

ACUPUNCTURE AND FIBROMYALGIA

About fibromyalgia

Around 1 in 25 of the UK population has fibromyalgia, a lifelong condition involving widespread musculoskeletal pain and tenderness, fatigue, sleep disturbance, and functional impairment, without any known structural or inflammatory cause (Annemans 2008; Hauser 2008; De Silva 2010; Burckhardt 1994). This problem is costly in terms of consultations, prescriptions and sick leave (Annemans 2008; Busch 2007; Boonen 2005; Hauser 2010).

In fibromyalgia, abnormalities in central pain-processing and the release of neurotransmitters including serotonin and noradrenaline lead to lower pain thresholds (Holman 2005; Clauw 2008). Predisposing factors for the condition include female gender, anxiety, trauma and viral infection (Clauw 2009). American College of Rheumatology diagnostic criteria for fibromyalgia are widespread pain lasting at least 3 months, affecting both sides of the body, above and below the waist; plus pain at 11 or more of 18 designated possible tender points, when 4kg/cm² force is exerted at each point Wolfe 1990).

The main aims of therapy are to reduce symptoms, to improve function, and to help patients adapt to the condition (Hauser 2008). Treatments include cognitive behavioural therapy and medication such as simple analgesics or NSAIDs, tramadol, antidepressants (low-dose tricyclics or antidepressant doses of selective serotonin re-uptake inhibitors or serotonin-noradrenaline re-uptake inhibitors) and antiepileptics (e.g. gabapentin, pregabalin).

References

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How acupuncture can help

Western-based systematic reviews of acupuncture for fibromyalgia are dependent on rather few, rather small, randomised trials in which the verum treatment has been compared to a sham version of acupuncture. Given that the sham interventions are not inactive placebos, but effectively different versions of acupuncture, it is not surprising that most reviews have not found acupuncture to be superior. The most recent (Langhorst 2010), with more trials included, reported acupuncture to have a significantly better analgesic effect than sham (though it was not superior for other symptoms). Another recent review, with access to the Chinese literature, was able to assess the effectiveness of acupuncture against conventional medication, as well as against sham (Cao 2010). This found it to be better than drugs in terms of pain relief. Acupuncture may have the greatest benefit when applied together with medication or other therapeutic options (Targino 2008, Jang 2010). Further trials are needed, of larger size and with sounder methodology, and especially those that compare acupuncture to existing conventional interventions. [See Table below]

In general, acupuncture is believed to stimulate the nervous system and cause the release of neurochemical messenger molecules. The resulting biochemical changes influence the body's homeostatic mechanisms, thus promoting physical and emotional well-being. Stimulation of certain acupuncture points has been shown to affect areas of the brain that are known to reduce sensitivity to pain and stress, as well as promoting relaxation and deactivating the analytical brain, which is responsible for anxiety (Wu 1999).

Acupuncture may help relieve pain in patients with fibromyalgia by:

- altering the brain's chemistry, increasing endorphins (Han 2004) and neuropeptide Y levels (Lee 2009; Cheng 2009), and reducing serotonin levels (Zhou 2008);
- evoking short-term increases in mu -opioid receptors binding potential, in multiple pain and sensory processing regions of the brain (Harris 2009);
- stimulating nerves located in muscles and other tissues, which leads to release of endorphins and other neurohumoral factors, and changes the processing of pain in the brain and spinal cord (Pomeranz 1987, Zhao 2008);
- reducing inflammation, by promoting release of vascular and immunomodulatory factors (Kavoussi 2007, Zijlstra 2003)
- improving muscle stiffness and joint mobility by increasing local microcirculation (Komori 2009), which aids dispersal of swelling.

About traditional acupuncture

Acupuncture is a tried and tested system of traditional medicine, which has been used in China and other eastern cultures for thousands of years to restore, promote and maintain good health. Its benefits are now widely acknowledged all over the world and in the past decade traditional acupuncture has begun to feature more prominently in mainstream healthcare in the UK. In conjunction with needling, the practitioner may use techniques such as moxibustion, cupping, massage or electro-acupuncture. They may also suggest dietary or lifestyle changes.

Traditional acupuncture takes a holistic approach to health and regards illness as a sign that the body is out of balance. The exact pattern and degree of imbalance is unique to each individual. The traditional acupuncturist's skill lies in identifying the precise nature of the underlying disharmony and selecting the most effective treatment. The choice of acupuncture points will be specific to each patient's needs. Traditional acupuncture can also be used as a preventive measure to strengthen the constitution and promote general well-being.

