We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,900
Open access books available

185,000
International authors and editors

200M
Downloads

Our authors are among the

154
Countries delivered to

TOP 1%
most cited scientists

12.2%
Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com



Chapter 3

Nonpharmacologic Treatment for Fibromyalgia

Fatmanur Aybala Koçak and Emine Eda Kurt

Additional information is available at the end of the chapter

http://dx.doi.org/10.5772/intechopen.70515

Abstract

Fibromyalgia is a common musculoskeletal pain condition associated with chronic widespread pain, tenderness at various points on the body, fatigue, and sleep abnormalities. Individuals with fibromyalgia often have comorbid anxiety, depression, and/or other pain syndromes. Research into pharmacologic remedies for fibromyalgia has demonstrated efficacy for a variety of agents, but pharmacology is only one piece of the puzzle when it comes to successful management of fibromyalgia. Nonpharmacological treatments, complementary and alternative medicines, and therapies can support alleviating fibromyalgia symptoms.There are many studies with regard to these treatment options.

Keywords: fibromyalgia, nonpharmacologic treatment

1. Introduction

Fibromyalgia (FM) has been defined as a chronic and common pain disorder and is associated with comorbid symptoms such as fatigue, nonrestorative sleep, poor balance, cognition and memory problems, psychological distress, and physical function impairment [1]. The life quality is also reduced in FM [2]. It is affecting approximately 2% of the general population [3]. FM is also an expensive and controversial condition. It has been associated with significantly higher costs for the individual and society [4]. However, current data do not enable identification of distinct factors in the etiology and pathophysiology of fibromyalgia syndrome [5]. Also, an important problem in FM patients is the low compliance rate which, in the case of most patients, depends on an inadequate clinical response and on the difficulty in making a correct clinical characterization of patients [6]. Among the treatment options for FM management, there are pharmacological as well as nonpharmacologic therapies (supplementary and alternative medical treatments included) [7]. Numerous studies were reported about different nonpharmacologic treatment options [8–10].

INTECH
open science | open minds

© 2018 The Author(s). Licensee InTech. This chapter is distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/3.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. CC BY

In this chapter, nonpharmacological treatment options will be explained in light of the last published guidelines.

2. Education and goal setting

The diagnosis of FM has positive influences on the management of this disease and leads to decrease in primary care visit, diagnostic tests and prescriptions. The nest stage is the training of patients. When the patient is convinced that the disease is not life-threatening, the anxiety will decrease [11]. The training and detailed goal setting are extremely important. Training on the treatment must be provided to the patient and his/her family as well. Acknowledging of the pain and the effects of this pain in his/her life is important. The patient must also be told to be active in his/her rehabilitation period, and it must be emphasized that she/he is not alone in this process. In this step, concrete goals must be set during the treatment period [12]. Mentioning the positive expectations from the treatment period and the prognosis and the participation of the patient are, again, extremely important. It is also useful to tell patients that there will be good days and bad days and that the treatment will decrease the effects of the symptoms but not completely eliminate the disease. It is extremely important that the patients are careful about the sleep hygiene, exercise schedule and some other nonpharmacologic modalities [11].

Strong evidence shows that patient training is effective in the FM management. In a randomized-controlled study, untreated controls were compared with trained FM patients and positive outcomes were reported [13]. The training was generally provided in groups like lectures with printed materials, discussions with groups and demonstrations. The duration of the trainings lasted between 6 and 17 sessions. The positive outcomes of the trainings included improvement in pain, sleep quality, fatigue, self-efficacy, and quality of life. Positive outcomes lasted between 3 and 12 months. In a study in which 100 patients were included, a multidisciplinary training program was applied for 1–1/2 days, and important positive improvements were reported it terms of Fibromyalgia Impact Questionnaire (FIQ) total score, pain scores, fatigue, morning tiredness, stiffness, anxiety, and depression in the 1-month follow-up [13, 14].

According to some clinicians, labeling FM in itself would deteriorate the symptoms, but a prospective study showed that the labeling, i.e., the diagnosis, did not have any adverse effects, on the contrary, it improved function over 18 months [15].

There are several studies in which well-controlled trials were reported as well as some other studies that reported that they could not find statistically significant superiority over other intervention methods when compared with the trained control group [16]. Burckhardt et al. [17] provided training to FM patients in one group, physical training condition and training to another group, and included delayed treatment waitlist controls in another third group [17]. They reported improved measurements in terms of physical activity in the active treatment groups [18].

If the patients are prone to be trained on self-management of the FM, a training and multiprofessional or multimodal program is the most important first-step action to involve the patients in the planned therapeutic activities. If such a program is not possible, an informed physician

can provide patient education, and for detailed nonpharmacologic treatments, a specialist may also be consulted [18, 19].

3. Exercises

McLoughlin et al. [20] reported that many female patients with FM are active at a less level when compared with healthy women whose ages match [20]. They have low perceived functional ability. They also demonstrate impaired physical performance [21]. There are many reports that described positive effects of various types or combined exercises on patients with FM [22]. Pain in FM patients may be associated with the central nervous system (CNS) pain-processing abnormalities including central sensitization and insufficient pain inhibition, peripheral tissues, as well as muscles, which might contribute to chronic pain via initiating and/or maintaining central sensitization [23]. In this way, exercise is expected to contribute to pain via muscle microtrauma process, repair and adaptation, which are associated with normal-acute exercise and exercise training. It has been reported in previous studies that there are metabolic outcomes in muscle tissues, which is consistent with deconditioning [24]. Some of these findings might be normalized by aerobic and strength training-induced metabolic adaptations, which contribute to improvements in pain [25]. In addressing conditions experienced by FM patients, exercise training was reported to be used successfully [8].

Although there are studies mentioning the efficiency of short-term aerobic exercises, the level of evidence for these studies is low. Effects on pain and tender points were determined to be at an insignificant level in statistical terms. In terms of the secondary outcomes such as depression, fatigue and sleep, the evidence is not clear on the effects of aerobic exercise on depression (in this respect, two studies reported medium/large effects [26]). There is no evidence that aerobic exercise prescribed at American College of Sports Medicine levels had effects on fatigue in FM patients [27]. Despite the fact that a meta-analysis shows that aerobic exercise has a positive effect on well-being and physical function, several factors moderated our appraisal. It has been demonstrated that aerobic and strength training improves depression in individuals that have depression at clinical level [28]. Moderate exercise can be beneficial for sleep in people with sleep complaints. It is also visible in training-related improvements in cardiorespiratory fitness. This situation suggests that fatigue may also be improved because as the maximal aerobic capacity of a person improves, that person will perform daily life activities at lower absolute percentages of maximal capacity [22]. Kurt et al. conducted a randomized study and reported that the FIQ score, sleep quality, total myalgic score, and depression scores of the group that received only aerobic exercise treatment improved after 15 sessions; however, in the third month follow-up, it was observed that the measurements regressed to the values that were present before the treatment. In recent studies, it has been reported that especially combined exercises or the combinations of exercise and other treatment options are more efficient [29].

