Review Article

Deep Dry Needling along with Soft Splint Therapy versus only Soft Splint Therapy for Patients Suffering from Temporomandibular Myofascial Pain Dysfunction Syndrome – A Systematic Review.

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Abstract

Occlusal stabilization splints are considered as the standard method of treatment for Myofascial Pain dysfunction Syndrome. Deep Dry Needling (DDN) of the Myofascial Trigger Points (MTrPs) of the masticatory muscles along with occlusal splints is a newer treatment modality. The objective of this study is to evaluate the effect of deep dry needling as an adjunct with stabilization splints in the treatment of patients suffering from myofascial pain dysfunction syndrome. Data search included an electronic search of PubMed, Google Scholar, EMBASE, Institutional Library and manual search of various journals. Articles in English language, published from 01/01/2000 till 31/12/2017. Comparative clinical studies, RCTs, controlled clinical trials and retrospective studies. Patients above 18 years of age, presenting with myofascial pain that underwent deep dry needling with or without occlusal splints were included in this study. Preliminary screening consisted of 298 studies, out of which 46 were selected among which 4 were duplicates. Out of 42 studies, 25 were excluded after reading the abstract. Of the 17 studies,2 were excluded and a total of 10 studies was included in qualitative synthesis with a total of 769 estimates. We concluded, occlusal splints are no doubt the gold standard for the treatment of Myofascial Pain Dysfunction Syndrome. But deep dry needling of the myofascial trigger points of the lateral pterygoid muscle, masseter and temporalis is an effective treatment modality and is maximally invasive as compared to occlusal splints. Thus, DDN with occlusal splints should be adopted as the treatment modality for Myofascial Pain Syndrome for better treatment outcomes.

KEYWORDS: *Myofascial pain syndrome, Occlusal splint, Bruxism, Dry needling*

Introduction

Disorders of the temporomandibular joint are characterized by a multiplex set of conditions that reflect symptoms that not only affect the joint, but also its surrounding structures. These conditions are prevalent in approximately 10% of individuals in the adult age group with a greater female predilection.**(**1**)** The symptoms usually fluctuate in all age groups but seem to impulsively resolve among the elderly. Pain in the head and neck region in most cases is attributed to that of the muscular origin or associated with myofascial pain of the temporomandibular joint. **(**2**)**

Myofascial trigger points (MTrPs) are localized areas of hyperalgesic zones that are usually associated with Temporomandibular joint Dysfunction (TMD). **(**3**)** These points develop due to muscle overload or trauma anywhere in the body. Active MtrPs are associated with voluntary pain while the latent ones evoke symptoms when compressed. Palpating the trigger point or injecting it with a needle, evokes a localized initial response leading to contraction of muscle fibers in or around these MTrPs. **(**4**)**

Since patients are refractive, a standard treatment approach is not feasible and hence, a variety of therapies, either isolated or in combination are being employed. The main outcome of such treatment is focused on pain relief. Most commonly, pharmacological agents like antidepressants, benzodiazepines and muscle relaxants are used primarily for the management. Depending on the efficacy of such drugs and keeping in mind the possible side effects, their long-term administration is considered. **(**5**)**

Among the several treatments used, stabilization occlusal splints being the most beneficial are also a conservative modality that brings about an effective reduction in pain but is a reversible form of the same. Various other techniques have been employed for the same in the recent past. The beneficial effects of acupuncture is an age-old treatment that originated in China in the 16th century used in the treatment of orofacial pain has been reported. It also has been reported that the effect of acupuncture therapy is similar to that of stabilization splints. **(**5,6**)**

Focused question : Does deep dry needling along with stabilization splints enhance the treatment of Myofascial Pain Dysfunction Syndrome (MPDS)?

Objective

To evaluate the effect of deep dry needling (DDN) as an adjunct along with stabilization splints for treating MPDS.

Materials and Methods

Inclusion criteria :

1. Articles appearing in literature from 01/01/2000 to 31/12/2017 (18 years).

2. Patients presenting with Myofascial (Orofacial) Pain with or without Bruxism.

3.Articles in English language only.

