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RESEARCH ARTICLE

MYOFACIAL PAIN DYSFUNCTION SYNDROME AND DIFFERENT TREATMENTS MODALITIES

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ABSTRACT

Objective: The aim of this study is to examine the effectiveness of four modality of treatments for myofacial pain dysfunction syndrome (MPDS). The MPDS represents one of the most important pain in the face. It is important to identify the most effective therapeutic modality in the management of hypersensitive points in the masseter muscle and lesser extend temporalis muscle known as "trigger points"(TrPs) to ablating muscle spasms and restoring normal muscle length of the masticatory muscle and alleviating pain and improving mouth range of motion in patients with myofascial pain dysfunction syndrom.

Material and Methods: The present randomized comparative study was on 97 patients, assigned as four groups to four treatment modalities as follow :

Group I: patients treated with pharmacological treatment including Non steroidal anti inflammatory (NSAID), myoreaxent and antidepressant or and anticonvulsant drugs.

Group 2: patients treated by wearing occlusal splint (night guard) with olive oil local massage.

Group 3: treated by physiotherapy with US and transcutenous nerve stimulation (TENS).

Group 4: treated with trigger point dry needling

All the patients were further evaluated for maximum inter incisor subjective evaluation regarding muscle pain.

Results: All the four treatment modalities will alleviate the MFPD in different percentage with different local and systemic side effects.

Conclusion: The findings suggest that occlusal splint with olive oil and US therapy with TENS is the most suitable treatment for alleviating pain and improving mouth range of motion with satisfaction of the patient and change the patients mode in addition to the less side effect.

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INTRODUCTION

Myofascial pain dysfunction syndrome (MPDS) is the most common cause of facial pain .Patients with MPDS experience pain, restricted jaw movements,and masticatory muscle tenderness (Hong and Hsueh, 1996). Psychological factors, occlusion imbalance, and parafunctional habits have been cited as its most important underlying causes (Haddad *et al*., 2012). It is a regional muscular pain syndrome characterized by the presence of hypersensitive points within taut band of skeletal muscle known as "trigger points" (TrPs) in one or more muscle and/or connective tissue (Bron and Dommerholt, 2012). The leading belief is that the muscle trigger points (MTrPs) are caused by an excessive release of acetylcholine (Ach) from motor endplates. The prolonged release of (Ach) results in chronic shortening and contractures of sarcomeres, coupled with decreased circulation lead to hypoxia and local ischemia. As a result prostaglandins, bradykinins, cytokines, and histamine are released, which then sensitize the sensory afferent nerve fibers of the muscle, likely accounting for the specific point tenderness commonly seen with MTrPs (Yap, 2007). The masseter muscles and, to a lesser extent, temporalis muscles are frequently involved in MPDS (Fernández-de-las-Peñas and Dommerholt, 2014). It has been suggested that certain nerve endings in the muscle tissue become sensitized by allergenic substances, which create a localized zone of hypersensitivity (McMillan and Blasberg, 1994). Trigger points (TrPs) are discrete, focal, hyperirritable areas located in taut bands of skeletal muscle. These points are painful upon compression and can induce referred pain, referred tenderness, motor dysfunction, and autonomic phenomena (Gerwin, 2014).

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Palpation of a hypersensitive bundle or nodule of muscle fiber of harder than normal consistency is the physical finding most often associated with a TrPs. Localization of a TrPs is based on the physician's sense of feel, assisted by patient expressions of pain and by visual and palpable observations (Simons *et al*., 1999). The pain may radiate to different regions, such as the dental arches, ears, temporales, forehead, occipital, sternocleidomastoid muscles, cervical region of spine or shoulder girdle (Walczynska-Dragon and Baron, 2011). It is classified as a musculoskeletal pain syndrome that can be acute or chronic, regional or generalized. It can be a primary disorder causing local or regional pain syndromes or a secondary disorder that occurs as a consequence of some other condition (Sipilä *et al*., 2011). The diagnosis MPDS requires a skilled clinician with training and experience in recording a patient's histories, conducting thorough examinations, and identifying MTrPs. Diagnosis confirmed by the occurrence, at least of a taut band, and pain felt by the patient when pressure is applied to a tender nodule (Gerwin and Dommerholt, 2002). The treatment of MPDS is complicated and requires specific knowledge and exercises to strengthen some groups of muscles and weaken others. Although the treatment seems difficult, most of the patients search for help due to MPDS assess that the treatment is successful, although an accurate diagnosis needs to be made to start the proper protocol of treatment (Cummings and White, 2001).

