(REVIEW ARTICLE)

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The effectiveness of the self-care protocol in managing pain in Tempro-mandibular joint disordered patients: Scope review

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Abstract

Background: Temporomandibular Joint disorder (TMD) consists of a variety of conditions which affect the jaw joints, surrounding muscles and ligaments. It can be caused by trauma, improper bites, or arthritis. These conditions are usually associated with pain and dysfunction of the temporomandibular joint, masticatory muscles, and other bone structures. Self-care protocol is a non-invasive approach. Self-care is commonly an initial management method for temporomandibular disordered patients.

Objectives: This review aims to assess the effectiveness of self-care in managing pain in TMJ-disordered patients when applied alone and in combination with other management methods.

Contents: This is a rapid review of the literature. The review was done in the databases Science Direct, Pubmed and Google Scholar. Articles in English published between 2010 and 2022 were included. Twelve articles were selected. These articles were included in accordance with predetermined inclusion and exclusion criteria.

Conclusion: There are two main goals in the management of temporomandibular disordered patients: the reduction of pain and the improvement of function. Self-care protocols are effective in achieving these two goals. TMJ-disordered patients present faster improvement in TMJ pain symptoms when self-care is combined with any other TMJ management methods.

Keywords: Self-care; Self-management; Temporomandibular disorders; Conservative treatment; Temporomandibular joint disorders; Non-invasive methods

1. Introduction

Orofacial pain is a nonodontogenic pain. This type of pain commonly manifests itself in the face and oral cavity. Orofacial pain treatment modalities mostly include physical therapy, occlusal appliances, pharmacotherapy, trigger-point injections, acupuncture, behavioural modification, self-care protocol, and biofeedback (Ay et al.,2010). Orofacial pain mostly includes temporomandibular disorder pain (TMD) (Gil-Martínez et al.,2018).

Temporomandibular disorders (TMD) are an interrelated set of clinical conditions and problems. TMD usually involves the masticatory muscles, and temporomandibular joint (TMJ) (Venancio, et al.,2009; Giro et al.,2018; Ferrillo, et al.,2022).

The etiology of TMD has been considered complex and multifactorial (Slade, et al.,2013). Several factors may contribute to its predisposition, initiation, and maintenance. Currently, it is found that parafunctional habits and psychosocial

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factors (e.g., anxiety, depression, and fatigue) also can play an essential role in the development of TMD (Mello et al,.2014). For that, treatment methods for TMJ disorders with only biomedical approaches are considered insufficient to promote the long-term improvement of TMD pain (Gui & Rizzatti-Barbosa,2015).

The main signs and symptoms of TMD (which may contribute to the diagnosis) are cracking, crackling, mouth opening limitation, sleep disorders, TMJ pain, headaches, asymmetry, and difficulties in mandibular movements (Gauer & Semidey, 2015). However, TMD is usually characterized by musculoskeletal pain and functional limitations, such as difficulties in chewing and speaking (Giro et al.,2018) and this may have a negative impact on an individual's quality of life (Von Korff et al.,1988; Bueno et al.,2018; Giro et al.,2018; De Leeuw &Klasser, 2018). The Intensity, psychosocial profile, and use of health care resources all confirm that TMD is essentially a chronic pain condition (Dworkin et al., 199Oa) that needs multiple approaches to deal with it.

Although there has been growing interest in TMJ pain as the major driver for seeking treatment among TMD-disordered patients (Kapos, et al.,2020), but still TMD pain affects 54.6% of patients with complaints of chronic headache, lower back pain, jaw pain, and neck pain (Sanita &Alencar,2009), and this pain is usually aggravated by applying the normal function of the jaws (De Leeuw, 2008, P.134).

Indeed, the literature has argued that there is an urgent need to understand the signs, symptoms, and influence of TMD on human biopsychosocial aspects which represents a concise guide to selecting the therapeutic approach for TMJ disorders. Thus, the recent concentration on non-invasive approaches for TMJ management has increased (Orlando, et al.,2007; De Resende, et al.,2021).