Exclusion criteria :

1.Animal studies.

2.Patients below 18 years of age.

3.Case reports, review articles, letter to the editor.

PICO

P = Patients suffering from MPDS.

I = Occlusal splint and Deep dry needling.

C = Effect of DDN and/or occlusal splint therapy in patients with or without bruxism.

O = Pain

Information Sources

An extensive search of the literature was published from 01.01.2001 till 31.12.2017 was carried out. Electronic search engines like Pubmed, Google Scholar, EMBASE, institutional library and the bibliography of studies that were included were included. In addition, only studies that were carried out in humans were looked at.

Search (Table 1)

Sr. No.	Keywords	Synonyms
1.	Myofascial Pain Syndrome	Orofacial Pain Syndrome, Temporomandibular Joint Dysfunction.
2.	Occlusal Splint	Stabilization splint, Occlusal guard
3.	Bruxism	Bruxomania, Night grinding.
4.	Dry Needling	Myofascial trigger point dry needling, Intramuscular simulation (IMS), Trigger point injection therapy

Search Strategies (Table 2)

Sr. No	Search strategy	Total articles	Selected articles	Articles after removal of duplicates
1	Myofascial Pain Syndrome AND Occlusal Splint	153	22	6
2	Myofascial Pain Syndrome with Bruxism AND Occlusal Splint	19	3	0
3	Myofascial Pain Syndrome AND Dry Needling	135	11	1
4	Myofascial Pain Syndrome and Bruxism AND Dry Needling	3	3	3
5	TMD with Bruxism AND Occlusal Guard	0	0	0
6	TMD AND Occlusal Guard	6	3	1
7	Trigger point injection therapy AND Occlusal splint in TMD	4	4	4
	Total	**298**	**46**	**15**

Search Engines

Pub Med

Google Scholar

EMBASE

Institutional Library

Study Selection

Preliminary screening consisted of 298 studies. The studies were screened and only 46 were included as per the eligibility criteria. 4 were found to be duplicates. 25 studies were excluded after reading the abstract. 2 were excluded because they were not in English. Thus, a total of 15 studies were included in the qualitative analysis with a total of 769 estimates.

Data were extracted independently by VV and the data extraction was confirmed by invigilators SS and PW. At first, the studies were screened by title and abstracts, the second step of screening consisted of obtaining full-text articles when they fulfilled the eligibility criteria. Any disagreement between the two reviewers was resolved after discussion. After this, a data extraction sheet was prepared.

Study ID	Author	Year	Location	Study Design	Setting	Sample size	Intervention	Study group	Control	Results	Remarks
1.	Thomas List & Martti Helkino	1992	Sweeden	Prospective	Institute	110	Acupuncture and Occlusal splint	Patients suffering from temporomandibular myofascial pain	Patients suffering from temporomandibular myofascial pain	Patients who were treated with acupuncture and occlusal splints showed significant relief in symptoms	Patients treated with acupuncture showed more significant pain relief.
2.	Thomas List & Martti Helkino	1992	Sweeden	Follow up	Institute	80	Acupuncture and occlusal splints	Patients suffering from temporomandibular myofascial pain	Patients suffering from temporomandibular myofascial pain	68% of patients treated with occlusal splints and 57% of patients treated with acupuncture showed a positive response to additional treatment modalities as compared to those who were not treated with either acupuncture and/or occlusal splints.	Patients who were not treated with either acupuncture and/or occlusal splints didn't show any positive response to alternative therapeutic modalities.