MATERIALS AND METHODS

97 patients from the outpatient clinic of the Oral and Maxillofacial Surgery Department, at average age of 30 years old, female to male ration 8:1 The patients were divided randomly in 4 groups each group treated in different modality as follows :

Group A, 32 patients started with pharmacological therapy which is Non steroidal anti inflammatory drugs (NSAID) and myorelaxrnt for two month and second stage added Antidepressent (Tryptizol) 10 mg and or Diazepam 5 mg once at bed time for 2-3 months under consultation with psychiatric physician.

Group B, 30 patients treated with occlusal splint (night guard) with local olive oil massage. Two types of removable intra oral splinting appliances were used. They were either a vacuum-formed soft occlusal splint constructed from 2-mm-thick elastic rubber sheets (soft splint) or a hard flat occlusal splint fabricated from transparent acrylic resin (hard splint) instruct to wear the appliance for 24 hours a day except when eating. One of the most popular occlusal splints is the Michigan-type bite splint (Ramfjord and Ash, 1994). This splint could be used in both dental arches, but preferably in the maxilla. The mandibular splint is used when the posterior area is missing teeth in the mandible and unwanted tooth movement must be avoided. They were treated for 100 days with local olive oil massage. Monthly follow-up visits were performed during the treatment period, and the dentist measured all parameters of (pain, tenderness of TrPs of the masticatory muscles, and range of mouth opening.

Group C, 20 patients treated with (US) Ultra sound and (TENS) transcutaneous electrical nerve stimulation. Therapeutic U/S (Figure 1) mode- continuous, Intensity-variable according to pain threshold but within 0.5 watts/cm^2, Range- 0.5 to 1. watts/cm^2 pulse 30HZ, 3MHZ treatment time-5 mins for 5 sessions 3 days interval between each sessions. TENS device (Figure 2) delivers biphasic pulsed currents in a repetitive manner using pulse durations of 50–250 ms and pulse frequencies of 1–200 pulses s21. The pulsed electrical currents are generated by a portable pulse generator conducting pad called electrodes and Figure 1 delivered across the intact surface of the skin via the self adhering (Iain Jones Mark, 2009). Patients can self-administer TENS and there is no potential titrate dosage as required, as there is no potential for toxicity. TENS five sessions of treatment per session 3 days after each session for 20 minutes standard for each session.

Figure 1.

Figure 2.

Figure 3.

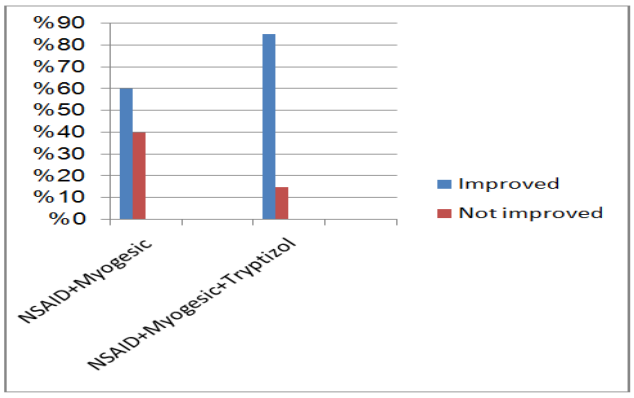

Figure 4. Pharmacological treatment Improvement percentage

Table 1. The adverse effect of Tryptizol

Adverse effects	Percentage of patients
Drowsiness	40%
Xerostomia	20%
Dizziness	8%
Urinary retention	6%
Constipation	12%