According to a Cochrane compilation conducted on the efficiency of resistance exercises in FM patients, it has been reported that moderate- and moderate- to high-intensity resistance training improves pain, tenderness, muscle strength, and multidimensional function in FM patients, and

it is obvious that the level of evidence for these studies is low. In addition, it has also been reported that resistance exercises are superior to flexibility exercises in terms of wellness, FM symptoms, and physical fitness; however, aerobic exercises are more successful than resistance exercises [8]. In an 8-week exercise program in which aerobic exercises and muscle strengthening exercises were compared, it was reported that fitness, depression, pain, sleep, fatigue, tender point count, and quality of life were improved in FM patients in both exercise groups, and no differences at statistically significant level were observed between the two exercise types [30].

There are exercise recommendations given in the past years such as American Pain Society (APS: 2005), (2) Association of the Scientific Medical Societies in Germany (AWMF: 2012), (3) Canadian Pain Society (CPS: 2013; also used in the United Kingdom), and (4) European League Against Rheumatism (EULAR: 2016) guidelines related to FM. APS, CPS, and AWMF assigned the highest ranking of recommendation for aerobic exercises [31]. In EULAR 2016 FM management guide, the proof levels of aerobic and stretching exercises are given as A in Ia Proof Level. However, according to the previous studies, it has also been reported that none of the two exercises was superior to the other one [10].

Besides these, especially in the last decade, extensive research was conducted on low-impact aerobics, flexibility, stretching, strength training exercise technique spectra, and some traditional exercise techniques such as Tai Chi, chi gong, yoga, and Nordic walk. In a more recent cohort study, it has been reported that Tai-Chi exercises could be an efficient rehabilitation method for FM in case it was done with the supervision of an expert [32]. It has been reported that Ai-Chi exercises, which are a form of Tai-Chi movements in water, led to reduced pain and improved life quality as well as physical-mental health in FM patients in a 10-week aquatic therapy program [33].

In two randomized-controlled studies, it was reported that Tai Chi had a potential as a useful method in the multidimensional treatment of FM [34]. Furthermore, studies showed improvement at a statistically significant level in static and dynamic balance, and timed get-up-and-go. According to these results, it was shown that functional mobility decreased the falling risk with Tai Chi in functional measurements and minimized difficulties in performing essential daily physical activities [35]. The German Pain Society 2017 guideline in "Complementary and alternative procedures for fibromyalgia syndrome" strongly recommends Qigong, Tai Chi, and yoga for the FM treatment [36].

Fischer-White et al. [37] conducted a compilation study and reported that there was a need for comprehensive yoga instructions, and they stated that the use of yoga in FM was investigated by a limited number of researchers, although there were no adequate proofs [37]. The yoga programs included traditional yoga postures, breathing exercises and meditation. In a study in which 22 FM women patients were included in an 8-week yoga program, improvements were observed in fibromyalgia symptoms and functional deficit [38]. In a controlled study conducted by Ide et al. [39] pranayama (a breathing technique in yoga) was utilized in combination with a range of motion and relaxation exercises in aquatic medium for female FM patients (sessions lasted for 1 h, four times a week, and 4 weeks). Important improvements were shown on several SF-36 and FIQ components together with global pain and dyspnea scores [39].

In recent years, Pilates has become a popular exercise form for healthy people and for people who need rehabilitation. Pilates exercises focus on core strengthening, posture, and coordination of breathing with movement and combines Asian and Western techniques. In 2009, Altan et al. [40] conducted a study and examined the effects of Pilates in 49 female FM patients. They showed improvements in pain scores and FIQ results compared to the control group (home relaxation and stretching exercises); but after an extra 12-week follow-up, no differences were detected between the groups [40]. In a recent randomized controlled study, the Visual Analogue Scale, algometry, Anxiety Inventory, FIQ, and Quality of life score were showed to improve in patients with FM [41].

In a study in which moderate-to-high intensity aerobic exercise by means of Nordic walking and low-intensity walking exercises applied twice a week (in 15 weeks) was compared, the former was found to be a feasible mode of exercise and resulted in improved functional capacity and a decreased level of activity limitations [42]. Mannerkorpi et al. [43] conducted a randomized-controlled study and reported similar results [43]. In a meta-analysis in which the effect of Qigong, which is a Chinese medical exercise combining static/dynamic physical exercises, breathing exercises, and meditation on FM was investigated, it was reported that there were little number of patients and studies on the topic, and although there was a low-quality evidence, Qigong might be a useful approach for FM patients in terms of pain, life quality, and sleep improvements [44].

In a Cochrane compilation in which the aquatic exercise studies were compiled, it was reported in studies that compared study groups and control groups that improvements could be achieved in aquatic exercise group in terms of pain, involvement, and physical functions. When aquatic exercises were compared with land exercises, it was reported that there were no differences at a statistically significant level between the groups, and when aquatic exercises were compared with the Ai-Chi exercises, it was reported that Ai Chi was superior to aquatic exercises for stiffness [45]. Recently, a randomized-controlled study, which includes both aquatic therapy and land-based therapy (warm-up, proprioceptive exercises, stretching, and relaxation periods), was reported. In a program of the study being applied for 3 days a week for 3 months, improvements were determined in both groups in terms of pain and balance, but no significant differences were detected between the groups [46]. Andrade et al. [47] reported that aquatic physical training with standardized intensities did not cause significant changes in body composition but was effective in promoting increased VO_2 at peak cardiopulmonary exercise test in women with FM [47]. The purposes of physical activity and exercise training include improving physical fitness and function together with the symptoms of fibromyalgia, and optimizing health, because a sedentary lifestyle and deconditioning are associated with the symptoms of fibromyalgia [20]. Moreover, a lower percentage of maximum capacity may be achieved in daily activities with more efficiency and the symptoms are less likely to increase [48]. Furthermore, targets depend on baseline body functions and the severity of the symptoms together with individual preferences and motivations [49]. In contrast, in a study, it was reported that nearly 2% of the competitive sport players had FM, which shows that people with FM may be extremely active. Although regular exercises (i.e., aerobic, strength, flexibility) are among the most important elements in the FM management, it is also important that the intensity, duration, incidence, and type of any adverse effects and frequency must be

prescribed [50]. Prescribing exercises for FM patients requires extreme care. After a detailed assessment that includes cardiovascular system, a personal exercise program for the target is designed [48]. Although the most prominent exercises are aerobics and stretching exercises in many studies, there is no such thing as "the most proper treatment." Different exercises may be combined in the same séance or in different séances. However, the evidence level on flexibility exercises is low, and they are generally combined with stretching exercises [51].

It has been reported by many authors that the frequency of exercises must be increased gradually starting from low intensity (by using the "*start-low & go-slow*" technique) to achieve at least moderate intensity [52]. Strengthening exercises must be started at lower resistance level of the normal values according to the age. If pain, fatigue and other FM symptoms increase, the duration of exercise session must be decreased. Also, the intensity of the exercises should be increased by 10% within 2 weeks of exercise (without exacerbating the symptoms) [48]. In recent studies, a formula that was computed with heartbeat according to the age in FM patients was developed. In terms of the target heartbeat zones for aerobic training within the anaerobic threshold, a training intensity range was shown to improve cardiorespiratory fitness. In previous studies, authors reported that maximum heartbeat could be predicted by using either $(208 - (0.7 \times \text{age}))$ or $(220 - \text{age})$. They also suggested sedentary individuals with FM to train within the anaerobic threshold at 52–60% of the heartbeat reserve or at 75–85% of the predicted maximum heartbeat [53].