3.	Mona Al Saad et al	2001	Riyadh	Prospective	Hospital	12	Occlusal Splint	Patients suffering from temporomandibular myofascial pain	Non TMD patients	All patients showed reduction of reported and clinically found muscle pain with no statistically significant differences between patients with and without TMD myofascial pain. Reduction in EMG activity level at maximum clenching was seen that was more significant with the anatomic occlusal device	EMG activity was reduced on use of both types of splints (stabilization splint and anatomic splint). Anatomic splints proved to be more effective
4.	A. Gavish et al	2002	Israel	Prospective	Hospital	37	Occlusal Splint	Patients suffering from temporomandibular myofascial pain		The splint group had a statistically significant reduction in pain intensity, in mean muscle sensitivity to palpation and in the pain experience during the chewing test compared with no change in the controls. A stabilization splint has a therapeutic value beyond its placebo effects	An intensive chewing test is an effective tool to evaluate the treatment modality efficacy in MFP patients.
5.	Ingalill Bergstrom, Thomas List and Tomas Magnusson	2008	Sweeden	Follow up study	Institute	65	Acupuncture and/or intercclusal splints	Patients suffering from temporomandibular myofascial pain		Among 87% patients who presented with temporomandibular disorder earlier, decreased to 38% and also the incidence of headaches reduced significantly. Patients gave a positive feedback to the treatment they received and hence authors concluded that the combination of occlusal splints and acupuncture is effective.	

6.	Cheryl Ritenbaugh et al	2008	Portland, Oregon	Prospective study	Institute	160	Traditional Chinese Medicine and Naturopathic Medcine and Specialty Care	Patients suffering from temporomandibular myofascial pain		Patients were assessed on their self- reported worst and average facial pain and interference with activities. It was observed that the patients showed significantly better response to TCM as compared to SC and much better response to NM as compared to SC.	
7.	F. Alencar JR* & A. Becker	2009	Brazil	Prospective & Comparative	Hospital	42	Occlusal Splint and Counselling	Patients suffering from temporomandibular myofascial pain		All the three different appliances (HS, SS, and NS) associated with counselling were able to equally reduce the Mod-SSI (symptoms-Tukey test) and digital palpa- tion (signed Kruskal–Wallis) test between baseline and 90 days.	Self care was considered to be more effective cost wise. But had delayed results
8.	Camero J. F. et al	2010	Denmark	Prospective	Institute	12	Deep dry needling of MTrPs in masseter muscle	Patients suffering from temporomandibular myofascial pain		Deep dry needling of active MTrPs in the masseter muscle helped in maximal pain- free jaw opening and increase in PPT	
9.	Fatih Ozkan et al	2011	Turkey	Prospective	Hospital	50	Occlusal Splint and Dry Needling	Patients suffering from temporomandibular myofascial pain		Positive improvement in overall signs and symptoms with statistically significant differences was observed in both groups. Group 2 (Patients treated with trigger point injections along with Soft Splints) showed significant	Trigger point injection therapy combined with splint therapy is effective in the managem ent of myofascial TMD pain.

										reduction in visual analogue scale (VAS) scores, and statistical analysis revealed a significant difference between the VAS scores of Group 1 and Group 2 at the 4th and 12th weeks of treatment follow-up ($p<0.001$).	
10.	P. C. R. Conti et al	2012	Brazil	Prospective	Hospital	51	Behavior changes andOcclusal Splint	Patients suffering from temporomandibular myofascial pain		Group I showed improvement in the reported pain at the first follow-up (2 weeks), whereas for groups II and III, this progress was detected only after 6 weeks and 3 months, respectively. The PPT values did not change significantly. It was concluded that behavioural changes are effective in the manage- ment of pain in MMP patients. However, the simul- taneous use of occlusal devices appears to produce an earlier improvement.	Myofascial pain can be treated with behavioral changes only but the use of occlusal splints helps in early pain relief
11.	Emad T. Daif	2012	Egypt	Prospective	Hospital	40	Occlusal Splint	Patients suffering from temporomandibular myofascial pain		85% of group A (Patients treated with occlusal splints) either completely recovered (35%) or clinically improved (50%) while only 20% of group B (Control group) had a spontaneous improvement. In group A, the means of the electromyographic amplitude records	No comparison group was included