An increasing weight of evidence from Western scientific research (see overleaf) is demonstrating the effectiveness of acupuncture for treating a wide variety of conditions. From a biomedical viewpoint, acupuncture is believed to stimulate the nervous system, influencing the production of the body's communication substances - hormones and neurotransmitters. The resulting biochemical changes activate the body's self-regulating homeostatic systems, stimulating its natural healing abilities and promoting physical and emotional well-being.

About the British Acupuncture Council

With over 3000 members, the British Acupuncture Council (BAcC) is the UK's largest professional body for traditional acupuncturists. Membership of the BAcC guarantees excellence in training, safe practice and professional conduct. To find a qualified traditional acupuncturist, contact the BAcC on 020 8735 0400 or visit www.acupuncture.org.uk

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The evidence

Research	Conclusion
Systematic reviews (SRs)	
Langhorst J et al. Efficacy of acupuncture in fibromyalgia syndrome a systematic review with a meta-analysis of controlled clinical trials. <i>Rheumatology</i> 2010; 49: 778-88.	A systematic review that assessed the efficacy of acupuncture in fibromyalgia syndrome (FMS). Seven randomised controlled trials with a median treatment time of 9 (range 6-25) sessions and 385 patients were included. Outcomes of interest were key symptoms of FMS, namely pain, fatigue, sleep disturbances, reduced physical function and side effects at post-treatment. Strong evidence for the reduction of pain (SMD 0.25; 95% CI 0.49 to 0.02; $p=0.04$) was found post-treatment. There was no evidence for the reduction of fatigue and sleep disturbances, or the improvement of physical function at post-treatment. Subgroup analyses resulted in moderate evidence for a significant and small reduction of pain at post-treatment in studies with electro-stimulation and individualised acupuncture. Stratifying the type of controls (penetrating vs. non-penetrating control acupuncture) did not change the results. <u>The reviewers concluded that there was a small analgesic effect with acupuncture but that this was not clearly distinguishable from bias.</u>
Cao H et al. Traditional Chinese medicine for treatment of fibromyalgia: A systematic review of randomized controlled trials. <i>Journal of Alternative and Complementary Medicine</i> 2010; 16: 397-409.	A systematic review that looked at the beneficial and harmful effects of TCM therapies for fibromyalgia. Twenty-five randomised controlled trials involving 1,516 participants were included. Overall, 10 trials were eligible for the meta-analysis, and data from remaining 15 trials were synthesized qualitatively. Acupuncture reduced the number of tender points (MD -3.21, 95% CI -4.23 to -2.11; $p<0.00001$), and pain scores compared with conventional medications (MD -1.78, 95% CI -2.24 to -1.32; $p<0.00001$) but not compared with sham acupuncture (MD -0.55, 95% CI -1.35-0.24; $p=0.17$). A combination of acupuncture and cupping therapy was better than conventional medications for reducing pain (MD -1.66, 95% CI -2.14 to -1.19; $p<0.00001$), and for improving depression scores (MD -4.92, 95% CI -6.49 to -3.34; $p<0.00001$). <u>The reviewers concluded that TCM therapies appear to be effective for treating fibromyalgia, though further, more rigorous, research is warranted.</u>
Baranowsky J et al. Qualitative systemic review of randomized controlled trials on complementary and alternative medicine treatments in fibromyalgia. <i>Rheumatology International</i> 2009; 30: 1-21.	A systematic review including 23 randomised controlled trials of acupuncture, balneotherapy, thermotherapy, magnetic therapy, homeopathy, manual manipulation, mind-body medicine, diet therapy and music therapy for the treatment of fibromyalgia. <u>The results for acupuncture were mixed, with a tendency toward positive results.</u>
Randomised controlled trials	
Jang ZY et al. Combination of acupuncture, cupping and medicine for treatment of fibromyalgia syndrome: a	A 4-week randomised controlled trial to evaluate the clinical effect of a combination of acupuncture, cupping and medicine for the treatment of fibromyalgia syndrome. In all, 186 patients were included and were

multi-central randomized controlled trial [Article in Chinese]. *Zhongguo Zhen Jiu* 2010; 30:265-9.