The core part of the non-invasive therapy is self-care (SC) and in some instances, self-care protocol may be what is just needed to manage TMJ pain. Self-care can also form a part of a more complex multimodal treatment plan (Turp, et al.,2007). Self-care protocol is effective in 60% to 90% of patients with myofascial pain. The percentages of SC protocol effectiveness may become higher if SC protocol is combined with other TMJ pain management methods (Wright & Fischer, 2000).

The purpose of this review is to assess the effectiveness of SC protocol on pain management in TMJ-disordered Patients and to assess the effectiveness of SC protocol when combined with other TMJ pain management methods in TMJ-disordered Patients. The findings of this review could make an important contribution to the field of dental public health.

2. Contents

The included articles in this review were those concerning conservative and SC protocols (therapies) for the treatment of TMD patients. Database searching was performed in Science Direct; PubMed; Google Scholar. The last electronic database search was performed on January 11th, 2023. A period filter was applied to select the relevant articles. Then the selected articles were pooled for a series of inclusion and exclusion steps. The included articles were full paper articles to reach an appropriate and not biased analysis, randomized control trials and observational studies, patients from all over the World, both sexes and patients were 18 years or more in accordance with the natural history of TMD). Also, this review included studies from 2010 and later as these articles contain the most recent data related to TMD.

 The exclusion step consisted of reading the titles and the abstract and the unrelated papers were excluded. The second step was the pdf download of the papers. The third step consisted of removing the duplicate articles (for more details see flowchart no.1).
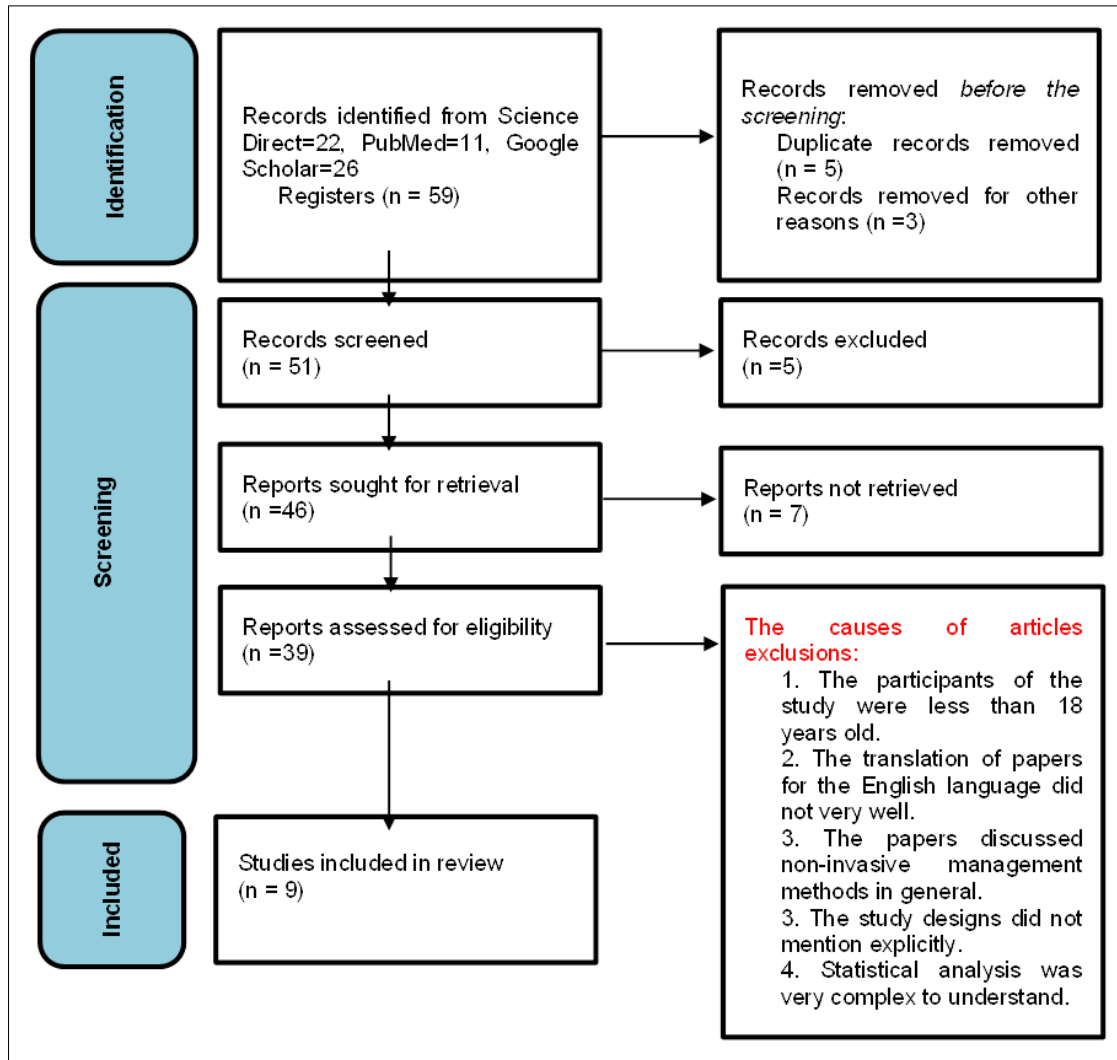
Figure 1 Review Contents