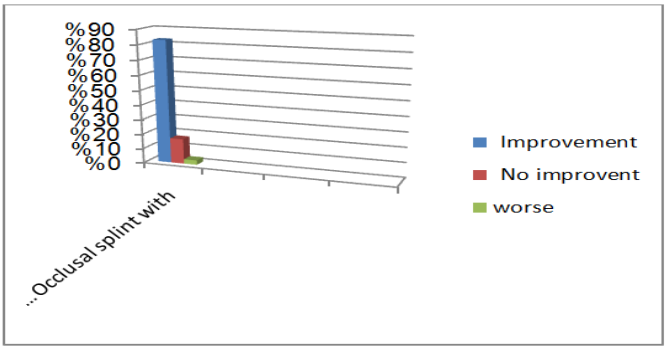

Figure 5. Occlusal splint with olive oil improvement percentage

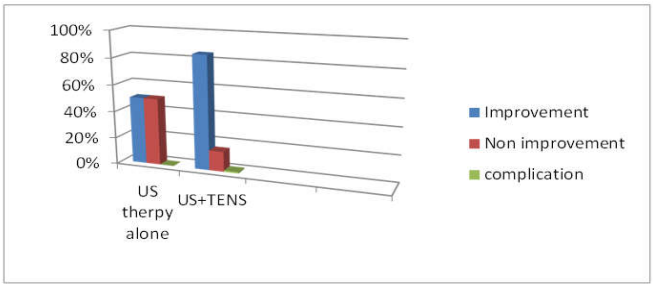

Figure 6. Ultra sound and Ultra sound with TENS improvement percentage

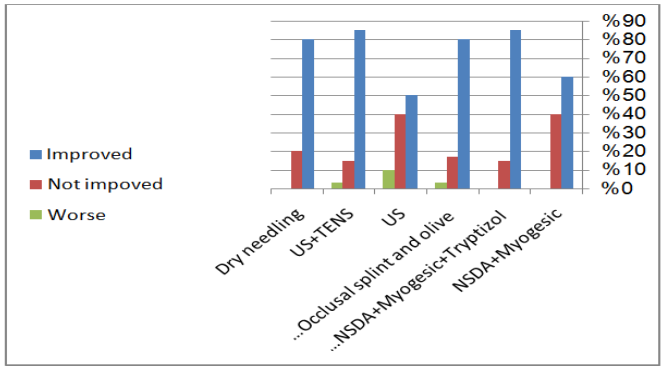

Figure 7. The four treatment modalities and percentage of response

Group D,15 patients treated with trigger point dry needling also known as intramuscular manual stimulation, or intramuscular needling. It involves penetration through skin without introducing any drug. Using a solid needle without central hollow or an injection needle with a central hollow can perform dry needling (Li-Wei Chou *et al*., 2014). Each TrPs was marked clearly the overlying skin Figure 2 was cleaned an prepared. The skin was held between the thumb and index finger. It was then punctured with a dry needle. The rapid movement of the tiny tipped needle can provoke strong stimulation. In this group, each patient received three sessions per week for 4 weeks, each session lasted 50s. (Figure 3) The acupuncture-like needle is inserted into the skin and muscle in the location of an MFTrP using an in-and-out technique in multiple directions, in order to inactivate the MFTrP Needles are removed once the trigger point is inactivated. Dry needling is typically followed by stretching exercises.

RESULTS

In Group A, The pharmacotherapeutic treatment study in 32 patient in average duration of symptoms 2 months with 2 month treated first with NSAID and myorelaxent agents clinical improvement was seen 60% (Figure 4). But when we added antidepressant Amitriptyline 10 mg and or benzodiazepam 5 mg once daily at night to our study sample of patients, clinical improvement and symptom relief increased to 85% for patients who were treated with over a period of 2-3months with Amitriptyline but with Drowsiness was complained by 40%. Dry Mouth was seen in 20% of our patients on initiation of treatment which was no more of problem after few weeks of treatment. Dizziness seen in 8% patient and urinary retention in 6%, constipation was seen in 12% patients. (Table 1).

