Physical Therapy Modalities in Management of Fibromyalgia

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Abstract: The etiology of fibromyalgia syndrome (FM) is uncertain and the prognosis for symptomatic recovery is generally poor. A wide variety of interventions are used in the management of FM. There is, however, no clear consensus on the treatment of choice and FM remains relatively refractory to treatment. Therefore, prevention, causal therapy and rehabilitation are not possible. FM patients frequently use alternative therapies, indicating dissatisfaction or ineffectiveness of traditional medical therapy. Alternative therapies are generally perceived to be more "natural" and as a result, to have fewer adverse effects. Despite the positive results found, the number of publications related to the application of physical therapy modalities such as acupuncture, transcutaneous electrical stimulation, laser, biofeedback, electrotherapy and magnetic field is still scant, especially concerning FM treatment. The demonstration of a long-term effective intervention for managing the symptoms associated with FM is needed. Multidisciplinary approaches to management include physical and medical therapeutic strategies. Treatment modalities should be individualised for patients based on target symptoms and impairment in functioning. Patience and positive attitude on part of the physician and active involvement of patients and their families in treatment are likely to enhance improvement. It can be concluded that there is a need for larger, more systematic and methodologically sound randomised controlled clinical trials to evaluate the effectiveness of physical therapy modalities of managing FM. We will review some of the existing studies of physical therapy relevant in the treatment of FM and give some practical advice for their use.

Key Words: Fibromyalgia Syndrome, Alternative Medicine, Physical Therapy, Acupuncture, Laser, Biofeedback, Transcutaneous electrical stimulation, Ultrasound, Electrotherapy, Magnetotherapy.

INTRODUCTION

Fibromyalgia (FM) is a disorder or condition characterised by widespread, chronic musculoskeletal aching and stiffness and pressure hyperalgesia at characteristic sites, called soft tissue tender points. The etiology of FM is uncertain and the prognosis for symptomatic recovery is generally poor [1, 2]. Some current etiologic hypotheses are that FM is a rheumatoid-like disease or a disorder of muscular abnormality or repair; that it results from aberrant mechanisms of peripheral pain; that it is a psychoneuroendocrine-immune disorder, a psychomatic disorder or a psychiatric disorder related to major depression [3, 4]. There are, however, few studies that examine the inflammatory response system and cytokines in FM [5-8]. It has been suggested that a subgroup of FM patients suffer from a low grade inflammatory process [9] or from exaggerated neurogenic inflammatory responses [10].

A wide variety of interventions are used in the management of FM [11]. There is, however, no clear consensus on the treatment of choice and FM remains relatively refractory to treatment. Therefore, prevention, causal therapy and rehabilitation are not possible. Currently, therapy is polypragmatic and is aimed at reducing the pain and other symptoms associated with this condition. Therapy consists of drug treatment, physical exercises, psychological interventions and other symptomatically oriented therapies, such as acupuncture and laser [12-14]. Effective interventions that last for more than a year have not yet been shown. Research is increasing exponentially in this field, to help us better understand the reasons why this disease develops [15].

Considering current knowledge there are virtually no specific treatments which are based on pathophysiological mechanisms underlying fibromyalgia. However, there is an array of treatment strategies in targeting disease consequences. While medication mainly focuses on pain reduction, physical therapy is aimed at pain, fatigue, deconditioning, muscle weakness and sleep disturbances and other disease consequences [16]. Rehabilitation plays a crucial role in the treatment of FM, particularly among patients more severely disabled by their chronic painful condition [15].

Patients seek alternatives to prescribed medications that are ineffective or have unpleasant side-effects. Alternative therapies are generally perceived to be more "natural" and as a result, to have fewer adverse effects. In addition, complementary approaches address symptoms that are often ignored by conventional therapeutic regimens, including fatigue and cognitive dysfunction. The percentage of patients with rheumatologic disorders using alternative therapies ranges from 33% to 100%, with 91% of patients with FM using complementary and alternative medicine over a 12-month period [17].

We will review some of the existing studies of physical therapy relevant in the treatment of FM and give some practical advice for their use.

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ELECTROTHERAPY

Electrotherapy, including transcutaneous electrical stimulation (TENS), electro-acupuncture, functional electrical stimulation, iontophoresis, laser interferential therapy and ultrasound, has been used in musculoskeletal pain conditions. Interferential electrotherapy with amplitude modulated at low frequencies reaches deep muscles and nerves, stimulates voluntary muscles, promotes an increase in peripheral blood flow, accelerate bone healing and reduces pain. Besides different sites of action, the combination of electrical therapy and ultrasound is more effective than each of them separately because it provides localised analgesia on previous detected painful areas [18].