4. Physical treatment modalities

The definition of physical therapies involves all treatments in which a physical activity or technique is used to have therapeutic effects. Such techniques are mostly used in the context of rehabilitation and are used on the basis of their ascertained mechanisms of action (i.e., the activation of the spinal gate, release of endogenous opiates, local metabolic action, etc.) Physical therapies have several types such as thermal (hot and cold), mechanical, light, electrical, and magnetic stimulation. Each of these has its own mechanism of action; however, peer-reviewed evidence of their effectiveness in FM is missing. Recent reviews have reported nonhomogeneous results, while some reviews are cautious in stating efficacy based only on few randomized-controlled trials. It is strongly suggested to conduct more studies to show a long-term, effective intervention for managing the FM symptoms [54]. Other reviews that have anecdotal evidence or small-scale observational physiotherapy studies report that physical therapies can be effective for various symptoms [55, 56].

4.1. Heat and cold

Although local cold therapy application with ice cubes or cooling sprays is useful in other muscle pains, they do not have any influence in FM. Cold sprays are applied with stretch-spray techniques. On the other hand, whole body cryotherapy at $-67^{\circ}C$ seems to have some short-term effect on some active trigger points and on the intensity of the pain. There are no data available about the long-term efficacy [56, 57].

Superficial heat and deep infrared heat, ultrasound application and the local thermal effect induced by stroking massages were reported to be useful for FM patients [58, 59]. The real efficacy of both superficial and deep heat is still a topic for further studies [56].

4.2. Balneotherapy, mud-pack/bath, hydrotherapy

The exact mechanisms of immersion of the body in mineral/thermal water or applying mud, which alleviates FM symptoms, are not understood adequately. It is considered that this effect stems from a combination of mechanical, thermal and chemical factors [60].

To discriminate between nonspecific mechanisms of simple bathe in hot water (hydrotherapeutic, in a broader sense), specific mechanisms (hydromineral and crenotherapeutic) depending on chemical and physical properties of the water are used. Buoyancy, resistance, immersion, and temperature together play important roles in this mechanism. Hot stimuli increase the threshold of pain and produce analgesia on nerve endings. A relief in muscle spasms is achieved via gamma fibers in muscle spindles and the descending pain inhibitory system is activated. The "Gate Theory" claims that relief in pain may stem from the temperature and hydrostatic pressure of water on the skin [61]. The absorption of minerals dissolved in thermal waters may be influential in the mechanism of balneotherapy [61, 62].

Some previous studies reported that sulfur baths had anti-inflammatory effects. Spa water that includes sulfur is thought to inhibit the production of cytokines especially IL-2 and interferon gamma. It has been claimed by some authors that memory T-cells are the principal targets of waters that are rich in sulfur because they are mainly produced by CD4 lymphocytes. Sulfur-containing water reduces the capacity of memory T-cells to proliferate and therefore the cytokine production, which alters immune response [63].

The exact mechanism of balneotherapy on fibromyalgia is not clear yet. Ardiç et al. [64] showed decreased levels of anti-inflammatory markers interleukin 1 (IL-1), prostaglandin E2, and leukotriene B4 after 15 sessions of balneotherapy in 44 FM patients [64]. Furthermore, heat and mineral contents of water have useful effects on body (especially in musculoskeletal, endocrinologic system, and in pain pathways). They also contain increased plasma endorphin and cortisol levels, and are responsible for the activation of diencephalic-pituitary-adrenal axis and decreased plasma levels of several inflammatory mediators (IL-1, IL-6, prostaglandin E2, leukotriene B4, tumor necrosis factor alpha) [29, 61]. Balneotherapy is recommended strongly by AWMF, APS and EULAR for the FM treatment [31]. In EULAR recommendations, it has been stated that without balneotherapy and exercise, hydrotherapy would not have any superiority and both were recommended with weak recommendation level [10]. In a recent comprehensive meta-analysis that investigated the efficiency of balneotherapy in FM patients, it was reported that there was weak evidence on the efficiency of balneotherapy; however, it could be applied as a supplementary treatment together with the basic treatment. It has been observed that the frequency and duration of treatment were taken in different terms in many different studies. There is no standardization on this [65].

In a 2-week study in which Bağdatlı et al. [66] compared the efficiency of balneotherapy and mud-pack, it was reported that Balneotherapy was a more efficient treatment in terms of

nonrefreshed awaking, pain intensity, FIQ score, fatigue, stiffness, anxiety, and depression subscales of FIQ in the follow-up measurements 1 month after the treatment [66]. The efficiency of balneotherapy and mud-bath was compared in another randomized-controlled study, and it was reported that both the treatments were influential on FM symptoms; however, the effect of mud-bath lasted more [67]. In a study conducted by Neumann et al., it was reported that balneotherapy had useful effects on FM symptoms and on the life quality of the patients [68].

After the treatment, Evcik et al. [69] reported important improvements in three parameters. It was reported in their study that there were low FIQ scores and some painful points at the sixth month follow-up assessments when they compared the baseline. However, Beck depression scores were increased to near-baseline level [69]. Dönmez et al. [70] also conducted a study and reported that balneotherapy was influential on FIQ scores, sleep disturbance, and on some painful points when compared to the baseline values in the sixth month [70]. In a randomized-controlled study in which combined treatment approaches were compared, it was reported that when balneotherapy and aerobic exercises were applied together with the existing treatment, the FIQ, depression scale, sleep quality, and total myalgic scores were better when compared to the exercise + balneotherapy group, and in addition, the effect duration could last as long as 3 months in terms of sleep quality in a combined therapy [29].

4.3. Electrical stimulation: TENS

Electrical current is the most frequently used physical therapy technique in pain management. Transcutaneous electrical nerve stimulation (TENS) is an electrical current for pain relief applied by means of superficial electrodes applied on skin. Investigators have found positive results with fibromyalgia using TENS [71]. In one review article, it was reported that TENS was a useful methodology to control specific symptoms like localized musculoskeletal pain [55]. On the other hand, it is possible to claim that TENS and related techniques can be useful in treating specific, contingent and localized pains, but they do not have obvious effects on generalized pain syndromes like FM [56].

4.4. Transcranial direct current stimulation (tDCS) and transcranial magnetic stimulation (TMS)

The possibility of central mechanisms in the pathogenesis of FM has led to the idea that transcranial stimulation treatments can be performed. Thus, studies were conducted in FM patients. The tDCS procedure applies a weak current to the scalp, while TMS therapy uses electrical current to produce a magnetic field. Then this magnetic field penetrates to skull to generate an electrical field in the brain of the patient. Stimulation of the primary motor cortex produces antinociceptive effects, while stimulation of the dorsolateral prefrontal cortex has antidepressant effects.