										(mV) of the monitored muscles have decreased after 6 months. However, the decrease was statistically insignificant (p > 0.05) in the patients (15%) who had no clinical changes. In group B, the means of the muscles' records (mV) in the left side slightly increased while those of the right side slightly decreased. These changes were statistically insignificant (p > 0.05).	
12.	Mario Vincente - Barrero	2012	Spain	Prospective	Hospital	20	Occlusal Splint and Dry Needling	Patients suffering from temporomandibular myofascial pain		Patients treated with decompression splints showed reductions in subjective pain and pain upon pressure on temporal, masseter and trapezius muscles, as well as increased mouth opening after the treatment. Patients treated with acupuncture showed pain reduction in the short term and improvements in all of the evaluated para- meters (stronger pressure was required to produce pain; mouth opening was improved).	Acupuncture was an effective complement and/or an acceptable alternative to decompression splints in the treatment of myofascial pain and temporomandibular joint pain-dysfunction syndrome.
13.	Luis - Miguel Gonzalez- Perez	2012	Spain	Prospective	Hospital	36	Dry Needling	Patients suffering from temporo		A statistically significant relationship (p<0,01) was	No comprison group was included

	et al							mandibular myofascial pain		found between therapeutic intervention and the improvement of pain and jaw movements, which continued up to 6 months after treatment. Pain reduction was greater the higher was the intensity of pain at baseline.	
14.	Luis - Miguel Gonzalez- Perez et al	2015	Spain	Prospective	Hospital	48	Dry Needling	Patients suffering from temporomandibular myofascial pain		A statistically significant difference ($p<0.05$) was detected for both groups with respect to pain reduction at rest and with mastication, but the DDN test group had significantly better levels of pain reduction. Moreover, statistically significant differences ($p<0.05$) up to day 70 in the test group were seen with respect to maximum mouth opening, laterality and protrusion movements compared with pretreatment values. Pain reduction in the test group was greater as a function of pain intensity at baseline.	Patients receiving the combination drug (methocarbamol/paracetamol) treatment described unpleasant side effects (mostly drowsiness).
15.	Paloma Maria Blasco-Bonora & Aitor Martin-Pintado-Zugasti	2016	Spain	Prospective	Hospital	17	Dry Needling	Patients suffering from temporomandibular myofascial pain		One-way analyses of variance showed significant improvements in pain intensity, PPT and jaw opening ($p<0.001$). Post-hoc analysis	Deep DN of active MTrPs in the masseter and temporalis in patients

										revealed significant differences between baseline and post-intervention follow-up time points in pain (immediate: Cohen's d=1.72, p<0.001; 1 week: d=3.24, p<0.001), jaw opening (immediate: d=0.77, p<0.001; 1 week: d=1.02, p<0.001) and PPT in the masseter (immediate: d=1.02, p<0.001; 1 week: d=1.64, p<0.001) and temporalis (immediate: d=0.91, p=0.006; 1 week: d=1.8, p<0.001). A dependent t-test showed a significant improvement in jaw functioning, reflected by a large reduction in 1-week JDC scores relative to baseline (d=3.15, p<0.001).	with myofascial TMD and SB was associated with immediate and 1-week improvements in pain, sensitivity, jaw opening and TMD-related disability.

Data Collection Process

A standard pilot form in excel sheet was initially used. Data extraction was done and the form was reviewed by an expert and finalized for all the articles.

Data

1. Study ID
2. Author – Name of the author(s)
3. Location – Place where the study was conducted
4. Year of publication – The year in which the study was published
5. Study Design – Retrospective/ Prospective/ Comparative