ULTRASOUND

Ultrasound therapy has achieved recognition as a suitable method in physical medicine in treatment of acute and chronic musculoskeletal disorders [19]. Experimental studies have shown that it is possible to heat deeper structures, such as joints, muscle and bone, with ultrasound [20, 21].

Although muscular pain has been a central feature of FM syndrome, controlled studies are controversial in supporting a role for muscle in pathophysiology of this condition. Perfusion and metabolic changes have been proposed to explain focal sustained contraction as well as, muscle deconditioning. Pulse ultrasound therapy improves sustained muscle contraction by increasing the permeability of the cell membrane; improves intracellular energy consumption; increases angiogenesis in ischemic tissues repair. In a recent study by Almedia *et al*. [18] suggest that combined therapy with pulsed ultrasound and interferential current, acting as an electrodiagnostic tool and as modality of physical therapy, provides an effective pain treatment, with consequent sleep improvement in FM.

TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION (TENS)

TENS is the most common example of electrically based analgesia. A satisfactory explanation of the mechanisms of TENS analgesia does still not exist. Recent research has proposed that TENS also stimulates the sympathetic nervous system and brain stem nuclei to produce endorphins and may inhibit arthritis related inflammation. Pain is the most common indication for TENS. Success rates in clinical studies vary from lows of about 25% to highs of about 80 to 95% and may be affected by a variety of different factors [16]. Since FM is characterised by generalised musculoskeletal pain, it is obvious that the use of TENS is limited. Nevertheless in some cases were a localised musculoskeletal pain problem is prominent the use of TENS is certainly justified based on the available clinical data in other conditions. A major advantage of TENS is its applicability to a home program and patient control of the treatment schedule. The effectiveness of TENS depends on proper instruction and monitoring of its use [22].

Specifically in FM, electroanalgesia by TENS and electro-acupuncture has been used with controversial results. In their study, Almeida at al. suggested that the use of combined therapy with pulsed ultrasound and interferential current proved to be a valid therapeutic option to FM improving not only pain manifestations but also the sleep pattern in a subjective and objective evaluation [18].

The only study to evaluate a non-pharmacological against a pharmacological intervention found transcutaneous electrical nerve stimulation to be inferior to adenosyl-L- methionine (an antidepressant) on 3 of the 13 outcomes assessed [23]. There were no significant differences in respect of subjective pain, sleep or fatigue. This and the short period of follow-up (6 weeks), limits the value of this finding.

The interferential electric current is characterised by a medium frequency wave with low frequency modulated amplitude. It acts as TENS does and promotes analgesia by blocking pain potentials in the dorsal horn of the spinal cord. In FM, it has been proposed that synaptic plastic alterations in the dorsal horn of the spinal cord and free nerve endings, in conjunction with insufficient pain suppression are involved in pain threshold decrease, hyperalgesia and allodynia. Interferential current reduces pain by acting in the common aspects of the theories proposed to explain the blockage of nociceptive stimuli in the dorsal horn of the spinal cord which are the stimulation of Aβ miyelinated fibers and the blockage of C amiyelinated nociceptive afferents, as well as increase in the opioid release [18].

ACUPUNCTURE AND ELECTRO ACUPUNCTURE

Acupuncture is a therapy that involves the stimulation of defined points on the skin typically by inserting needles; however, related techniques such as manual (acupressure), electrical or laser stimulation of acupuncture points are also often summarised under this term [24].

Acupuncture is a traditional Chinese medical practice primarily involving needle placement into areas thought to have energy flow or "qi" for at least 2500 years. The general theory of acupuncture is based on the premise that patterns of energy flow through the body, that are essential of health. Disruption of this flow is believed to be responsible for disease. Acupuncture may correct imbalances of flow at identifiable points close to the skin [16, 25]. Acupuncture theory suggests that stimulation has the potential to create positive change in any aspect of a person's physical, emotional, mental or spiritual being.

Ancient traditional Chinese medicine texts recognise a condition called the *Bi syndrome*, in which acupuncture is highly effective. This syndrome is similar to FM and consists of myofascial pain, arthralgia and fatigue with varying manifestations. Acupuncture and TENS is commonly used to alleviate pain in various pain condition [26, 27].