In a review that examined the effectiveness of tDCS and TMS, decrease in pain scores was reported after these treatments, but different results were reported in the number of tender points, in functional assessments, and in depression scales [72]. In a guideline about therapeutic use of tDCS, level B evidence (probable efficacy) was found for FM [73]. In a more recent

meta-analysis about the effectiveness of tDCS in FM, it is more likely to control pain and improve general FM-related function in FM patients than sham tDCS [74].

4.5. Laser

The data on using laser in FM are few and conflicting; however, there are some rare studies reporting efficacy. In some studies, it has been reported that there were no effects [75, 76] while in some others, it has been reported that there is a statistically significant reduction in both spontaneous and mechanical pain [77]. It is difficult to compare various treatment protocols because of the varying lengths of emission wave and power across different and nonstandardized protocols [56].

4.6. Biofeedback

There are numerous studies in the literature on biofeedback approaches. Buckelew et al. [78] conducted a study and compared electromyogram (EMG) biofeedback, exercise training, combination treatment (biofeedback and exercise) and an educational/attention control group [78]. Compared to the control group, they reported that patients in the treatment groups showed improvements in some functional and clinical scores. Another controlled trial was conducted in which patients were assigned to either a fitness program or surface EMG, and the authors could not show significant improvement compared to the control group [79]. Although there are contrary results, the findings that are mostly positive suggest that EMG biofeedback may be a preferred treatment option for some patients with FM [18].

In the revised recommendations of EULAR for managing FM, there were two reviews that were conducted about biofeedback. Glombiewski et al. [80] reviewed 7 studies with 321 participants. Treatment sessions varied from 6 to 22. The control therapy consisted of sham biofeedback, attention control, medication and treatment as usual. Biofeedback was influential in reducing the intensity of the pain, although all trials showed poor quality. EULAR has weak opposition about biofeedback [10].

5. Cognitive behavioral therapies

Cognitive behavioral therapies (CBTs) are a combination of cognitive + behavioristic therapies. In cognitive part, such a therapy will ensure that there will occur changes in emotions and behaviors [18]. In this way, several drawbacks like overgeneralizing, magnifying negative aspects, minimizing positive ones and catastrophizing will be eliminated. Such drawbacks will be replaced with realistic and effective considerations, which will eventually decrease emotional stress and self-defeating behavior. Specifically, in FM, the consideration or the expectation of the worst possible outcome has been associated with the severity of the pain, decreased functioning and affective distress in FM [81, 82]. In cognitive therapy step, worries like "*This is the worst pain, and I cannot do anything*" are replaced with statements such as "*Although my pain is worse, there are still things I can do to lessen it*." Behavioral therapy, on the other hand, unlike the cognitive one, is based on the claim that thoughts and feelings are not as important as

operant behaviors, and tries to increase adaptive behavior via positive-negative reinforcement. Behavioral therapy also extinguishes maladaptive behaviors by punishing the patient in such cases. There are several behavioral techniques that might be applied in FM like behavioral activation (getting patients move again), graded exercises (initiating exercise and then activities increasing slowly), activity pacing (not overdoing it on the days when the patient feels well and remaining active on days when the patient feels bad), pain-reducing behaviors (not reinforcing behaviors related with secondary gain), sleep hygiene (identifying the behaviors that are known to disrupt sleep), and learning relaxation techniques for the purpose of lowering stress (for example imagery, breathing, muscle relaxation, etc.) [18].

In general, applying CBT for FM has three steps [83]. Step 1 consists of training in which the participation of the patient in pain management is focused on and the nature of the pain is dealt with. In step 2, there is skill training on pain reduction to improve functional status and sleep quality, etc. In Step 3, these skills are applied in real-life situations. CBT also involves homework assignments to learn and practice these skills. The "Booster Sessions" also aim the same thing and help to sustain the effects for longer durations [84].

In the revised recommendations of EULAR for managing FM there were 5 reviews that included 30 trials and at least 2031 participants about CBT. Although the quality of individual trials was reported as being weak in general, in one quality review, there were 23 trials comprising >2000 patients [85]. Cognitive behavioral therapies (CBTs) were effective in reducing pain and disability after the treatment when compared with the controls. The results lasted for longer durations. EULAR proposes behavioral therapies as weak [10].

6. Traditional and complementary medicine

The requirement of traditional and complementary medicine (TCM) processes is very common in patients with chronic diseases for which conventional therapies have failed to obtain a cure all around the world. The rheumatologic disorders are one of the most common causes of admission to the TCM practitioners. The TCM usage rate of patients with FM reaches almost 100% [86, 87].

6.1. Acupuncture

Acupuncture is a traditional Chinese medicine form. Needles are placed at various predefined points on the body. It has many effects including reducing pain. It is claimed to work by reducing the inflammation, causing endorphin release, and creating a calmer mind [88]. Many studies showed its use in reducing pain in FM and other pain types when compared to no treatment or sham acupuncture [89]. It has been shown that acupuncture decreases the number and intensity of painful spots. It also modifies neurohormonal parameters [56].

In a clinical study, 70 patients underwent electroacupuncture. It was reported that there was 70% improvement in some parameters in the intervention group against 4% in the sham acupuncture group [90].

In the revised recommendations of EULAR for managing FM, there were eight reviews about acupuncture. In one high-quality review, it was reported that acupuncture, when used

together with the standard therapy, resulted in a 30% improvement in pain scores. Electric acupuncture was also associated with improvements in pain and fatigue. Some mild and transient adverse events were also reported. The active mechanism of acupuncture has not been clarified, and the evidence supporting the use of real vs. sham acupuncture is less consistent. EULAR proposes acupuncture as weak [10].

6.2. Manual therapy/massage/chiropractic

Manual treatments are hands-on therapies used to increase motion range and to decrease pain and swelling. Tissue and muscles relaxation along with stretching exercises is the commonly used manual treatments. Proprioceptive neuromuscular facilitation is used to increase range of motion and strength. Pain leads to immobilization, which further leads to soft tissue (fascia, tendons, ligaments etc.) restriction that can create abnormal strain pattern that can crowd or pull the osseous structures out of proper alignment resulting in compression of joints, which produces pain and/or dysfunction. Neural and vascular structures can also be compressed causing neurological or ischemic conditions. Shortening of the myofacial fasicle can limit its functional length, reducing its strength contractile potential or deceleration capacity facilitating positive changes in this system by therapeutic intervention like myofascial release. Mobilizing the restricted fissure can reverse the effects of immobilization provided that it does not last for an excessive period. Movement encourages the collagen fibers to align themselves along the lines of structural stress and improves the balance of glycosaminoglycans and lubricates and hydrates the corrective tissues [91].

Massage is commonly used in TCM therapy in FM patients. Based on the patient survey data, the intervention has been reported with the highest satisfaction levels [18].

A systematic review and meta-analysis examined fatigue, anxiety, depression, and sleep disturbance. They also included studies investigating traditional Chinese massage that was not extensively reviewed previously. Their main result was that massage therapy that lasted more than 5 weeks gave significant improvement in pain, anxiety, and depression [89, 92].

In the revised recommendations of EULAR for managing FM, there were 6 reviews reported including 1 meta-analysis in which there are 9 trials and 404 patients. Methodological problems were noted with all of the studies, only four were at low risk of bias in terms of random allocation. EULAR has a weak opposition about massage [10].