6. Setting –Hospital/ Out Patient Department

7. Sample size

8. Intervention – Type of minimally invasive technique

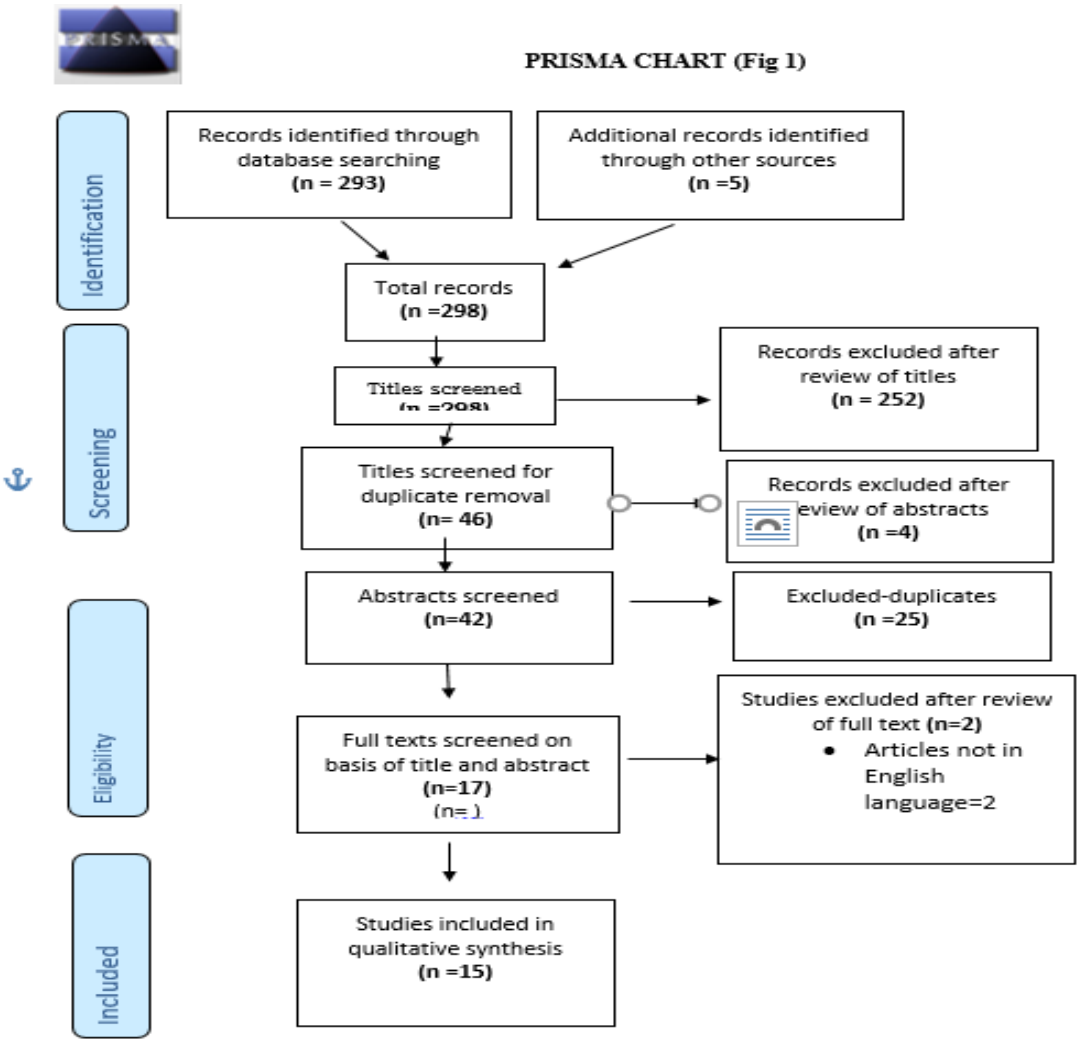
9. Study group – Type of population included in the study

10. Control – Conventional technique

11. Results – Result of the study

12. Remarks – Comment of authors (VV, SS, PW)

Results



STUDY CHARACTERISTICS: Table 1 and Table 2

Discussion

As there is no fixed line of management for patients suffering from myofascial pain due to their refractive nature, a variety of treatment modalities are being employed either individually or in combination. For patients suffering from MPDS, pain relief is the desired treatment outcome. In the recent past, acupuncture (deep dry needling) has been discovered to be an efficient therapeutic alternative for conditions causing chronic pain. It is known that occlusal splints are used as an effective mode of treatment for MPDS. This review however discusses the efficiency of the combination of DDN and occlusal splints in the treatment of MPDS.

