SYSTEMIC REVIEW

UTILIZING ELECTROPHYSICAL AGENTS IN FIBROMYALGIA – A REVIEW

ABSTRACT

BACKGROUND
Fibromyalgia (FM) frequently termed as fibrositis is a discomforting rheumatic syndrome which is associated with spasm, localize and palpable tenderness, chronic fatigue, headache, depression and bowel symptoms. The use of electro physical agents in order to treat FM is still a growing concern. A systematic review was executed to appraise the use of different electro physical agents in FM.

METHODS
Seventy three articles were reviewed including RCTS. Clinical trials and Experimental studies, highlighting the use of electro physical agents and comparing them with each other.

CONCLUSION
Fibromyalgia is a syndrome is challenging to comprehend and treat effectively. Patients are looking for substitution therapies due to ineffectiveness and dissatisfaction to the conventional and therapies in trend. Although many results have been found in favor of using different modalities related to physical therapy treatment for FM still specific use of modalities like TENS, biofeedback, magneto and electromagnetic therapies is still a question. Treatment should be given according to the need of patient, targeted symptoms and functional impairments.

KEY WORDS
Fibromyalgia, TENS, IFC, Heat, Cold, Laser, Ultrasound

M. Usman Khan
Senior Lecturer
Ziauddin College of Physical Therapy
Ziauddin University
m_khanusman@hotmail.com

Sumaira Imran Farooqui
Associate Professor
Principal
Ziauddin College of Physical Therapy
Ziauddin University
sumairainmannaroomf@gmail.com

Amna Aamir Khan
Assistant Professor
Ziauddin College of Physical Therapy
Ziauddin University
akhan39@caledonian.ac.uk

INTRODUCTION

FM is characterized as syndrome with wide spread body-ache, muscular tenderness, tendons, joint junctions and other soft tissues. It has been related to fatigue, insomnia, depression, anxiety and sometimes headaches. Usually tenderness found at 11 of 18 precise muscle-tendon sites. As research conducted on fibromyalgia shows that around 2% of the general population suffers from fibromyalgia, where men are affected 10 times less than women. In a few researches a hypotheses has been recently developed that FM is a psychologically neuro-endocrine, psychiatric or a psychosomatic disorder, that may be linked with depression, it may also involve the disturbance of cytokines in the body or its inflammatory response. There may be exaggerated inflammatory responses in FM syndromes or increase receptor activity to pain. Currently, extensive variety of options is available for the treatment of FM. Nevertheless, the consensus for the treatment choices is still unidentified. Different types of therapies are evolving for the treatment of FM, different school of thoughts is working on the pharmacological treatment while others on traditional physiotherapy treatments including laser and acupuncture while psychological treatments remain in trend. As the etiological factors of FM are still obscure, immense effort is placed on the long term relieving effects of FM.

After looking at the current facts no specific treatments are available which can decrease the ailments. The traditional painkillers and muscle relaxants have been used since many years to decrease the signs and symptoms of FM but no noteworthy work has been done on the long term and permanent relief of FM. However, a wide variety of treatment strategies are available that can help in temporary relief. While in contrast to traditionally used drug treatments, physiotherapy helps in improving the QOL of a patient suffering from FM. An increase in the awareness regarding the adverse effects of orally ingest pain killers and muscle relaxants have initiated the search of alternative treatment regimes. Most of the time alternative treatment procedures are taken as naturally relieved therapies that have little or no adverse effect on the long term health status of the patient. Physical therapy is widely being utilized as an alternative therapy by not only focusing on reduction of pain but also helping in the areas of deconditioning, muscle weakness, and insomnias. One of the researches indicates that over 91% patients are looking for alternative therapies and only 9% were taking drug treatments.

METHODOLOGY

Five articles were reviewed including RCTs, Clinical trials and Experimental studies. Comparative studies, double blind placebo controlled trial were also considered for the review. These studies emphasized on the use of electro physical agents and comparing them with each other. The studies selected for the review either had a single intervention or a combination therapy of two modalities. These studies selected the use of ultrasound, TENS, acupuncture, laser therapy, IFC, and electromyography biofeedback training. Richard et al. evaluated the patients in OPD, patients (n=164) were divided into 6 weeks program with a follow-up to 6 months in a multidisciplinary program, they found the changes in quality of life, satisfaction level of patients, pain and functional activities and consequences by using the patients questionnaires and clinical evaluation in combination. On the other hand Flaro-Boisette et al.2 evaluated 80 FM patients through questionnaire and found that the two-third of the FM patients was using alternative medications and multiple interventions. Different Studies3-12 measured the reliability of Infrared Laser therapy with a Placebo laser on trigger points of healthy students, twice each point, and that Infrared Laser therapy give better results than placebo laser.