Chiropractic treatments, like massage therapy, have also become a popular modality in FM patients. Few randomized-controlled trials were reported in FM patients using chiropractic modalities [18, 56]. In the revised recommendations of EULAR for managing FM, there were three reviews about chiropractics. The most recent compilation summarized three studies [93]. The studies were of poor quality and lacked robust data. EULAR has strong opposition about chiropractic treatments [10].

6.3. Meditative movement/mindfulness/mind-body therapy

"Mind and body therapy" is a heterogeneous term that means as "meditative movement therapy" or "complementary and alternative exercise." The goal is to improve the flow of qi (the life energy) through the body with purposeful hand and body movements. A review of

studies demonstrated improvements after 6 months compared to baseline in patients with FM. However, the studies had significant methodological issues and variability [94]. Tai Chi is another mind-body technique with specific movements. A meta-analysis that included seven studies evaluated Tai Chi for FM that showed improvements in some symptoms [89, 95].

In the revised recommendations of EULAR for managing FM, there were six reviews focusing on qigong, yoga, Tai Chi, or a combination of them. However, there was inadequate evidence for individual recommendations. EULAR proposes meditative movement as weak [10].

There were 6 reviews that included 13 trials and 1209 participants about mindfulness/mind-body therapy in the EULAR revised recommendations. One recent review provided evidence that mindfulness-based stress reduction resulted in improvements in pain compared with usual care. However, these effects were considered to be biased. EULAR proposes mindfulness/mind-body therapy as weak [10].

6.4. Guided imagery/hypnotherapy

Although hypnosis is one of the oldest therapies for pain, interest in hypnosis for controlling chronic pain rose only in the last decade. Hypnosis is defined as a state of consciousness involving focused attention and reduced peripheral awareness and is characterized by an enhanced capacity for response to suggestion [96]. Imagery is defined as a dynamic, psycho-physiological process in which a person imagines and experiences an internal reality in the absence of external stimuli. These images can be initiated by the patient or guided by a therapist. In a systematic review conducted on evaluating the efficacy, acceptability and safety of guided imagery/hypnosis (GI/H) in FM, randomized-controlled trials comparing GI/H with controls were analyzed. The main outcomes were ≥50% pain relief, ≥20% improvement of health-related quality of life, psychological distress, disability, acceptability and safety at the end of therapy and a 3-month follow-up. There were 7randomized controlled trials (RCTs) with 387 subjects that were included into a comparison of GI/H vs. controls. There was a benefit from GI/H compared to the controls at the end of the therapy [97]. In the revised recommendations of EULAR for managing FM, hypnotherapy evaluation was considered weak [10].

7. Conclusion

FM is a common musculo-skeletal disorder and is otherwise known by unexplained chronic widespread pain, a lower pain threshold, high tender point count (tenderness on examination at specific, predictable anatomic sites known as tender points), sleep disturbances, fatigue, headache, irritable bowel syndrome, morning stiffness, paresthesia of the extremities, frequent psychological distress, and depressed mood [98]. For these reasons, FM has a negative effect on work capacity, family life, social functions, and life quality [7]. Typically, management of fibromyalgia is multidisciplinary. Furthermore, the treatment of the patients must be organized individually after the detailed examination. There are many nonpharmacologic treatment options available in the treatment of fibromyalgia. When this disease is thought to last for a lifetime, increasing the quality of life of patients should be the primary goal. It should

concentrate first on nonpharmacologic modalities. This is in view of accessibility, cost, safety and patient preference. It is considered that in addition to the existing standard treatment modality of the patient, the treatment may be more efficient and the burden of medication might be reduced with the selection of the best nonpharmacologic treatment option for the patient.

Among these nonpharmocologic treatment methods, exercise therapy, balneotherapy, cognitive behavioral therapies, acupuncture, and meditative movement/mindfulness/mind-body therapies are more effective treatment methods according to the evidence-based medicine approach. These are summarized in **Table 1**. In case of severe disability, combination therapies should be performed.

Nonpharmacologic therapies	Which symptoms improved after treatment
Exercise therapy	
Aerobic exercise	Pain [10, 29, 30], physical functions [10, 29], global well-being [30], emotional distress/depression [28–30], fatigue [22, 30], number of tender points [29, 30], sleep disturbance [29, 30], decreased quality of life [30]
Strengthening exercise	Pain [8, 10, 30], physical functions [8, 10], global well-being [8, 30], emotional distress/depression [28, 30], fatigue [22, 30], number of tender points [8, 29, 30], sleep disturbance [29, 30], decreased quality of life [30]
Tai Chi exercises/Ai-chi exercises/yoga	Pain [32, 39],decreased quality of life [32, 33, 39], loss of balance [35], physical functions [39]
Balneotherapy	Pain [10, 66–70], fatigue [66–68], stiffness [66], physical functions [66, 67, 69, 70], emotional distress/depression/anxiety [66, 68, 69], decreased quality of life [67, 68], sleep disturbance [67, 68, 70], headache/gastrointestinal disturbances [67, 68], number of tender points [67, 69]
Cognitive behavioral therapies	Pain [10, 18], disability [10, 18], emotional distress/depression/anxiety/ maldaptive thoughts [18], fatigue [18]
Acupuncture	Pain [10, 56, 88, 89], fatigue [10, 88], stiffness [88, 89], global well-being [88], number of tender points [89]
Meditative movement/ mindfulness/mind-body therapies	Sleep disturbance [10, 89, 94, 95], fatigue [10, 94, 95], emotional distress [10, 94], pain [10, 89, 94, 95]

*According to the evidence-based results of guidelines, systematic reviews and meta-analyses.

Table 1. Most effective* nonpharmacological therapies for fibromiyalgia.

Author details

Fatmanur Aybala Koçak and Emine Eda Kurt*

*Address all correspondence to: eedakurt@gmail.com

Medical Faculty, Department of Physical Medicine and Rehabilitation, Ahi Evran University, Kırşehir, Turkey

References

[1] Wolfe F, Clauw DJ, Fitzcharles M-A, et al. The American College of Rheumatology preliminary diagnostic criteria for fibromyalgia and measurement of symptom severity. Arthritis Care and Research. 2010;**62**:600-610

[2] Mease PJ, Arnold LM, Crofford LJ, et al. Identifying the clinical domains of fibromyalgia: Contributions from clinician and patient delphi exercises. Arthritis Care and Research. 2008;**59**:952-960

[3] Häuser W, Ablin J, Perrot S, Fitzcharles MA. Management of fibromyalgia: Practical guides from recent evidence-based guidelines. Polish Archives of Internal Medicine. 2017;**127**(1):47-56

[4] Sicras-Mainar A, Rejas J, Navarro R, et al. Treating patients with fibromyalgia in primary care settings under routine medical practice: A claim database cost and burden of illness study. Arthritis Research and Therapy. 2009;**11**(2):R54

[5] Üçeyler N, Burgmer M, Friedel E, et al. Etiology and pathophysiology of fibromyalgia syndrome: Updated guidelines 2017, overview of systematic review articles and overview of studies on small fiber neuropathy in FMS subgroups. Schmerz 2017;**31**:239-245. DOI: 10.1007/s00482-017-0202-5

