one is not in control of the intensity of pain). Patients in the low-impact group had significantly lower levels of catastrophic consequences of pain and lower rates of depressive episodes (Angarita-Osorio et al., 2019). This shows that depression and anxiety can exacerbate the impact Fibromyalgia has on a patient.

Diagnosis

Historically, the diagnosis of Fibromyalgia has been based on tender points, which hurt when directly pressed on, general aches and pains in at least three or more areas of the body and widespread pain (Wolfe et al., 2016). In 2010 they discarded the tender points due to unreliability and invalidity (Wolfe et al., 2016). They also disposed of the widespread pain

requirement. Currently, Fibromyalgia diagnosis mainly uses two scales: The Widespread Pain Index (WPI) and Symptom Severity Scale (SSS). The WPI scale consists of five regions and for each body part that the patient has pain in, they score one point. The SSS assesses symptoms like fatigue on a scale from no problem to severe. A Fibromyalgia diagnosis requires the patient to have a WPI score greater than or equal to seven and an SSS score greater than or equal to five or a WPI between four and six and an SSS score greater than or equal to nine. Another requirement is generalized pain in four of the five body regions. Lastly, symptoms must persist for a minimum of three months. A patient's FS, or Fibromyalgia Score, is calculated by adding their WPI and SSS. Patients with an FS score lower than 12 cannot satisfy the criteria. The FS score is a good way to numerically assess the severity of one's symptoms (Wolfe et al., 2016).

Finding objective diagnostic tools to diagnose Fibromyalgia was a research goal. In a study by Garcia-Martin et al. (2016), researchers investigated the effect of Fibromyalgia on retinal nerve fiber layer damage by examining participants' eyes, giving a visual field test and looking at retinal nerve fiber with an optical coherence tomography (OCT) device (Garcia-Martin et al., 2016). Fibromyalgia patients had retinal nerve fiber layer damage and axonal nerve damage in the optic nerve. Because Fibromyalgia lacks a definitive diagnostic test, OCT tests may be a good diagnostic tool, as the tests are inexpensive and noninvasive (Garcia-Martin et al., 2016).

When discussing diagnosis, it is also important to bring attention to the higher prevalence of Fibromyalgia in women. Researchers investigated sex ratios by looking at a biased sample of Rheumatoid Arthritis patients who were diagnosed with Fibromyalgia and an unbiased sample of Rheumatoid Arthritis patients with no Fibromyalgia diagnosis. They found that in the biased

sample about 90% of patients diagnosed with Fibromyalgia were women; however, in the unbiased sample 60% were women, which indicated an overdiagnosis of women with Fibromyalgia (Wolfe, Walitt, Perrot, Rasker, & Hauser, 2018). The results also showed that women had more pain and more severe symptoms. The researchers recognized that Fibromyalgia is more prevalent in women, but predicted that factors like the overrepresentation of women in Fibromyalgia commercials and in support groups, led to clinician bias.

Causes

Fibromyalgia is a disease with unknown etiology, but there are multiple theories on factors that could cause the disease, like stress. Dysregulation of hypothalamic-pituitary-adrenal (HPA) axis is triggered by excessive stress and can cause an over release of cortisol (Shea, Walsh, MacMillan, & Steiner, 2004). Normally, cortisol helps maintain homeostasis during stressful experiences, but an overproduction of cortisol is a triggering factor for many diseases. In Fibromyalgia, researchers believe that dysregulation of the HPA axis, due to sexual, emotional and physical abuse, can bring out symptoms in predisposed individuals (Gunduz, Erzincan, & Polat, 2019). They found that psychiatric comorbid illnesses and domestic violence were both higher in the Fibromyalgia group than in the control group (Gunduz et al., 2019). Another study found similar results as they found sexual assault/abuse and physical assault/abuse were associated with Fibromyalgia diagnosis (Haviland, Morton, Oda, & Fraser, 2010). Based on various research, stress is considered to be part of the pathophysiology of Fibromyalgia, and sexual and physical abuse seem to mediate that relationship (Gunduz et al., 2019; Haviland et al., 2010).