In Group B : The subjective response for 30 patient treated by individually fabricated occlusal splints (hard or soft) with olive oil massage of the affected muscle 80% patients feeling significant improvement (that the symptoms including limitation and mandibular deviation improved more better than the muscle tenderness). 17% show no change and 3 % show worse change because they are suffering from psychological trauma and or don't wear the splint regularly during the 4-months follow-up period. (Figure 5)

In Group C: The result from 22 patient treated with US and TENS show that 50% of the patient establish first low-dose ultrasound evokes segmental antinociceptive effects on trigger points in comparison to the pre-treatment values pain severity. Tenderness and the level of depression decreased at follow-up visits immediately and 3 months after the treatment also. But in US with TENS treatment result suggested that high frequency, high intensity TENS with US is effective in reducing myofascial pain in 85% and relieved the symptoms which including the pain and limitation of mouth opening and that these pain reductions do not reflect changes in local trigger point sensitivity and only 15% show no change after 5 session of treatment with 3 days interval between each session and 3 months follow up (Figure 6). The most common complaint is an allergic type skin reaction and only 1% show allergic reaction and this is almost always due to the material of the electrodes, the conductive gel used with TENS or the tape employed to hold the electrodes in place

Group D: Dry needling treatment for 10 patient we reported an immediate analgesic affect without hypesthesia in 80% of cases and 20 % will not response when the most painful location was engaged by the needle but the patient some of the feel pain post operative due to needle pricking, develop infection and other have post needling soreness, hemorrhages at the needling site and patient uncooperation (most of the patients will refuse treatment because of fear. (Figure 7)

DISCUSSION

The successful management of patients with MPDS syndrome is dependent on establishing an accurate diagnosis and using proper therapy based on an understanding of the etiology of the disorder. Establishing an accurate diagnosis is accomplished by taking a careful history, doing a thorough examination, and having knowledge of the various other conditions that can produce signs and symptoms similar to those of MPD syndrome. In Group A, The non steroidal anti-inflammatory drugs (NSAIDS) used are efficient and effective in treatment of acute MPDS and will be the first line drug for acute myofascial pain. NSAIDs inhibit the activity of both cyclooxygenase-1 (COX-1) and cyclooxygenase -2 (COX-2), and thereby, the synthesis -1 and cyclooxygenase-2 of prostaglandins and thromboxanes, It is thought that inhibiting COX-2 leads to the anti-inflammatory, analgesic and antipyretic effects (Syrop, 2002). Psycological Stress is an important aspect of MPDS. Tension and emotional stress increase the severity of the symptoms (Moulton, 1995). Stressful events usually trigger the symptoms of the disease (Prevalence of temporomandibular disorder subtypes, 2007). Stress reduces the inhibitory effect of the sensory system in the thalamus which results in depletion of GABA and endorphins in CNS. Hyperactivity of efferent gamma neurons resulting in contraction and pain of muscles. Patient suffering from MPDS are more susceptible to anxiety and depression (Le´pine and Briley, 2004). So using antidepressant in the treatment MFPDS increase the level of 5-HTP that improve mood and regulate pain signals. Low doses of antidepressants' also relieve pain. The 5-HTP can improve symptoms of MFDS including pain, anxiety, morning stiffness and fatigue. Many people with MPDS have low level of serotonin in the brain (Association between experience of stressful life events and muscle-related temporomandibular disorders in patients seeking free treatment in a dental hospital).

In Group B, The main purpose of the occlusal splinting is to disengage the occlusion, place the condyle in the centric position, relax the masticatory muscles and prevent further tooth wear due to nocturnal parafunctional activity (Caruso *et al*., 1990). In addition to that it has been found that using of massage together with olive oil rub, helped to reduce muscle fatigue, to remove lactic acid. It is theorized that olive oil had heat-insulating characteristics. Some authors believe that rubbing with oil help to raise the temperature of the body (warm it up) and further lead to flexibility (limberness) of the muscles. It is important to note that the relation of the maxillary and mandibular arches may differ after the treatment when compared to the initial state. After the replacement of the mandible, the condyles are replaced, and consequently, the mandible is positioned properly and the pain is reduced (Nikities N Nomikos and Demeitrios S Kories, 2010). In Group C, Ultrasound (US) treatment modalities in MFTPt Its used for heating deep tissue. (US) it is noninvasive method which consists of piezoelectric Crystals that convert the electrical energy to mechanical oscillation energy using high-frequency alternating current (Van der windet *et al*., 1999). During ultra sound therapy, cell membrane permeability increases by altering sodium and potassium ion gradients. This increased permeability improves gas exchange and promotes healing, decreases inflammation increases vasodilatation, regeneration and waste removal, accelerates lymph flow and stimulates local metabolism. The healing effect of ultrasound impairs conductivity of an insonated nerve and thus decreases the sensation of pain (Carmine *et al*., 1984). While the TENS delivers electricity across the intact surface of the skin to activate underlying nerves. In the clinical context, it is most commonly assumed to refer to the use of electrical stimulation with the specific intention of providing symptomatic pain relief (Burton and Marrer, 1974).