[6] Bazzichi L, Giacomelli C, Consensi A, et al. One year in review 2016: Fibromyalgia. Clinical and Experimental Rheumatology. 2016;**34**:145-149

[7] Bennett RM.The rational management of Fibromyalgia patients. Rheumatic Diseases Clinics of North America. 2002;**28**:181-199

[8] Busch AJ, Webber SC, Richards RS, et al. Resistance exercise training for fibromyalgia. Cochrane Database of Systematic Reviews. 2013;**12**:CD010884

[9] Theadom A, Cropley M, Smith HE, Feigin VL, McPherson K. Mind and body therapy for fibromyalgia. Cochrane Database of Systematic Reviews. 2015;**4**:CD001980. DOI: 10.1002/14651858.CD001980

[10] Macfarlane GJ, Kronisch C, Dean LE, et al. EULAR revised recommendations for the management of fibromyalgia. Annals of the Rheumatic Diseases. 2017;**76**:318-328

[11] Hawkins RA. Fibromyalgia: A clinical update. The Journal of the American Osteopathic Association. 2013;**113**:680-689

[12] Turk DC, Vierck CJ, Scarbrough E, Crofford LJ, Rudin NJ. Fibromyalgia: Combining pharmacological and nonpharmacological approaches to treating the person, not just the pain. The Journal of Pain. 2008;**9**:99-104

[13] Goldenberg DL, Burckhardt C, Crofford L. Management of fibromyalgia syndrome. Journal of the American Medical Association. 2004;**292**:2388-2395

[14] Pfeiffer A, Thompson JM, Nelson A, et al. Effects of a 1.5-day multidiscplinary outpatient treatment program for fibromyalgia: A pilot study. American Journal of Physical Medicine and Rehabilition. 2003;**82**:186-191

[15] White K, Nielson WR, Harth M, et al. Does the label "fibromyalgia" alter health status, function and health service utilization?: A prospective within-group comparison in a community cohort of adults with chronic widespread pain. Arthritis and Rheumatism. 2002;**47**:260-265

[16] Goossens ME, Rutten-van Mölken MP, Leidl RM, et al. Cognitive-educational treatment of fibromyalgia: A randomized clinical trial. I. Clinical effects. The Journal of Rheumatology. 1996;**23**:1237-1245

[17] Burckhardt CS, Mannerkorpi K, Hedenberg L, et al. A randomized, controlled clinical trial of education and physical training for women with fibromyalgia. The Journal of Rheumatology. 1994;**21**:714-720

[18] Hassett AL, Gevirtz RN. Nonpharmacologic treatment for fibromyalgia: patient education, cognitive-behavioral therapy, relaxation techniques, and complementary and alternative medicine. Rheumatic Diseases Clinics of North America. 2009;**35**: 393-407

[19] Rooks DS, Gautam S, Romeling M, et al. Group exercise, education, and combination self-management in women with fibromyalgia: A randomized trial. Archives of Internal Medicine. 2007;**167**:2192-2200

[20] McLoughlin MJ, Colbert LH, Stegner AJ, Cook DB. Are women with fibromyalgia less physically active than healthy women? Medicine and Science in Sports and Exercise. 2011;**43**:905-912

[21] Jones CJ, Rutledge DN, Aquino J. Predictors of physical performance and functional ability in people 50+ with and without fibromyalgia. Journal of Aging and Physical Activity. 2010;**18**:353-368

[22] Busch AJ, Barber KA, Overend TJ, Peloso PMJ, Schachter CL. Exercise for treating fibromyalgia syndrome. Cochrane Database of Systematic Reviews. 2007;**4**:CD003786. DOI: 10.1002/14651858.CD003786

[23] Staud R. Biology and therapy of fibromyalgia: Pain in fibromyalgia syndrome. Arthritis Research & Therapy. 2006;**8**(3):208

[24] Elvin A, Siosteen AK, Nilsson A, Kosek E. Decreased muscle blood flow in fibromyalgia patients during standardised muscle exercise: A contrast media enhanced colour Doppler study. European Journal of Pain. 2006;**10**(2):137-144

[25] Deschenes MR, Kraemer WJ. Performance and physiologic adaptations to resistance training. American Journal of Physical Medicine & Rehabilitation. 2002;**81**(11 Suppl): 3-16

[26] Gowans SE, deHueck A, Voss S, Silaj A, Abbey SE. Six month and one-year follow up of 23 weeks of aerobicnexercise for individuals with fibromyalgia. Arthritis Care & Research. 2004;**51**(6):890-898

[27] Schachter CL, Busch AJ, Peloso P, Sheppard MS. The effects of short vs long bouts of aerobic exercise in sedentary women with fibromyalgia: A randomized controlled trial. Physical Therapy. 2003;**83**(4):340-358

[28] Brosse AL, Sheets ES, Lett HS, Blumenthal JA. Exercise and the treatment of clinical depression in adults: Recent findings and future directions. Sports Medicine. 2002;**32** (12):741-760

[29] Kurt EE, Koçak FA, Erdem HR, Tuncay F, Kelez F. Which non-pharmacological treatment is more effective on clinical parameters in patients with fibromyalgia: Balneotherapy or aerobic exercise? Archives of Rheumatology. 2016;**31**(2):162-169. DOI: 10.5606/ArchRheumatol. 2016.5751

[30] Bircan Ç, Karasel SA, Akgün B, El Ö, Alper S. Effects of muscle strengthening versus aerobic exercise program in fibromyalgia. Rheumatology International. 2008;**28**:527-532

[31] Thieme K, Mathys M, Turk DC. Evidenced-based guidelines on the treatment of patients: Are they consistent and ıf not, why not? have effective psychological treatments been overlooked? Journal of Pain. 2016;**27**. DOI: 10.1016/j.jpain.2016.12.006

[32] Maddali Bongi S, Paoletti G, Calà M, Del Rosso A, El Aoufy K, Mikhaylova S. Efficacy of rehabilitation with Tai Ji Quan in an Italian cohort of patients with Fibromyalgia Syndrome. Complementary Therapies in Clinical Practice. 2016;**24**:109-115. DOI: 10.1016/j. ctcp.2016.05.010

[33] Perez-De la Cruz S, Lambeck J. Effects of a programme of aquatic Ai Chi exercise in patients with fibromyalgia. A pilot study. Revista De Neurologia. 2015;**60**(2):59-65

[34] Jones KD, Sherman CA, Mist SD, Carson JW, Bennett RM, Li F. A randomized controlled trial of 8-form Tai chi improves symptoms and functional mobility in fibromyalgia patients. Clinical Rheumatology. 2012;**31**:1205-1214

[35] Wang C, Schmid CH, Rones R, et al. A randomized trial of tai chi for fibromyalgia. The New England Journal of Medicine. 2010;**363**:743-754

[36] Langhorst J, Heldmann P, Henningsen P, et al. Complementary and alternative procedures for fibromyalgia syndrome: Updated guidelines 2017 and overview of systematic review articles. Schmerz. 2017;**31**(3):289-295. DOI: 10.1007/s00482-017-0206-1