These studies conducted focused on the electro therapeutic treatment of patients having fibromyalgia and other musculoskeletal problems.

There are many other situations like stroke rehabilitation stroke lower back pain etc, can be treated with electro-therapeutic modalities. Further research is likely to uncover additional areas where electrotherapy interventions will be useful.

In this review, we have regarded the existing and current work done on FM and the use of different Electro and physical agents such as heat therapy, Cryotherapy, ultrasonic waves, Tens acupuncture therapy.

HEAT THERAPY

Kelly Rehan13 explained heat therapy as the most ideal maneuver for the diminution of chronic aches and pains linked with fibromyalgia. As when heat is applied it relaxes the muscle which in turn speeds up the blood flow, that allows extra blood to carry extra oxygen and nutrients which triggers the body’s natural healing process. Heating may not eliminate the reason of pain, but it can successfully ease the pain. Heating therapies or heat therapy can be done through dry heating that is using electrical heating pads, hot water bottles etc or moist heating treatments through steam or by moist or warm cloth. Baranowsky et al.4 (2009), they conduct a RCT to identify and evaluate the quality and effects of complementary and alternative medicine (acupuncture, balneotherapy, thermotherapy, magnetic therapy). The ACR criteria for FM was published in 1990, they have investigated from 1990s to july 2007. Encouraging consequences were also recorded for mild infrared hyperthermia in 1 RCT. - Hot packs are effectual in conditions related to inflammation as it effectively improves blood circulation and lessen pain which is a condition in fibromyalgia. Whirlpool and Jacuzzi jet massaging therapy also plays vital role in the treatment of fibromyalgia. The writer also explains a type of soothing warmth therapy ‘Waan’ that produce far infrared ray, dry sauna bath concluding the significant and positive outcomes on pain reduction to the patients involved in the study.

COLD THERAPY

Swenson et al (1996) wrote an article in which he highlighted the effects of cryotherapy. Cold therapy is as old as the Middle Ages, where it was used as an anesthesia preoperatively by the Roman physician Galen. During 4th century B.C The Greek physician Hippocrates wrote that cold therapy was used to control inflammation and in relieving pain thus lessens swelling. Ernst, End. A Fialka, gave scientific evidence from clinical trials that cold therapy may reduce the nerve conduction, resulting in decreases muscle spasms, and hinder edema subsequent to injury peer, K.P., Warren, R.F. and Horowitz L. worked on the
Randomized control trail
NAMES OF AUTHOR AND DESCRIPTION:
RICHARD S6
THIS STUDY IS ABOUT THE TREATMENT OF FIBROMYALGIA
SPEER K17
THIS STUDY IS ABOUT EFFICIACY OF CRYOTHERAPY IN FROZEN SHOULDER AND ELBOW SURGERIES
BERMAN BM39
THIS STUDY IS ABOUT THE ACCUPUNCTURE TREATMENT OF FIBROMYALGIA

Survey based study
NAMES OF AUTHOR AND DESCRIPTION:
PIORO- BIOSSET M12
THIS STUDY IS REGARDING ALTERNATIVE MEDICINE IN FIBROMYALGIA SYNDROME
GUR A. KARAKOC M58
THIS STUDY IS ABOUT LOWER POWER LASER THERAPY AND EXERCISES OF PAIN AND FUNCTION WITH PATIENTS HAVING CHRONIC BACK PAIN

Random sampling
NAMES OF AUTHOR AND DESCRIPTION:
WOLFE F2
THIS STUDY IS ABOUT THE PREVALANCE AND CHARACTERISTICS OF FIBROMYLGIA IN GENERAL POPULATION

STUDY

SYSTEMATIC REVIEW
NAMES OF AUTHOR AND DESCRIPTION:
LEHMAN J19
THIS STUDY IS ABOUT HEATING OF JOINT STRUCTURES BY APPLYING THERAPEAUTIC ULTRASOUND

CLINICAL TRAIL
MESTER E58
THE BIO STIMULATIVE EFFECT OF LASER BEAM

postoperative shoulder and estimated the importance of the effects of cryotherapy by using VAS. This prospective study included 50 consecutive. By postoperative day 1017. On examination the inflammation reported to be reduces in patients who were receiving cryotherapy treatment and thus the pain on VAS reduced. A study conducted by Matsushita K et al explained that the waon therapy is effective in fibromyalgia. Patients experienced a signifi-
ULTRASOUND