The National Institute of Health Consensus Conference on Acupuncture [25] concluded that acupuncture may be useful as an adjunct or alternative treatment for FM or it may be included in a comprehensive management program for patients with FM [25]. Literature studies have reviewed the scientific evidence of the use of acupuncture in the treatment of FM [16, 28-31]. Some randomised, controlled and cohort studies have been published that show the beneficial effect of acupuncture for patients with FM [32-34]. One of the advantages of acupuncture is the lower incidence of adverse effects, compared with that of many drugs [25].

Results from a randomised controlled trial reported that FM patients receiving electro acupuncture experienced significant improvement in both subjective pain reduction and objective increase of pain threshold compared to patients receiving sham electro acupuncture. But there are few high-quality controlled studies to support its widespread use [35, 36].

Berman and *et al.* [2]) stated in their review about the effectiveness of seven studies of acupuncture in the treatment of FM that there is a limited amount of high quality evidence suggesting that real acupuncture is superior to sham acupuncture for improving symptoms in FM. Some authors have even found that there is a possibility of exacerbation of FM related pain with acupuncture [29, 35]. This was one of the major reasons for early withdrawal in these studies [16].

Deluse *et al*. [35] performed a high-quality, randomised study that 70 patients with FM. The treatment was based on the administration of six electro acupuncture applications for 3 weeks. The authors found statistically significant improvements in 5 of 8 outcome measures (including visual analogue scale (VAS), pain threshold, sleep quality and amount of analgesic use) as compared with a sham electro acupuncture group. Seventy percent of the patients in the electro acupuncture group noticed an improvement in pain threshold when compared with the patients in the control group. According to the author, electro acupuncture may become an effective adjunct method in the treatment of FM. Although acupuncture appears to be relatively safe, technicians must be trained properly and there are certain risks and contraindications to its use [37].

Sprott *et al.* [12] noted the lack of objective parameters to measure chronic pain. Acupuncture was applied to 29 patients with FM (25 women and 4 men). The results found in the research concerning the serum levels of serotonin and substance P suggest that acupuncture can promote changes in the concentration of pain-modulating substances. In addition, authors observed reductions in the number of pathological tender points and decreased VAS scores corresponding to patients' own reports of pain reduction in patients with FM treated with acupuncture in a non-controlled 6-week study.

In another study, Sprott *et al.* [33] evaluated 20 patients with FM using acupuncture that was adapted according to each patient's needs after a specific protocol. The five most significant tender points were evaluated by laser flowmetry and the data were compared with temperature measurement and dolorimetry. Increased blood flow was registered above all tender points after acupuncture was applied. The number of tender points was reduced from 16.1 to 13.8 after therapy. These data suggest that acupuncture is useful in the treatment of FM.

In a cross-over designed pilot study by Sandberg *et al*. [38] involving 10 to 14 acupuncture sessions showed improvement in tender point count. In this study, seventy-eight percent of all patients had immediate pain relief, 33% continued to have pain relief at 2 to 3 months. General reduction in pain, based on patient's assessment of global treatment effect, lasted only up to 8 weeks. However, in a small subgroup of patients, relief of musculoskeletal pain in focal areas persisted beyond that duration, until the completion of 24-weeks of follow-up. Therefore, despite improvement with 10 to 14 acupuncture session, relief of symptoms was brief and no-long lasting global improvement was detected. Sandberg *et al*. also demonstrated that one needle stimulation (acupuncture) into the anterior tibial muscle and overlying skin increases local skin and muscle blood flow in FM patients. Deep needle stimulation produces a greater increase to merely inserting the needle subcutaneously. However, the deep mode of needle stimulation also induces more pain and discomfort to the patients, which should be considered in the clinic. In contrast to FM patients, healthy subjects do not respond to subcutaneous needle insertion with increased skin or muscle blood flow [39].

Waylonis [32] carried out a study with electro acupuncture, treating 39 patients who had generalised chronic pain. Forty-six percent of the patients reported greater enhancement of their symptoms with this techniques than with any other type of therapy they had previously received. Fifty-nine percent found that acupuncture was more effective than any other physical therapy. Sixty-nine percent of the patients who were analysed were taking fewer medications. The author suggests that acupuncture is as effective as ultrasonography, cryotherapy and medication.