[37] Fischer-White TG, Anderson JG, Taylor AG. An ıntegrated methodology to assess compliance with delphi survey key components of yoga ınterventions for musculoskeletal conditions as applied in a systematic review of fibromyalgia studies. Explore (NY). 2016;**12**(2):100-112. DOI: 10.1016/j.explore.2015.12.003

[38] Carson JW, Carson KM, Jones KD, et al. A pilot randomized controlled trial of the Yoga of awareness program in the management of fibromyalgia. Pain. 2010;**151**:530-539

[39] Ide MR, Laurindo LMM, Rodrigues-Junior AL, Tanaka C. Effect of aquatic respiratory exercise-based program in patients with fibromyalgia. International Journal of Rheumatic Diseases. 2008;**11**:131-140

[40] Altan L, Korkmaz N, Bingol U, Gunay B. Effect of pilates training on people with fibromyalgia syndrome: A pilot study. Archives of Physical Medicine and Rehabilitation. 2009;**90**(12):1983-1988. DOI: 10.1016/j.apmr.2009.06.021

[41] Ekici G, Unal E, Akbayrak T, Vardar-Yagli N, Yakut Y, Karabulut E. Effects of active/passive interventions on pain, anxiety, and quality of life in women with fibromyalgia: Randomized controlled pilot trial. Women & Health. 2017;**57**(1):88-107

[42] Jones KD. Nordic walking in fibromyalgia: A means of promoting fitness that is easy for busy clinicians to recommend. Arthritis Research & Therapy. 2011;**13**(1):103. DOI: 10.1186/ar3225

[43] Mannerkorpi K, Nordeman L, Cider A, Jonsson G. Does moderate-to-high intensity Nordic walking improve functional capacity and pain in fibromyalgia? A prospective randomized controlled trial. Arthritis Research & Therapy. 2010;**12**(5):189. DOI: 10.1186/ar3159

[44] Lauche R, Cramer H, Häuser W, Dobos G, Langhorst J. A systematic review and meta-analysis of qigong for the fibromyalgia syndrome. Evidence-based Complementary and Alternative Medicine. 2013;**2013**:635182. DOI: 10.1155/2013/635182

[45] Bidonde J, Busch AJ, Webber SC, et al. Aquatic exercise training for fibromyalgia. Cochrane Database of Systematic Reviews. 2014;**10**:CD011336. DOI: 10.1002/14651858.CD011336

[46] Rivas Neira S, Pasqual Marques A, Pegito Pérez I, Fernández Cervantes R, Vivas Costa J. Effectiveness of aquatic therapy vs land-based therapy for balance and pain in women with fibromyalgia: A study protocol for a randomised controlled trial. BMC Musculoskeletal Disorders. 2017;**18**(1):22. DOI: 10.1186/s12891-016-1364-5

[47] Andrade CP, Zamunér AR, Forti M, França TF, Tamburús NY, Silva E. Oxygen uptake and body composition after aquatic physical training in women with fibromyalgia: A randomized controlled trial. European Journal of Physical and Rehabilitation Medicine. 2017. DOI: 10.23736/S1973-9087.17.04543-9

[48] Jones KD, Liptan GL. Exercise interventions in fibromyalgia: Clinical applications from the evidence. Rheumatic Diseases Clinics of North America. 2009;**35**:373-391

[49] Nijs J, Mannerkorpi K, Descheemaeker F, Van Houdenhove B. Primary care physical therapy in people with fibromyalgia: Opportunities and boundaries within a monodisciplinary setting. Physical Therapy. 2010;**90**:1815-1822

[50] Inanici F, Ozdemir O, Aydog T, et al. The frequency of fibromyalgia in sport professionals. Rheumatology International. 2011;**31**(8):1121-1122. doi: 10.1007/s00296-010-1567-2.

[51] Cazzola M, Atzeni F, Salaffi F, et al. Which kind of exercise is best in fibromyalgia therapeutic programmes? A practical review. Clinical and Experimental Rheumatology. 2010;**28**:117-124

[52] Lemos MC, Valim V, Zandonade E, Natour J. Intensity level for exercise training in fibromyalgia by using mathematical models. BMC Musculoskeletal Disorders. 2010;**11**:54

[53] Busch AJ, Webber SC, Brachaniec M,et al. Exercise therapy for fibromyalgia. Current Pain and Headache Reports 2011;**15**:358-367. DOI: 10.1007/s11916-011-0214-2

[54] Gur A. Physical therapy modalities in management of fibromyalgia. Current Pharmaceutical Design. 2006;**12**:329-359

[55] Offenbächer M, Stucki G. Physical therapy in the treatment of fibromyalgia. Scandinavian Journal of Rheumatology. 2000;**113**:78-85

[56] Casale R, Cazzola M, Arioli G, et al. Non pharmacological treatments in fibromyalgia. Reumatismo. 2008;**60**:59-69

[57] Gutenbrunner C, Englert G, Neuen-Lahusen M, Gehrke A. Controlled study on effects of cold chamber exposures (−67°C, 3 min] in fibromyalgia. Akt Rheumatology. 1999;**24**:77-84

[58] Citak-Karakaya I, Akbayrak T, Demirturk F et al. Short and long-term results of connective tissue manipulation and combined ultrasound therapy in patients with fibromyalgia. Journal of Manipulative and Physiological Therapeutics. 2006;**29**:524-528

[59] Almeida TF, Roizenblatt S, Benedito-Silva AA, Tufik S. The effect of combined therapy (ultrasound and interferential current) on pain and sleep in fibromyalgia. Pain. 2003;**104**: 665-672

[60] Fioravanti A, Cantarini L, Guidelli GM, Galeazzi M. Mechanisms of action of spa therapies in rheumatic diseases: What scientific evidence is there? Rheumatology International. 2011; **31**:1-8

[61] Guidelli GM, Tenti S, De Nobili E, Fioravanti A. Fibromyalgia syndrome and spa therapy: Myth or reality? Clinical Medicine Insights Arthritis and Musculoskelet Disorders. 2012;**5**:19-26. DOI: 10.4137/CMAMD.S8797

[62] Kurt EE, Erdem HR, Tuncay F. Balneotherapy in chronic inflammatory rheumatic disease. Journal of Physical Medicine & Rehabilitation Sciences. 2016;**19**(3):167-173

[63] Ghersetich I, Lotti TM. Immunologic aspects: Immunology of mineral water spas. Clinics in Dermatology. 1996;**14**:563-566

[64] Ardiç F, Ozgen M, Aybek H, Rota S, Cubukçu D, Gökgöz A. Effects of Balneotherapy on serum IL-1, PGE2 and LTB4 levels in fibromyalgia patients. Rheumatology International. 2007;**27**:441-446

[65] Naumann J, Sadaghiani C. Therapeutic benefit of Balneotherapy and hydrotherapy in the management of fibromyalgia syndrome: A qualitative systematic review and meta-analysis of randomized controlled trials. Arthritis Research & Therapy. 2014;**16**(4):141. DOI: 10.1136/annrheumdis-2017-211587