In the field of physical therapy ultrasound has been acknowledged as the best modality to reduce the musculoskeletal pain symptoms whether acute or chronic. With the experimental studies it has been proved that we can heat deeper structures with ultrasound like bone, joints and muscles by using 1 MHz frequency\textsuperscript{15}. The main characteristic of fibromyalgia is pain, but there is a controversy in sustaining the position of muscles in pathogenesis by controlled studies. Muscle deconditioning and focal sustained contraction have been explained by perfusion and metabolic changes. The function of pulse ultrasound therapy is to improve muscle performance by rising the permeability of the cell membrane it then improves intracellular energy utilization in turn increase angiogenesis in ischemic tissues repair\textsuperscript{20}. An observational prospective cohort study was conducted on 20 FM patients, and received soft tissue manipulations in combination with ultrasound therapy; they observed the reduction in the intensity of pain. Also the complaints of non-recoverable sleep decreased thus showed enhancement in efficient behavior\textsuperscript{21}. A study conducted by Almeida and subordinates suggested the use of combination therapy of ultrasound and interferential current, which gives an effective way for the treatment of pain and sleep pattern improvement in FM patients\textsuperscript{22}.

TENS AND IFC (INTERFERENTIAL CURRENT)

TENS is the most commonly used current that produce analgesia electronically. The mode and process of pain relief through TENS is still obscure. Pain is the most common condition that recommended the use of TENS. The latest research work has hypothesized that by the stimulating the brain stem nuclei or sympathetic nervous system endorphins can be release and it may also constrain the inflammatory pains due to arthritic conditions. The rate of success of the use of TENS in different domains has found to be vary between 25%-90%\textsuperscript{23}. The use of TENS in FM is limited as it is characterized as the generalized musculoskeletal pain. However in some musculoskeletal problems the justification of the use of TENS in different other conditions is also available on the basis of clinical data. The domestic use of portable TENS can be on an advantage. The significant results for the usage of TENS also depend on the criteria of instruction followed and monitoring of its use\textsuperscript{24}. There have been controversial results obtained in FM with the use of TENS and electro-acupuncture techniques. According to one study combination therapy of ultrasound and IFC showed an valuable affect so it makes ultrasound and TENS as a precious modality in physical therapy which gives an effective way to treat pain and solve the insomniac condition in FM patients\textsuperscript{25}. Di Benedetto P et al. have done the only study to appraise a non-pharmacological in contradiction of a pharmacological intervention TENS to be mediocre to adenosyl-L-methyl-oxide (an antidepressant) on 3 of the 13 outcomes evaluated\textsuperscript{26}. They found no significant changes in terms of pain, sleep patterns and functional status. The follow up of this study was only 6 weeks and because of this it limits the value of this finding. De Domenico describes the IFC as a low frequency, amplitude modulated current that is produced by intersecting two medium frequency currents having different carrier frequencies. IFC behaves like TENS and helps in promoting analgesic effects by pain gate mechanism. The pain alleviation by IFC can be understand by the proposed pain gate theories, which explains that the blockade of the nociceptive stimuli in the dorsal horn of the spinal cord occur, and thus the A\textsubscript{B} myelinated fibers stimulated and results in the blockage of C amylolin- ated nociceptive afferents, as well as it enhances the release of opioid analgesics\textsuperscript{27}.

MAGNETO THERAPY AND ELECTROMAGNETIC FIELD

Magneto therapy is the use of magnetic energy to alleviate the pain, the lodestones have been used anciently, a natural sources of magnetism. Likewise, the electrical energy and electrical rays were used for the treatment of pain anciently by Egyptians, Romans and Greeks. Later on these were symbolized as the basis for the use of electrical and magnetic energies to alleviate pain. Mesmer and Heli were the first one who have used permanent magnets over the painful regions and found dramatic results. Currently, in this era, many of the medical conditions have been treated through the use of static magnets in the form of braces, chain, necklaces and bands, along with the pulsed therapies, and its use is interestingly increasing day by day\textsuperscript{28}. Now a days researchers are using electromagnetic techniques on infants. As investigators use randomized, placebo controlled designs with better endpoints, and the usage of static magnetic field for cervical pains. A precaution must be taken while treating with static magnets that the magnet should be kept at least 6 inches away from the pace makers\textsuperscript{29}. The pain can be reduced and relieved by the use of Pulsed electromagnetic field therapy, by the removal of toxins because of increasing blood supply to the region. Track examined that while treating post-polio syndrome patients by targeting the tender points through static magnetic therapy and observed better results than placebo in transient pain relief (19% vs 76%) by Mc Gill pain score questionnaire. It has been hypothesized that C fiber neurons can be desensitized by the use of magneto therapy and thus helps in relieving pain\textsuperscript{30}.