Thomas List and Martti Helkino **(**7**)** in January 1992 published a prospective study to evaluate the effectiveness of the combination of acupuncture and occlusal splints in the management of MPDS by means of subjective and/or clinical assessment. A total of 110 patients among which 23 were male and 87were female patients and those who presented with 6 months of history of MPDS were included in the study. After random allocation to three groups, viz acupuncture, occlusal splints and control they were assessed before and immediately after treatment. It was observed that treatment acupuncture and occlusal splints showed statistically significant effectiveness and thus concluded that they are a good treatment modality for temporomandibular myofascial pain.

Later in June 1992, Thomas List and Martti Helkino **(**8**)** published a follow-up study pertaining to the use of acupuncture and occlusal splints. Among those 110 patients who participated in the first study, 30 were lost to follow up and among the 80 patients who participated in the follow up by filling the questionnaires showed that 68% of patients treated with occlusal splints and 57% of patients treated with acupuncture showed a positive response to additional treatment modalities as compared to those who were not treated with either acupuncture and/or occlusal splints. Thus they concluded that a combination of acupuncture and occlusal splints is an effective treatment modality and suggested that more studies should be carried out to prove the same.

Mona Al-Saad and Riyadh Akeel **(**9**)** in the year 2001 published a prospective study that compared the electromyographic (EMG) activity level and clinical presentations in patients with myelogenous TMDs that were treated with two different types of occlusal devices. 11 participants were divided into two groups, wherein one group was treated with usual flat plane occlusal devices and the second group was treated with anatomic splints. The gravity of signs and symptoms were assessed and the EMG activity

of the masseter muscle was recorded and the values were evaluated prior to treatment and were subsequently followed up at regular intervals up to 4 weeks following the delivery of the occlusal device. The EMG was also recorded in 7 normal patients as a control group. It was observed that all patients showed a reduction of reported and clinically found muscle pain, with not much a difference between both the groups. Thus, they concluded that both types of occlusal devices are beneficial to patients suffering from TMD.

Gavish A. et al **(**10**)** in the year 2002 published a prospective study that evaluated the usefulness of the stabilization appliance to reduce the morbidity in MPDS patients and compared the unpleasant experience through the chewing test between the two groups, with and without splints. 37 participants who presented with aggravating pain and symptoms took part in this study and were divided into two groups among which 21 received the splint for nocturnal use and the remaining 16 were equally watched upon clinically without the splint. They were then made to perform a chewing test succeeded by a period of rest and their pain intensity was assessed on a VAS scale over a period of 2 months followed by the same tests again. It was noted that the level of pain at baseline prior to the chewing test was high in both groups. Hence, they concluded that the splint had a more therapeutic effect.

Ingalill Bergstrom, Thomas List and Tomas Magnusson **(**11**)** in February 2008 published a long-term follow-up study of 18- 20 years of the study carried out in 1992 by Thomas List and Martti Helkino7,8. 55 patients who received therapy then participated in this study and readily filled the questionnaire. Among 87% of patients who presented with temporomandibular disorder earlier, decreased to 38% and also the incidence of headaches reduced significantly. Patients gave positive feedback to the treatment they received and hence authors concluded that the combination of occlusal splints and acupuncture is effective.

Cheryl Ritenbaugh et al **(**6**)** in June 2008 published a prospective study to assess the feasibility and acceptability of two different medicinal treatments for MPDS compared to specialty care. 160 women in the age group of 25-55 years participated in this study. Patients were exposed to all modes of treatment. Patients were assessed on their self-reported facial pain and interference with routine day-to-day chaos. It was observed that the patients showed significantly better responses to both the medicinal treatments as compared to specialty care. Hence the authors concluded that there are potential benefits of medicinal treatments over specialty care in treating TMDs.