Another important factor regarding the diagnosis of Fibromyalgia is infections. One study investigated the effect that Hepatitis B had on the prevalence of Fibromyalgia (Yazmalar et al., 2016). Researchers found that Hepatitis B patients had higher rates of Fibromyalgia than a control group. This disease causes a variety of clinical symptoms and usually leads to stress and anxiety, so researchers believe that stress and anxiety may mediate the relationship between the diseases. Another possible explanation is that the release of cytokines after Hepatitis B infection may cause Fibromyalgia (Yazmalar et al., 2016). Cytokines are immune system proteins which promote inflammation. Inflammation is helpful up to a certain point, but chronic inflammation leads to negative symptoms, like fatigue, which also occur in Fibromyalgia (Ernberg et al., 2018). Ernberg and colleagues examined elevated cytokines in Fibromyalgia patients by taking blood samples (Ernberg et al., 2018). They found cytokines were higher in Fibromyalgia patients, which suggests that excessive inflammation may be leading to symptoms. In another study, they found levels of hsCRP, an inflammatory marker, were higher in patients with Chronic Fatigue Syndrome and Fibromyalgia, which again provides evidence that inflammation is part of the cause of Fibromyalgia (Groven, Fors, & Reitan, 2019). Various infections besides Hepatitis B have also been linked to Fibromyalgia. Some examples are Lyme disease, Hepatitis C, HIV, Coxsackie virus and B19, and the link between these infections and Fibromyalgia is mediated by stress, as well as the release of inflammatory proteins (Yazmalar et al., 2016).

In another study, researchers looked at the link between Fibromyalgia and obesity, as they hypothesized that obesity-induced TNF- α may be partially responsible for pain associated with Fibromyalgia (Tian et al., 2018). TNF- α is a cytokine and causes proinflammatory effects. The researchers used a mouse model and fed one group of mice a high fat diet and the other

group of mice a low fat diet. Next, they used an acid saline injection to induce Fibromyalgia in the treatment group mice. They found the acid saline injections increased levels of TNF- α and a high fat diet further sensitized the increase. This study shows obesity and Fibromyalgia are both associated with increased TNF- α , so perhaps obesity is part of the cause of Fibromyalgia. However, it is important to note that this study has some limitations as the acid saline injections only induced hyperalgesia, not all Fibromyalgia symptoms.

Biological alterations in pain processing may be part of the cause of Fibromyalgia. A study looked at the effect of aminopeptidases on the pathophysiology of Fibromyalgia. They found Oxytocinase activity was higher in Fibromyalgia patients, and a subgroup of participants in the Fibromyalgia group had lower levels of EDA activity (Martinez-Martos et al., 2019). These aminopeptidases are Enkephalins, which bind to opioid receptors, so the experiment provides evidence that dysregulation of the endogenous opioid system may be causing hyperalgesia.

Overall, researchers believe that the cause of Fibromyalgia is related to both environmental triggers and biological factors. Alterations in the stress response which may be caused by abuse or infections plays a key role in the cause of Fibromyalgia (Gunduz et al., 2019; Haviland et al., 2010; Yazmalar et al., 2016). Various studies provide evidence that inflammation plays a role in the disease's pathophysiology (Yazmalar et al., 2016; Ernberg et al., 2018; Groven et al., 2019; Tian et al., 2018). Lastly, another theory is that altered levels of Enkephalins, which relate to the pain response, could be part of the etiology of the disease (Martinez-Martos et al., 2019).

Treatment

There is no cure for Fibromyalgia, so treating the symptoms through medicine and therapy is important for increasing quality of life and reducing symptoms. One medication used for the treatment of Fibromyalgia is Pregabalin. In 2011, Pauer et al. did a double-blind, placebo-controlled study to investigate the effectiveness of Pregabalin internationally. In comparison to a placebo pill and other doses, the researchers found that patients who received the 450mg showed the most benefits. (Pauer et al., 2011). Further studies have confirmed the efficiency of Pregabalin (Arnold, Emir, Pauer, Resnick, & Clair, 2015; Argoff et al., 2016). Researchers found that symptoms improved as quickly as one day after beginning treatment (Arnold et al., 2015). Also, a study found that it was effective in reducing symptoms in patients with comorbid Osteoarthritis, which is important because many patients have comorbid disorders (Argoff et al., 2016). Overall, studies show that Pregabalin is an effective pharmacological treatment option for Fibromyalgia (Pauer et al., 2011; Arnold et al., 2015; Argoff et al., 2016)