Berman and Colleagues [29] pointed out in their review that there are several issues raised but not sufficiently answered in the studies reviewed:

1. What is the long-term effect of acupuncture? Can booster doses sustain benefit in responders?
2. What is the optimal acupuncture treatment for FM?
3. Does acupuncture work synergistically with antidepressant medication?

In conclusion, despite the positive results found, the number of publications related to the application of acupuncture is still scant, especially concerning FM treatment. Lee [30] and Millea and Holloway [28] published systematic reviews of the material that had published since 1966 about the use of acupuncture in the treatment of chronic pain. According to Lee [30], most of the studies have a poor methodology. It is necessary to conduct a larger number of randomised, controlled studies, have a significant number of patients and standardise the points that are used [34].

LASER THERAPY

Laser or photodynamic treatment, is also in its infancy although the application of light for purposes of healing has been used for thousands of years [40]. Laser light is artificial and represents light amplification by stimulated emission of the radiation. Today, a variety of cold lasers have been used for the treatment of pain. The most popular are the gallium aluminum arsenide, gallium arsenide and helium-neon. These visible and infrared lasers have powers of 30 to 90 nW and can deliver from 1 to 9 J/cm^2 to treatment sites. Cold laser or low level laser therapy are non-thermal. Penetration depends on wavelength and can alter cellular functions [41].

Many claims have been made about the use of lasers to alleviate pain and these claims have many critics. The Food and Drug Administration (FDA) has now accepted the pain-

relieving benefits of 830-nm light in reversing carpal tunnel syndrome. The recent approval by the FDA will allow more physicians in the United States to use this modality to treat carpal tunnel syndrome, various other syndromes and arthritis [41]

Low level laser therapy (LLLT) has been shown to affect many subcellular and cellular processes, although the mechanisms have not been well defined [42]. However, it is important to note that LLLT does not produce significant tissue temperature changes, so any potential physiological effects appear to be non-thermal [43].

LLLT has been used experimentally to treat a wide a variety of clinical conditions, but no consensus regarding indication or effectiveness has been established [44-47]. The equipment, experimental designs and techniques used in the low-energy laser literature are highly variable and close attention should be paid to therapy parameters when reviewing and comparing these studies. Still, the efficacy of this therapy method is controversial. Many authors have reported significant pain reduction with LLLT in acute and chronic painful conditions such as rheumatoid arthritis, osteoarthritis, fibromyalgia, postoperative pain and low-back pain [13, 14, 48-51].However, some have failed to show such an effect in painful musculoskeletal pathologies [52-54].

The exact mechanism of pain reduction by LLLT is not completely understood although a number have been postulated. While the underlying mechanism is unknown, it has been demonstrated in animal studies that laser therapy results in a selective reduction of Aβ and C fiber activity [55]. Anti-inflammatory effects have been demonstrated both in-vitro [56] and in-vivo [57, 58] and a direct effect on motoricity of lymph vessels [59], reducing interstitial fluid at the site of inflammation, has been described. Many investigators have observed an anti-inflammatory effect of LLLT in studies conducted in patients with rheumatoid arthritis [60, 61]. A histochemical study has shown a marked increase of prostaglandin I_2 following LLLT and consequently inhibition of platelet aggregation and vasodilatation [62]. Improvement of local circulation leads to reduction of edema and better oxygenation of tissues and thus may result in reduction of pain. In addition, increased fibroblast activity and lying down of collagen in damaged ligaments may also contribute to long-term pain relief associated with laser therapy [63]. Lack of Na-K- ATP ase activity seems to increase nociceptive impulse transmission; an increase in Na-K-ATP ase following LLLT may be a factor in pain attenuation [64-66]. Kudoh, *et al.* [64] reported a charge of Na-K-ATP ase in rat saphenous nerve alter LLLT treatment.

It has also been suggested that LLLT has effects on peripheral nerve stimulation and microcirculation regulation, interrupting the pain mechanisms and thereby providing analgesia [67]. In some experimental studies pain thresholds have been shown to increase owing to laser application [68]. Analgesia may also occur due to the release of endogenous opioids following laser stimulation [69]. Thus, LLLT could produce pain relief by one or a combination of these mechanisms: collagen proliferation, anti-inflammatory effect, circulation enhancement, peripheral nerve stimulation and analgesic effect.

There are many open questions. What is the real mechanism of the therapy? What is the correct dosage per point? We know that the penetration of the skin differed between Ga-As and He-Ne lasers. Most of the energy is absorbed in the first two millimeters. Also there are differences in the technology and in the devices and differences between the geometry of the laser beam, the divergence of the beam and the system of collimation of the diode laser equipment. Because of the large number of positive reports and the innocuous nature of the therapies, further clinical evaluation of laser therapy is warranted [13].