F Alencar JR. and A. Becker **(**12**)** in the year 2009 compared the benefit of different occlusal splints in relation to clinical counseling and in managing MPDS. The study consisted of 42 patients that were

randomly put into three clinical categories using different splints. Their assessment over a period of 3 months showed equal treatment outcomes with respect to all three types of splints. Thus, they concluded that patient counseling and motivation play a major role in the treatment outcome.

Camero J. F. et al **(**13**)** assessed the effects of dry needling over MTrPs in the masseter muscle in 12 female patients suffering from MPDS. Treatment was provided in 2 visits; the first visit being deep dry needling into the MTrP of the masseter muscle and the other visit being sharp dry needling in the most painful site of the temporomandibular region (placebo). Patients were assessed on basis of Pressure Pain Threshold (PPT) over the masseter muscle TrP and mandibular condyle and painless active jaw opening pre-and post-intervention. Statistically significant beneficial effects were noted in the DDN sessions. Thus authors concluded that DDN of MTrPs in the masseter muscle helped in maximal pain- free jaw opening and increase in PPT

Faith Ozkan et al **(**14**)** conducted a study in the year 2011 consisting of fifty patients that were put into two groups of 25 each. Group 1 was treated with splints and the patients in Group 2 were treated with TrP injections combined with splint therapy. Positive improvement was observed in both groups. However, the group treated with combination therapy showed a more noted reduction in the VAS scores, at follow-up. They concluded that trigger point injection therapy in combination with splint therapy is efficient in the management of MPDS as compared to that of only stabilization splints.

P. C. R. Conti* et al **(**15**)** tested a hypothesis that treatment with intraoral devices with a variety of occlusal configurations was beneficial in the management of myofascial pain. 51 patients were analyzed and then divided into 3 categories viz, Group 1 (full coverage acrylic stabilization occlusal splint); Group 2 (anterior device nociceptive trigeminal inhibitory (NTI) system), and Group 3 (psychiatric guidance for behavioral changes and self-care (control group)). Patients were followed up to 3 months regularly and were evaluated using the VAS and PPT of the masticatory muscles. It was noted that Group 1 showed a marked improvement in pain at the first follow-up (2 weeks) whereas for groups 2 and 3, this progress was delayed up to a maximum of 3 months. Hence they concluded that behavioral changes are beneficial, however, the adjunctive use of occlusal devices produces an earlier improvement.

Emad T. Daif **(**16**)** in the year 2012 assessed the effect of occlusal splint therapy on the EMG activity of masticatory muscles in TMD patients with myofascial pain and to check for a possible relationship between this effect and the treatment outcome. 40 patients participated in this study and were divided into two equal groups amongst which one was treated by occlusal splints for 6 months, while the second one controlled. A clinical assessment and surface EMG for masticatory muscles were performed at

baseline, and then 6 months later. It was observed that 85% of the group treated with splints completely recovered or improved clinically while only 20% of the control group had little improvement. They concluded that occlusal splints could eradicate or improve the signs and symptoms of patients with myofascial pain.

Mario Vicente-Barrero et al **(**17**)** in the year 2012 evaluated the results of applying acupuncture or occlusal splints in the treatment of MPDS patients. The study included 20 patients and results were evaluated by means of the VAS, measurements of mouth opening and lateral deviation of the jaw in millimeters, and assessment of sensitivity to pressure on different points in the temporomandibular myofascial region before and 30 days after treatment. It was noted that patients treated with splints showed a reduction in subjective and objective pain, as well as increased mouth opening and those with acupuncture, showed pain reduction in the short term and improvements in all of the evaluated parameters. Hence, they concluded that acupuncture was an effective complement and/or acceptable alternative to splints in the treatment of MPDS.

Luis-Miguel Gonzales-Perez et al **(**18**)** in the year 2012 evaluated the usefulness of DDN in the treatment of MPDS. 36 patients were included in this study. Differences in pain with a VAS scale and range of mandibular movements before and after intervention were studied and pain reduction was significantly greater as compared to baseline. On basis of the findings in their study, they concluded that DDN in the TrPs in the external pterygoid muscle can be beneficial in the management of patients with MPDS.