[66] Bağdatlı AO, Donmez A, Eröksüz R, Bahadır G, Turan M, Erdoğan N. Does addition of 'mud-pack and hot pool treatment' to patient education make a difference in fibromyalgia

patients? A randomized controlled single blind study. International Journal of Biometeorology. 2015;**59**(12):1905-1911. DOI: 10.1007/s00484-015-0997-7

[67] Bazzichi L, Da Valle Y, Rossi A,et al. A multidisciplinary approach to study the effects of Balneotherapy and mud-bath therapy treatments on fibromyalgia. Clinical and Experimental Rheumatology. 2013;**31**(6 Suppl 79):111-120

[68] Neumann L, Sukenik S, Bolotin A, et al. The effect of Balneotherapy at the Dead Sea on the quality of life of patients with fibromyalgia syndrome. Clinical Rheumatology. 2001;**20**:15-19

[69] Evcik D, Kizilay B, Gökçen E. The effects of Balneotherapy on fibromyalgia patients. Rheumatology International. 2002;**22**:56-59

[70] Dönmez A, Karagülle MZ, Tercan N, et al. SPA therapy in fibromyalgia: A randomised controlled clinic study. Rheumatology International. 2005;**26**:168-172

[71] Sunshine W, Field TF, Quintino O, et al. Fibromyalgia benefits from massage therapy and transcutaneous electrical stimulation. Journal of Clinical Rheumatology. 1996;**2**:18-22

[72] Marlow NM, Bonilha HS, Short EB. Efficacy of transcranial direct current stimulation and repetitive transcranial magnetic stimulation for treating fibromyalgia syndrome: A systematic review. Pain Practice. 2013;**13**:131-145

[73] Lefaucheur JP, Antal A, Ayache SS, et al. Evidence-based guidelines on the therapeutic use of transcranial direct current stimulation (tDCS). Clinical Neurophysiology. 2017 Jan;**128**:56-92

[74] Zhu CE, Yu B, Zhang W, et al. Effectiveness and safety of transcranial direct current stimulation in fibromyalgia: A systematic review and meta-analysis. Journal of Rehabilitation Medicine. 2017;**49**:2-9

[75] Matsutani LA, Marques AP, Ferreira EA, et al. Effects of muscle stretching exercises with and without laser therapy at tender points for patients with fibromyalgia. Clinical and Experimental Rheumatology. 2007;**25**:410-415

[76] Waylonis GW, Wilke S, O'Toole D, Waylonis DA, Waylonis DB. Chronic myofascial pain: Management by low-output helium-neon laser therapy. Archives of Physical Medicine and Rehabilitation. 1988;**69**:1017-1020

[77] Gur A, Karakoc M, Nas K, et al. Effects of low power laser and low dose amitriptyline therapy on clinical symptoms and quality of life in fibromyalgia: A single-blind, palcebo-controlled trial. Rheumatology International. 2002;**22**:188-193

[78] Buckelew SP, Conway R, Parker J, et al. Biofeedback/relaxation training and exercise interventions for fibromyalgia: A prospective trial. Arthritis Care and Research. 1998;**11**:196-209

[79] van Santen M, Bolwijn P, Verstappen F, et al. A randomized clinical trial comparing fitness and biofeedback training versus basic treatment in patients with fibromyalgia. The Journal of Rheumatology. 2002;**29**:575-581

[80] Glombiewski JA, Bernardy K, Häuser W. Efficacy of EMG- and EEG-biofeedback in fibromyalgia syndrome: A meta-analysis and a systematic review of randomized controlled trials. Evidence-based Complementary and Alternative Medicine. 2013;**2013**: 962741

[81] Gracely RH, Geisser ME, Giesecke T, et al. Pain catastrophizing and neural responses to pain among persons with fibromyalgia. Brain. 2004;**127**:835-843

[82] Edwards RR, Bingham CO, Bathon J, et al. Catastrophizing and pain in arthritis, fibromyalgia and other rheumatic diseases. Arthritis and Rheumatism. 2006;**55**:325-332

[83] Keefe FJ. Cognitive behavioral therapy for managing pain. Clinical Psychologist. 1996;**49**: 4-5

[84] Friedberg F, Williams DA, Collinge W. Lifestyle-oriented non-pharmacological treatments for fibromyalgia: A clinical overview and applications with home-based technologies. Pain Research. 2012;**5**:425-435

[85] Bernardy K, Klose P, Busch AJ, et al. Cognitive behavioural therapies for fibromyalgia. Cochrane Database of Systematic Reviews. 2013;**10**(9):CD009796. doi: 10.1002/14651858.CD009796

[86] Kibar S. Fibromiyalji Sendromu Tedavisinde Tamamlayıcı Tıp Yöntemleri. Turkiye Klinikleri J PM&R-Special Topics. 2015;**8**:50-56

[87] Wahner-Roedler DL, Elkin PL, Vincent A, et al. Use of complementary and alternative medical therapies by patients referred to a fibromyalgia treatment program at a tertiary care center. Mayo Clinic Proceedings. 2005;**80**:55-60

[88] Deare JC, Zheng Z, Xue CCL, et al. Acupuncture for treating fibromyalgia. Cochrane Database of Systematic Reviews. 2013;**31**(5):CD007070. doi: 10.1002/14651858.CD007070

[89] Chinn S, Caldwell W, Gritsenko K. Fibromyalgia pathogenesis and treatment options update. Current Pain and Headache Reports. 2016;**20**:25

[90] Braz AS, de Paula AP, Diniz Mde F, de Almeida RN. Non-pharmacological therapy and complementary and alternative medicine in fibromyalgia. Revista Brasileira de Reumatologia. 2011;**51**:269-282

[91] Kaur J, Kaur N. Fibromyalgia: Non-pharmacological management. Delhi Psychiatry Journal. 2008;**11**:39-42

[92] Li Y-H, Wang F-Y, Feng C-Q, Yang X-F, Sun Y-H. Massage therapy for fibromyalgia: A systematic review and meta-analysis of randomized controlled trials. PLoS One. 2014;**9**: e89304

[93] Ernst E. Chiropractic treatment for fibromyalgia: A systematic review. Clinical Rheumatology. 2009;**28**:1175-1178

[94] Sawynok J, Lynch M. Qigong and fibromyalgia: Randomized controlled trials and beyond. Evidence-based Complementary and Alternative Medicine. 2014;**2014**:379715

[95] Raman G, Mudedla S, Wang C. How effective is Tai Chi mind-body therapy for fibromyalgia: A systematic review and meta-analysis. Journal of Alternative and Complementary Medicine. 2014;**20**:A66-A66

[96] Elkins GR, Barabasz AF, Council JR, Spiegel D. Advancing research and practice: The revised APA Division 30 definition of hypnosis. The International Journal of Clinical and Experimental Hypnosis. 2015;**63**:1-9

[97] Zech N, Hansen E, Bernardy K, Häuser W. Efficacy, acceptability and safety of guided imagery/hypnosis in fibromyalgia—A systematic review and meta-analysis of randomized controlled trials. European Journal of Pain. 2017;**21**:217-227

[98] Mease P. Fibromyalgia syndrome: Review of clinical presentation, pathogenesis, outcome measures and treatment. The Journal of Rheumatology. 2005;**32**:6-21

IntechOpen

IntechOpen

IntechOpen