ELECTROMYOGRAPHIC BIOFEEDBACK TRAINING

Biofeedback is the emerging technology use in order to train a body function similar to the voluntary action. It teaches specific to develop consciousness of processes and sensations that are not usually noticeable, and make them in the voluntary control with the use of biofeedback equipment. When using a biofeedback equipment on an individual, it measures physiological variables such as heart rate, skin temperatures, and pressures on the skin surface. The equipment is able to detect minute’s changes in measurements, and if it detects a minute change it can encourage the patient to correct it. After sometime the purpose of biofeedback is to distinguish these changes deprived of the help of equipment. It is an approach that has been used to enhance the control of physiological activities by the non-physiological response. Electromyography (EMG) biofeedback is extensively been used and is reinforced by many of the researchers, clinicians and therapists and have also a wide variety of literatures\textsuperscript{31}. Ferracioli et al. examined 15 subjects in an open trial and examines that patients with FM can considerably treated and benefited by the use of EMD techniques\textsuperscript{32}. There is
50% improvement noticed in 9 patients over 6 months. In one the study done by Bucklew et al. on biofeedback training he demonstrated that after giving 6 weeks procedure the short and long term benefits in 119 FM patients have been achieved. The use of EMG biofeedback acts as an adjunct in a multidisciplinary treatment procedure, but still the exact mechanism is unknown.82 A study by Molina et al. proved that there is a reduction in plasma ACTH and endorphin (morphine like substance in the body) by using EMG biofeedback treatment and found beneficial.83 One of the studies suggests that the patients who do not have psychopathological problems get benefit from Electromyography biofeedback.82

**ACCUPOINTURE**

The use of acupuncture therapy by needling has been approved and implemented by the national institute of health conference presumed that needle therapy may be valuable as an aide and option for patients with FM or it might be incorporated in a complete administration program.84 Writing studies have surveyed the logical confirmation of the utilization of needle therapy in the treatment of FM.85 Some randomized, controlled and companion studies have been distributed that demonstrate the helpful impact of needle therapy for patients with FM.86-89 One of the preferences of needle therapy is the lower frequency of antagonist impacts, contrasted and that of numerous medications.90 Results from a randomized controlled trial reported that FM patients accepting electro needle therapy experienced noteworthy change in both subjective torment lessening also, treated the helpful impact of needle therapy for patients accepting sham electro needle therapy. Yet, there are couple of high caliber controlled studies to backing its broad utilization.92,93 Bermen et al. also examined that there is a likelihood of decreasing pain by using needle therapy94, Deluse et al. performed a high caliber, randomized Study with 70 patients with FM,95 he applied 6 needles for 3 weeks, and found significant re results in 8 of 8 result measures that were VAS, quality of rest, torment edge, and pain relieving techniques as contrasted and a sham electro Needle therapy bunch. While 70% of the subjects receiving the electro needle therapy shows positive results in relieving pain then the control group bundle. As demonstrated by the Deluse, electro needle treatment may transform into a fruitful subordinate therapy for FM. Regardless of the way that needle treatment has all the reserves of being decently protected, precautionary measures must be taken while using the needle technique.96 Needle treatment was associated with 29 Patients with FM (25 women and 4 men).97 The results found in the investigation concerning the serum levels of serotonin and Substance P. Prescribe that needle treatment can propel changes in the centralization of torment directing substances. In addition, researchers viewed reductions in the amount of masochist Sensitive centers and reduced VAS scores contrasting with Patients’ own specific reports of torment reduction in patients with FM. Treated with needle treatment in a non-controlled 6-week study. In another study, Sprott et al. evaluated 20 patients with FM using needle treatment that was balanced by every tolerable pre requisites after a specific tradition.99 The five most Basic fragile centers were evaluated by laser flowmetry likewise, the data were differenti- ated and temperature estimation. Similarly, doliometry extended circulatory system was selected beforehand each one of the sensitive concentrates after needle treatment was associated. The number of sensitive centers was lessened from 16.1 to 13.8 after treatment. These data prescribe that needle treatment is useful in the treatment of FM. In a cross-over arranged pilot consider by Sandberg et al. including needle therapy,98 The 14 needle treatment sessions showed Change in sensitive point number.99 In this study, seventy-eight Percent of all patients had brief misery easing. 33% Continued having desolation lightening at 2 to 3 months. General Diminishing in desolation, in light of calm’s examination of around the world Treatment effect, kept setting off simply up to 8 weeks. Regardless, in a little subgroup of patients, reduction of musculoskeletal desolation in focal locales persevered past that timeframe, until the climax of 24-weeks of postliminary. As needs be, disregarding change With 10 to 14 needle treatment session, reduction of signs was brief and no sold over all change was distinguished. Sandberg et al. moreover displayed that alternate needle impelling (needle treatment) into the premier tibia muscle and Overlying skin fabricates close-by skin and muscle circulatory system in FM patients. Significant needle impelling makes a more unmistakable Extension to just implanting the needle subcutaneously.100 In any case, the significant system for needle induction moreover induces more anguish and uneasiness to the patients, which should be considered in the middle. As opposed to FM patients, strong Subjects don’t respond to subcutaneous needle insertion with extended skin or muscle circulatory system.100 Waylon is finished a study with electro needle treatment, Treating 39 patients who had summed up unending torment.101 Forty-six percent of the patients reported more conspicuous over haul of their symptoms with this strategies than with any other kind of treatment they had previously gotten. Ferracioli et al. examined 15 subjects in an open-trial and encouraged consequences were also recorded for mild cervical pains. A precaution must be taken while treating patients deprived of the help of equipment. It is an approach of the purpose of biofeedback is to distinguish these chang- es and that of numerous medications.102