divided into an acupuncture, cupping and western medicine group (amitriptyline) (group A); an acupuncture plus cupping group (group B); and a western medicine alone group (group C). The McGill Pain Questionnaire (MPQ), the Hamilton Depression Scale (HAMD), the amount of tender points and the time to a beneficial effect were used to assess therapeutic effect. The cured and markedly effective rate was 65.0% in group A, 15.9% in the group B and 16.1% in group C ($p < 0.001$ between group A and both groups B and C). After treatment, MPQ and HAMD scores, and the amount of tender points decreased in all the three groups, group A being significantly better than group B and group C. The time to a beneficial effect was less in group A than groups B and C. The researchers concluded that the therapeutic effect of a combination of acupuncture, cupping and amitriptyline on fibromyalgia syndrome is superior to that of acupuncture plus cupping or amitriptyline alone.

Targino RA et al. A randomized controlled trial of acupuncture added to usual treatment for fibromyalgia. *Journal of Rehabilitation Medicine* 2008; 40: 582-8.

A randomised controlled trial that evaluated the effectiveness of acupuncture for fibromyalgia in 58 women. Patients were given either acupuncture plus tricyclic antidepressants and exercise, or tricyclic anti-depressants and exercise only. Patients rated their pain on a visual analogue scale. A blinded assessor evaluated both the mean pressure pain threshold value over all 18 fibromyalgia points and quality of life using SF-36. At the end of 20 sessions, patients who received acupuncture were significantly better than the control group in all measures of pain and in 5 of the SF-36 subscales. After 6 months, the acupuncture group was significantly better than the control group in numbers of tender points, mean pressure pain threshold at the 18 tender points and 3 subscales of SF-36. The reviewers concluded that addition of acupuncture to usual treatments for fibromyalgia may be beneficial for pain and quality of life up to 3 months after the end of treatment

Martin DP et al. Improvement in fibromyalgia symptoms with acupuncture: Results of a randomized controlled trial. *Mayo Clinic Proceedings* 2006; 81: 749-57.

A randomised controlled trial to compare real and sham acupuncture for fibromyalgia in 50 patients. Symptoms were measured with the Fibromyalgia Impact Questionnaire (FIQ) and the Multidimensional Pain Inventory at baseline, immediately after treatment, and at 1 month and 7 months after treatment. Total fibromyalgia symptoms, as measured by the FIQ, were significantly improved in the acupuncture group compared with the control group during the study period ($p = 0.01$). The largest difference in mean FIQ total scores was observed at 1 month (42.2 vs. 34.8 in the control and acupuncture groups, respectively; $p = 0.007$). Fatigue and anxiety were the most significantly improved symptoms during the follow-up period. However, activity and physical function levels did not change. Acupuncture was well tolerated, with minimal adverse effects. The researchers concluded that acupuncture significantly improved symptoms of fibromyalgia, and that symptomatic improvement was not restricted to pain relief and was most significant for fatigue and anxiety.

Research on mechanisms for acupuncture

Harris RE et al. Traditional Chinese acupuncture and placebo (sham) acupuncture are differentiated by their effects on mu-opioid receptors (MORs). *Neuroimage* 2009; 47: 1077-85.

A 4-week randomised controlled trial that compared both short- and long-term effects of traditional Chinese acupuncture (TA) versus sham acupuncture (SA) treatment on in vivo MOR binding availability in chronic pain patients diagnosed with fibromyalgia. Positron emission tomography (PET) with (^{11}C) -carfentanil was performed once during the first treatment session and then repeated a month later following the eighth treatment. Acupuncture therapy evoked short-term increases in MOR binding potential, in multiple pain and sensory processing regions including the cingulate (dorsal and subgenual), insula, caudate, thalamus, and amygdala. Acupuncture therapy also evoked long-term increases in MOR binding potential in some of the same structures including the cingulate (dorsal and perigenual), caudate, and amygdala. These short- and long-term effects were