In Group D, Dry needling (DN) involves inserting the needle into a myofascial trigger point. Preliminary research supports that dry needling improves pain control, reduces muscle tension and normalizes dysfunctions of the motor end plates. The sites at which nerve impulses are transmitted to muscles. This can help speed up the patient's return to active rehabilitation with the goal of reducing pain and restoring range of motion (Kalichman and Vulfsons, 2010). The dry needling is also theorized to disrupt reverberatory central nervous system circuit say interrupt motor end-plate noise, eliciting an analgesic effect. Eliciting a localized twitch re-sponse relax the muscle (David *et al*., 2013). The localized twitch response that often occurs in needling of MTrPs may correct levels of several chemicals in the affected muscles, including bradykinin, calcitonin gene-related peptide, and substance P (Ff- Rifat Aridici). To the sensitive nociceptors can generate strong impulses, and these impulses are transmitted to the spinal cord. It is likely that these impulses can subsequently break the negative cycle in which the neural circuit is responsible for the MTrPs (Kamanli *et al*., 2005).

Conclusion

Due to the diverse causes of the MPDS management requires various methods of treatment that are conformable to the origin of the dysfunction. Regarding the Pharmacologic treatments. The use of NSAIDs and COX2 inhibitors alleviate pain to some limit but when companied with anti depressant (Tryptizol) and \or Diazepam, appears to demonstrate increase the level of the patient pain relieve and patient mouth opening and mostly its effective in patients with psychological trauma and depression. The use of the conservative treatment including occlusal splint both forms of occlusal splints (soft and hard) with olive oil massage improved symptoms in patients with MPDD. So using the night guard with the olive oil showed significant that it found that most commonly reported conservative treatments show good results after 100 days of use so that it represented most commonly reported conservative treatments without side effect .In the case of severe acute pain or chronic pain resulting from serious disorders, inflammation and/or degeneration pharmacotherapy, minimally invasive and invasive procedures should be considered. The ultrasound is most safest and painless successful in alleviating muscle symptoms the ultrasonic therapy was not alone effective in relieving symptoms but more effective when used as an adjunct to the accepted modalities of therapy such as TENS lead to reduces the number and intensity of MTrP. TENS is used extensively in health care because it is inexpensive, safe, and can be a administered by patients themselves. The most common complaint is an allergic type skin reaction about 10%of

patients and this is almost always due to the material of the electrodes, the conductive gel or the tape employed to hold the electrodes in place. So it should be considered as one of the best choice treatment for MPDS pain because of their low risk of side effect. Dry needling (DN) is a relatively new treatment modality and most effective ways used by physicians and physical therapists worldwide. It is minimally invasive, cheap, easy to learn. The trigger point model advocates that inactivation of the MTrPs via dry needling is the fastest and most effective means to relieve pain or improve range of motion. Management success is primarily based on the cooperation of the patients are the mainstay of interventional treatment as compared to other conventional interventions and carries a low risk. The best technique for total and immediate inactivation of MTrP is "multiple rapid insertions." It very likely provides high-pressure stimulation to the multiple sensitizes nociceptors via the descending pain inhibitory path way, quickly interrupting "MTrP circuit" vicious cycle to eliminate pain immediately. This technique is strongly recommended for myofacial pain in order to resume patients normal life rapidly thus saving medical and social resources but there are several adverse effects associated with dry needling, including post-needling soreness, hemorrhages at the needling site and uncooperative patients a due to fear .

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