Other medical treatments for Fibromyalgia include Gabapentin, which causes analgesic effects by altering an inhibitory neuron called GABA, and Osteopathic Manipulative Medicine (OMM), a manual medicine treatment that uses multiple modalities to fix the musculoskeletal structure and function (Marske et al., 2018). For OMM, clinicians performed various treatment modalities, like facilitated positional release and myofascial. The OMM and combined treatment groups showed improvements in pain while the OMM group also showed improvement in overall perceived health. Studies found Gabapentin was effective in treating symptoms, so research on the combination of Gabapentin and OMM may be helpful (Arnold et al., 2007).

In addition to medication, research found that vitamin D supplements improved symptoms in women with Fibromyalgia (Carvalho, Araujo, Mota, Aires, & Araujo, 2018).

Because fibromyalgia patients often have pain, poor mobility, depression and are often overweight, they may spend less time outdoors, leading to less sun exposure and less vitamin D. This study is limited by its small sample size, but vitamin D does seem to be effective in improving Fibromyalgia symptoms.

Fibromyalgia can also be treated with many non-pharmacological options like acupuncture and physical therapy. A study by Ozen et al. compared the effectiveness of acupuncture and physical therapy to determine which is better (Ozen, Cosar, Cabioglu, & Cetin, 2019). For the physical therapy treatment group, patients received hotpack therapy, TENS and ultrasound on various tender points. Hotpack therapy was chosen because heat decreases pain and muscle spasm while increasing tissue metabolism and connective tissue extensibility. TENS reduces local musculoskeletal pain through the release of endorphins and the Gate Control Theory. With the Gate Control Theory, multiple stimuli are entering the spinal cord at the same spot which diminishes the pain response due to the competing signals. Another study by Noehren et al. studied the effect of TENS on Fibromyalgia and found that it decreased pain and increased quality of life in patients (Noehren et al., 2015). For the study by Ozen et al., ultrasound sound therapy was also chosen as part of the physical therapy due to anti-inflammatory effects, increases in cell permeability and slowing neural transmission to reduce pain. The acupuncture treatment consisted of daily sessions with needle insertions. They found that both treatments reduced symptoms. In another study, they stimulated acupuncture points through vibration and music. The results showed improvements in Fibromyalgia symptoms and their impact on daily functioning indicating stimulation of acupuncture points in other ways is also effective (Weber, Werneck, Paiva, & Gans, 2015).

Studies showed exercise is an effective treatment option in reducing Fibromyalgia symptoms, but symptoms can prevent patients from exercising (Ernberg et al., 2018). Aerobic exercise has been shown to be effective, and recently more research has been done on strength training. In one study, they looked at the effects of resistance group exercise on Fibromyalgia symptoms (Larsson et al., 2015). They had meetings before exercise because other studies found social support reduced symptoms (Gunduz, Usen, & Aydin Atar, 2019). Also, in the pre-exercise meetings they adjusted loads so patients were not discouraged. Exercise reduced pain and improved their isometric knee-extension force and Fibromyalgia Impact Questionnaire scores. Another study examined strength training's effect on patients' mood. The strength training improved patients' mood and decreased fatigue and mental confusion (Steffens, Sieczkowska, Coimbra, & Vilarino, 2019). These studies showed that exercise helped reduce pain and boosted mood and cognitive abilities (Ernberg et al., 2018; Larsson et al., 2015; Steffens et al., 2019).