It is important to remember that the literature on LLLT studies is uneven and disorganised. Future works may show that results now in apparent conflict are actually different aspects of the same problem. For example, it seems reasonable that various tissues with dissimilar absorption spectra could respond differently to diverse stimulating frequencies. In addition, discrepancies in energy dosages, therapy techniques and therapy schedules may be important enough to complicate evaluation [70, 71].

Authors of present manuscript previously carried out a randomised, single-blind and placebo- controlled study to evaluate the efficacy of 904 nm Gallium Arsenide low energy laser therapy in 40 FM patients [13]. Patients were randomly allocated to active (Ga-As) laser or placebo laser treatment daily for two weeks except weekends. Both the active laser and placebo laser groups were evaluated for the improvement in pain, number of tender points, skinfold tenderness, stiffness, sleep disturbance, fatigue and muscular spasm. In both groups, significant improvements were achieved in all parameters except sleep disturbance, fatigue and skinfold tenderness in the placebo laser group. It was found that there was no significant difference between the two groups with respect to all parameters before therapy whereas a significant difference was observed in parameters as pain, muscle spasm, morning stiffness and tender point numbers in favour of laser group after therapy. The authors suggest that laser therapy is effective on pain, muscle spasm, morning stiffness and total tender point number in FM and suggest that this therapy method is a safe and effective way of treatment in the cases with fibromyalgia.

Gur *et al*. [14] carried out another randomised, single-blind and placebo- controlled study to compare the effectiveness of 904 nm Gallium Arsenide low energy laser therapy and low-dose (10 mg/ day) amitriptyline therapy on clinical symptoms and quality of life in patients with FM. In this study, Seventy-five patients with fibromyalgia were randomly allocated to active (Ga-As) laser (25 patients), placebo laser (25 patients) and amitriptyline (25 patients) therapy. In laser group, the patients were treated for 3 min at each tender point daily for two weeks, except weekends, at each point of approximately $2J/cm^2$ with a Ga-As laser. The same unit was used for the placebo treatment, for which no laser beam was emitted. Patients in the amitriptyline group took 10 mg daily at bedtime throughout the 8 weeks. In the study, Significant improvements were indicated in all clinical parameters in laser group and significant improvements were indicated in all clinical parameters except fatigue in amitriptyline group, whereas significant improvements were indicated in pain, tender point number, muscle spasm,

morning stiffness and Fibromyalgia Impact Questionnaire score in placebo group. A significant difference was observed in clinical parameters such as pain intensity and fatigue in favour of active laser group over the other groups. A significant difference was observed in morning stiffness and depression in the amitriptyline group compared to the placebo group after therapy. Additionally, a significant difference was observed in depression score in the amitriptyline group in the comparison to the laser group after therapy. The authors concluded that both low dose amitriptyline and LLLT are effective on clinical symptoms and Quality of Life and suggested that both Ga-As laser and 10 mg amitriptyline therapies are a safe and effective treatment in the patients with FM.

ELECTROMAGNETIC FIELD AND MAGNETO-THERAPY

Magnetotherapy or the use of magnetic energy to treat pain, dates back to ancient humans who used natural sources of magnetism such as lodestones. Similarly, electric energy from natural sources was used in ancient Egypt and in the Greek and Roman cultures; electrics eels and electric rays were used to shock the regions of pain. These approaches using magnetic or electric energy were later refined. Permanent magnets generating static fields were developed and were applied by Mesmer and Hell over painful regions with dramatic results. Now, in the twenty-first century, static magnets are receiving increased interest and are applied as necklaces, chains or bands, as well as in pulsed therapy [42].

The use of magnetic fields to treat pain is currently in its infancy. Observational reports on a variety of conditions have suggested that exposure to weak magnetic fields can lead to pain relief. As investigators use randomised, placebo-controlled designs with better endpoints, they will be able to determine if indeed the application of static magnetic fields to target neck pain is effective. There is currently no significant risk in the application of static magnets except to keep the magnet 6 inches or more away from cardiac pacemakers [41]. Pulsed electromagnetic field therapy reduces stress and eases pain. Blood circulation is also improved, which helps eliminate toxins.