	absent in the sham group, where small reductions were observed, an effect more consistent with previous placebo PET studies. Long-term increases in MOR BP following TA were also associated with greater reductions in clinical pain. The researchers concluded that their findings suggest that divergent MOR processes may mediate clinically relevant analgesic effects for acupuncture and sham acupuncture.
Cheng CH et al. Endogenous Opiates in the Nucleus Tractus Solitarius Mediate Electroacupuncture-induced Sleep Activities in Rats. <i>Evid Based Complement Alternat Med</i> 2009 Sep 3. [Epub ahead of print]	An animal study that investigated the involvement of the nucleus tractus solitarius opioidergic system in electroacupuncture-induced alterations in sleep, the findings of which suggested that mechanisms of sleep enhancement may be mediated, in part, by cholinergic activation, stimulation of the opioidergic neurons to increase the concentrations of beta-endorphin and the involvement of the μ -opioid receptors.
Lee B et al. Effects of acupuncture on chronic corticosterone-induced depression-like behavior and expression of neuropeptide Y in the rats. <i>Neuroscience Letters</i> 2009; 453: 151-6.	In animal studies, acupuncture has been found to significantly reduce anxiety-like behaviour, and increase brain levels of neuropeptide Y, the brain levels of which appear to correlate with reported anxiety.
Komori M et al. Microcirculatory responses to acupuncture stimulation and phototherapy. <i>Anesth Analg</i> 2009; 108: 635-40.	Experimental study on rabbits in which acupuncture stimulation was directly observed to increase diameter and blood flow velocity of peripheral arterioles, enhancing local microcirculation.
Zhao ZQ. Neural mechanism underlying acupuncture analgesia. <i>Prog Neurobiol</i> 2008; 85: 355-75.	Review article that discusses the various peripheral and central nervous system components of acupuncture anaesthesia in detail.
Zhou Q et al. The effect of electro-acupuncture on the imbalance between monoamine neurotransmitters and GABA in the CNS of rats with chronic emotional stress-induced anxiety. <i>Int J Clin Acupunct</i> 2008 ;17: 79-84.	A study of the regulatory effect of electro-acupuncture on the imbalance between monoamine neurotransmitters and GABA in the central nervous system of rats with chronic emotional stress-induced anxiety. The levels of serotonin, noradrenaline and dopamine fell significantly, while GABA levels were significantly higher in the rats given acupuncture ($P<0.05$, or $P<0.0$). The researchers concluded that the anti-anxiety effect of electro-acupuncture may relate to its regulation of the imbalance of neurotransmitters.
Kavoussi B, Ross BE. The neuroimmune basis of anti-inflammatory acupuncture. <i>Integr Cancer Ther</i> 2007; 6: 251-7.	Review article that suggests the anti-inflammatory actions of traditional and electro-acupuncture are mediated by efferent vagus nerve activation and inflammatory macrophage deactivation.
Han JS. Acupuncture and endorphins. <i>Neurosci Lett</i> 2004; 361: 258-61.	A literature review of studies relating to the release of endorphins by acupuncture.
Zijlstra FJ et al. Anti-inflammatory actions of acupuncture. <i>Mediators Inflamm</i> 2003; 12: 59-69.	An article that suggests a hypothesis for anti-inflammatory action of acupuncture: Insertion of acupuncture needles initially stimulates production of beta-endorphins, CGRP and substance P, leading to further stimulation of cytokines and NO. While high levels of CGRP have been shown to be pro-inflammatory, CGRP in low concentrations exerts potent anti-inflammatory actions. Therefore, a frequently applied 'low-dose' treatment of acupuncture could provoke a sustained release of CGRP with anti-inflammatory activity, without stimulation of pro-inflammatory cells.
Wu MT et al. Central nervous pathway for acupuncture stimulation: localization of processing with functional MR imaging of the brain--preliminary experience. <i>Radiology</i> 1999 ; 212: 133-41.	An experimental study using MRI to characterise the central nervous system pathway for acupuncture stimulation, which found that acupuncture activates structures of descending antinocioceptive pathway and deactivates areas mediating pain modulation.
Pomeranz B. Scientific basis of acupuncture. In: Stux G, Pomeranz B,	Needle activation of A delta and C afferent nerve fibres in muscle sends signals to the spinal cord, where dynorphin and enkephalins are

eds. Acupuncture Textbook and Atlas. Heidelberg: Springer-Verlag; 1987: 1-18.

released. Afferent pathways continue to the midbrain, triggering excitatory and inhibitory mediators in spinal cord. Ensuing release of serotonin and norepinephrine onto the spinal cord leads to pain transmission being inhibited both pre- and postsynaptically in the spinothalamic tract. Finally, these signals reach the hypothalamus and pituitary, triggering release of adrenocorticotrophic hormones and beta-endorphin.

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