Fibromyalgia is often comorbid with mental illness, so psychological treatment can reduce symptoms. Cognitive Behavioral Therapy (CBT), which taught skills to reduce pain and reinforced the skills through assignments, reduced symptoms and improved functioning (Angarita-Osorio et al., 2019). In another study, they used Emotional Awareness and Expression Therapy (EAET) which helped patients connect their symptoms to emotionally activated CNS mechanisms. They also used a Fibromyalgia education program, which improved symptoms with the rationale that being informed can allow for communication between patients. Results showed EAET improved symptoms the most, but CBT and Fibromyalgia education reduced symptoms (Lumley et al., 2017). EAET, CBT and Fibromyalgia education are valid approaches to targeting symptoms psychologically (Angarita-Osorio et al., 2019; Lumley et al., 2017).

Repetitive Transcranial Magnetic Stimulation (rTMS) is effective in treating depression, which prompted researchers to study rTMS as a treatment for Fibromyalgia (Cheng et al., 2019). Studies showed that rTMS that stimulated the left dorsolateral prefrontal cortex reduced symptoms (Cheng et al., 2019; Fitzgibbon et al., 2018). Also, they found rTMS was particularly effective in treating pain in Fibromyalgia patients with comorbid depression (Cheng et al., 2019).

For the treatment of Fibromyalgia, a combination of different treatment options can provide symptom relief. Medications, physical therapy, acupuncture, exercise, psychological therapy and rTMS are all effective ways to reduce symptoms. More research is necessary to eliminate symptoms completely as current treatments only reduce symptom severity and improve life functioning.

Conclusion

Fibromyalgia is a chronic disease which results in symptoms such as generalized pain and fatigue. Studies show that pain tolerance and pain thresholds were higher in Fibromyalgia patients (Galvez-Sanchez et al., 2018; Barbero et al., 2017). Issues regarding sleep and fatigue are also very prevalent in Fibromyalgia patients and difficulties falling asleep are associated with higher pain (Cervilla et al., 2019; Wagner et al., 2012). Fibromyalgia impacts cognitive functioning, especially visual and verbal memory (Galvez-Sanchez et al., 2018; Schmaling & Bettterton, 2016). Lastly, comorbid illnesses are very prevalent with Fibromyalgia and those include Anxiety, Depression, Osteoarthritis, Chronic Fatigue Syndrome and more (Angarita-Osorio et al., 2019; Argoff et al., 2016; Schmaling & Bettterton, 2016).

The diagnosis of Fibromyalgia relies on scales like the WPI and SSS which are combined into an FS score (Wolfe et al., 2018). Researchers are investigating more specific diagnostic tests

like OCT tests (Garcia-Martin et al., 2016). Future research looking for more specific, objective diagnostic tests, like OCT tests, will be useful in ensuring fast and accurate diagnosis.

The cause of fibromyalgia seems to relate to stress, inflammation and alterations in pain processing. Dysregulation of the HPA axis is associated with higher rates of Fibromyalgia (Gunduz et al., 2019; Haviland et al., 2010). Inflammation from infections and obesity leads to symptoms. (Yazmalar et al., 2016; Tian et al., 2018; Groven et al., 2019). Lastly, pain processing irregularities are associated with Fibromyalgia (Martinez-Martos et al., 2019).

Treatment for Fibromyalgia involves many different modalities. Medications, like Pregabalin, Gabapentin and OMM, as well as vitamin D supplements improved symptoms (Pauer et al., 2011; Arnold et al., 2015; 12; Marske et al., 2018; Carvalho et al., 2018). Additionally, various types of physical therapies as well as other therapies, like acupuncture and music therapy, reduced symptoms (Ozen et al., 2019; Noehren et al., 2015; Weber et al., 2015). Exercise improved symptoms, but exercise intolerance often inhibits that (Ernberg et al., 2018; Larsson et al., 2015; Gunduz et al., 2019; Steffens et al., 2019). Psychological treatments are effective because of mood changes in patients (Angarita-Osorio et al., 2019; Lumley et al., 2017). Lastly, rTMS reduced pain in patients (Cheng et al., 2019; Fitzgibbon et al., 2018). Because there is no cure, more research on established and new treatment options is necessary.

More research on Fibromyalgia should be done so an exact cause can be determined and treatment options can be targeted towards the causes. Progress has been made in research on the cause of Fibromyalgia, but further research is necessary. Most patients do not receive complete symptom relief even through a combination of various treatments, so research focused on treatments that remove symptoms and restore complete life functioning is important.

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