Luis-Miguel Gonzalez-Perez et al **(**19**)** in the year 2015 determined whether DDN of TrPs in the Lateral Pterygoid Muscle (LPM) would greatly reduce pain and improve function, compared with methocarbamol/paracetamol medication. The study consisted of 48 patients with chronic myofascial pain located in the LPM that were assigned to one of the two groups. The test group received three applications of needling once per week consecutively for three weeks, while control group patients were given two tablets of a methocarbamol/paracetamol combination every 6 hours for 3 weeks and were assessed pre-treatment, and up to 8 weeks after finishing the treatment. The DDN group had better levels of pain reduction. The evaluation of efficacy was assessed by both patients/investigators and was noted that results were better for the last group. Some patients who received combination drug treatment described unpleasant side effects (mostly drowsiness). Thus, they concluded that DDN of the TrPs in the LPM showed better efficiency in reducing pain and improving maximum mouth opening, laterality and protrusion movements, compared with methocarbamol/paracetamol treatment.

Paloma Maria Blasco- Bonora and Aitor Martin-Pintado-Zugasti **(**20**)** in the year 2016 evaluated the effects of DDN on MTrPs of the masseter and temporalis on PPT, pain-free maximal jaw opening and TMD related disability in 17 patients with sleep bruxism and MPDS and each patient received intervention in the masseter and temporalis MTrPs. Assessments were made before treatment, immediately after treatment and at 1-week follow-up. Jaw disability was assessed using the Jaw Disability Checklist (JDC) at baseline and at 1-week post-treatment only. Thus they concluded that DDN of the active MTrPs in the masseter and temporalis in the patients with MPDS and SB was associated with immediate and 1-week improvements in pain sensitivity, jaw opening and TMD-related disability.

All our studies were conducted between the years 2001 and 2017. Of the 15 studies, 7 were prospective, 5 were comparative and 3 were follow-up studies and showed global distribution. A total of 769 patients suffering from Myofascial Pain Syndrome were treated using conventional occlusal stabilization splints or by DDN or by DDN along with occlusal splints. Amongst the 6 studies that used occlusal splints with or without behavioral counseling for patients suffering from Myofascial TMD; 1 study did not include a comparison group; 2 studies concluded that behavioral changes alone could help relieve myofascial pain effectively but 3 studies proved that occlusal splints helped to relieve myofascial pain effectively. And among the remaining 6 studies, that used DDN, 3 studies that used DDN with occlusal splints proved that Acupuncture along with occlusal splints proved to be a compliment in the treatment of MPDS.

Limitations

We found that 6 studies used minimally invasive techniques i.e. occlusal stabilization splints, of which 1 study did not have a comparison group and 2 studies proved that behavioral changes were effective alone. 4 studies talked about DDN of MTrPs of the muscles of mastication, and 1 study proved that DDN proved to be a complement to the conventional stabilization splint therapy in the treatment of MPDS. The parameters used for assessing the outcome of treatment were different in all studies. The number of studies carried out talking about the two treatment modalities in combination is inconsequential; thus making the choice is debatable.

Conclusion

On thorough comparison of the results, we conclude that occlusal splints are no doubt the gold standard for the treatment of Myofascial Pain Dysfunction Syndrome along with behavioral changes.

But Deep Dry Needling of the Myofascial Trigger Points of the Lateral Pterygoid Muscle, Masseter and Temporalis is an effective treatment modality and is maximally invasive as compared to occlusal splints; and DDN with Occlusal Splints should be adopted as the treatment modality for Myofascial Pain Syndrome for better treatment outcomes.

Future Implications

One of the drawbacks of this systematic review is that there are very few articles that support combination therapy for MPS. This represents an opportunity for future research in which a long-term multi-centric, prospective, randomized controlled trial can be undertaken with a comparison of occlusal splints alone and occlusal splints with deep dry needling in the treatment of MPS to help enhance treatment outcomes.

Conflict of Interest: None

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