Trock [72] reports studies including one of 50 patients with post-polio syndrome in whom static magnets paced on trigger points were significantly better than placebo in transient pain relief (76% *vs* 19%) based on McGill Pain Questionnaire scores. Use of magnets is based on the theory that magnets may affect membrane potentials of C-fiber neurons and cause them to become desensitised.

ELECTROMYOGRAPHIC BIOFEEDBACK TRAINING

Biofeedback teaches an individual to become aware of processes and sensations in the body that are not normally apparent and to learn to bring them under conscious control with the use of special equipment. An individual is hooked up to a biofeedback instrument which measures such physiological variables as skin temperature and heart rate and translates those measurements and thus effect the body function(s) being measured. Since the equipment is designed to detect even minute changes in measurements, the patients' effort to affect body processes is reinforced by every positive change in measurements, no matter how small and the patient is further encouraged to bring these processes into conscious awareness and control. Over time, the goal is to be able to influence these sensations and processes without the aid of the biofeedback instruments.

Biofeedback is a therapeutic approach that uses non-physiological feedback to facilitate control of physiological processes. There are a number of different approaches and reported indications for biofeedback. Electromyographic (EMG) biofeedback in particular is widely used and is supported by some of the broadest and oldest literature [16].

EMG biofeedback involves providing patients with audio feedback of muscle tension per surface electrodes to attempt to control the tension and relieve discomfort [31].

Biofeedback was found to be effective in a randomised controlled trial of 24 patients with questionable blinding [73]. Another study randomised 119 patients to biofeedback/ relaxation training, exercise, a combination of the 2 or an education only control group. All of the active treatment groups had better outcomes than the control group, but this was primarily because of worsening outcomes in the control group [74].

EMG biofeedback training has been considered beneficial in patients with FM. Ferracioli *et al*. [73] studied 15 patients in an open- labeled trial. The patients received auditory feedback of muscle tension in scalp muscle determined with the use of surface electrodes placed on the forehead. The authors reported a 50% clinical improvement in 9 patients at 6 months. Subsequently, further analysis included 12 patients randomised to sham- controlled or EMG biofeedback; improvement was found in all outcomes in the treatment group, whereas the sham group had improvement only intender point count. A criticism of the reliability of these results is the questionable blinding method in the study [31].

In a study by Buckelew *et al*. [74] it was demonstrated that biofeedback training for 6 weeks produce short and long term benefits in the areas of self-efficacy, disease severity and physical activity in 119 FM patients. Although the exact mechanisms of EMG biofeedback in FM are not known there is evidence of some benefit, at least as an adjunct in a multidisciplinary treatment approach [16].

Molina *et al.* [75] indicated that EMG biofeedback training reduced plasma ACTH and beta-endorphin during treatment, indicating an opioid or neuroendocrine basis for some of the observed beneficial effects of EMG biofeedback in FM patients. Sim and Adams [76] found biofeedback to be infrequently used for fibromyalgia by y-therapists in the UK, probably due to lack of specialist training and/or unavailability of suitable equipment [77].

Electromyography biofeedback seems to help some patients, in particular those with no psychopathologic disturbance [78]. It is sometimes recommended as part of a multimodal pain therapy in patients with FM [36].

CONCLUSIONS

Fibromyalgia remains a syndrome that is difficult to understand and treat successfully. FM patients frequently use alternative therapies, indicating dissatisfaction or ineffective-

ness of traditional medical therapy. The demonstration of a long-term effective intervention for managing the symptoms associated with FM is needed. Despite the positive results found, the number of publications related to the application of physical therapy modalities such as acupuncture, TENS, laser, biofeedback, electrotherapy and magnetic field is still scant, especially concerning FM treatment. Multidisciplinary approaches to management include physical and medical therapeutic strategies. Treatment modalities should be individualised for patients based on target symptoms and impairment in functioning. Patience and positive attitude on part of the physician and active involvement of patients and their families in treatment are likely to enhance improvement. It can be concluded that there is a need for larger, more systematic and methodologically sound RCTs to evaluate the effectiveness of physical therapy modalities of managing FM.

ABBREVIATIONS

FM	=	Fibromyalgia
VAS	=	Visual analogue scale
TENS	=	Transcutaneous electrical stimulation
FDA	=	the Food and Drug Administration
LLLT	=	Low level laser therapy
Ga-As	=	Gallium-Arsenide
He-Ne	=	Hellium-Neon
EMG	=	Electromyographic
ACTH	=	Adrenocorticotrophic hormone

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