**LASER THERAPY**

The use of Light for healing has a history of thousands of year, but still there is a lot of work required in the field of Low Level Laser Therapy (LLLT). Laser therapy is the application of electromagnetic radiation with a combina- tion of unique properties, which probably from the basis for a number of biological reactions. Laser light is a sort of non-natural light and produced by the amplification of
light. Currently, number of LLLT in trend to treat painful conditions, like GaAAlAr, GaARandHeNe, theses lasers are non-thermal in nature, the depth of penetration of waves depends on the wavelength and it can bring physiological changes in the cellular functions, also known by the name of cold lasers\(^4\). Laser got the first approval by FDA (food and drug administration) in 2002, as the use of EPA’s for the use of carpel tunnel syndrome and now various other syndromes and arthritises can be treated through it\(^5\). LLLT has been indicated to influence numerous sub cellular and cell forms, in spite of the fact that the components have not been all around characterized\(^6\). In any case, LLLT is unable to change the tissue temperatures significantly and it is a non-thermal modality\(^7\). LLLT has also been consumed for the treatment of various clinical problems; however no consents in regards to sign or viability have been created\(^8\). The Hardware, test outlines and systems utilized as a part of the Low-vitality laser writing are exceptionally variable and close consideration ought to be paid to treatment parameters when assessing What’s more, contrasting these studies. Still, the viability of this treatment strategy is questionable. Various investigators have examined the reduction in pain with LLLT in intense and excruciating conditions, for instance, RA inflammation, osteoarthritis, Fibromyalgia, postoperative agony and low back pain\(^9\). However, some have neglected to show such an impact in Excruating musculoskeletal pathologies\(^10\). One of the histochemical research work has observed that there is increase in Prostaglandin after LLLT and hence limit the platelet accumulation and vasodilation results\(^11\). Absence of Na-K-ATPase movement appears to increase Nociceptive motivation transmission; an increment in Na-K-ATP. As taking after LLLT may be an element in agony lessening\(^12\). Due to the extensive number of positive reports and the Harmless nature of the treatments, further clinical assessment of laser treatment is justified. It is critical to recall that the writing on LLLT Studies is uneven and disarranged. Future treatment for fibromyalgia and chronic fatigue syndrome. Adv Neuro immunol 1995; 5:39-56.


Gur A. Physical therapy Modalities I management of fibromyalgia dept of physical medicine and rehab.

CONCLUSION

Fibromyalgia is a syndrome which is too challenging to comprehend and treat effectively. Patients suffering with FM frequently look for substitution therapies, because of the ineffectiveness and dissatisfaction to the conventional and the therapies in the trend. A lot of work has been needed to understand the effective intervention to manage the signs and symptoms associated with FM. Although many results have been found in favor of use different modalities related to physical therapy treatment for FM but still specific use of modalities like TENS, biofeedback, magnetotherapy are still a question. Treatment should be given according to need of patient, targeted symptoms and functional impairments. In order to increase the chances of improvement the positive attitude of physician towards the patient and his/her problem and their families shows significant results. By reviewing all the above literatures it has been concluded that there is a need of more systemic and larger RCTs to appraise the effectiveness of physical agents and electrotherapy modalities in patients suffering from FM.

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