An identification card was done for each study included in this review; this card contains all information related to the study with important notes for each study. NHLBL quality assessment tool was used to summarize the properties of each study included in this review (see Table No. 1 below).

Table 1 Quality assessment for screened studies included in this review.

	Criteria	St.1	St.2	St.3	St.4	St.5	St.6	St.7	St.8	St.9
1	Was the research question or objective in this paper clearly stated?	√	√	√	√	√	√	√	√	√
2	Was the study population clearly specified and defined?	√	√	√	√	√		√	√	√
3	Was the participation rate of eligible persons at least 50%?	√	√	√	√	√			√	√
4	Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?	√	√	√	√	√	√	√	√	
5	Was a sample size justification, power description, or variance and effect estimates provided?		√	√	√	√	√			

#										
6	Were the exposure(s) of interest measured prior to the outcome(s) being measured?		√	√	√	√	√	√	√	√
7	Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?		√	√	√	√		√	√	
8	For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome	√	√	√	√	√		√		
9	Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?			√		√		√	√	
10	Was the exposure(s) assessed more than once over time?									
11	Were the outcome assessors blinded to the exposure status of participants?	√	√	√		√	√	√	√	

3. Literature Review

TMD refers to any dysfunction of the TMJ. This dysfunction occurs when the muscles and ligaments around the jaw joints become inflamed or irritated. The condition may be acute or chronic, and the resulting pain may be mild or severe. The etiology of TMD includes, but is not limited to; trauma, occlusal pathology, and oral behaviors (Slade, et al., 2016). All TMJ management methods aim to control symptoms, decrease pain, improve masticatory function, increase joint mobility, prevent new damage, re-educate the patient, and improve quality of life. Therefore, evaluating the multiple and most effective therapy methods for different types of TMD is essential (Maixner, et al.,2012; Liu & Steinkeler, 2013; Kapos, et al.,2020). Squarely, counselling and SC-based therapies are conservative, low-cost, and beneficial treatment alternatives for TMD. For that, the purpose of this review is to assess the SC protocols in TMD management. Most recent studies have dictated that the SC protocol principle is reducing jaw muscle activity during the daytime.

Forssell, et al. (1999) and Kang, et al. (2013) said in their studies that SC protocol may become the successful method among the TMD non-invasive management methods such as occlusal splints and cognitive behavioural therapy. In this context, Michelotti et al., (2012) selected the patients randomly from the University of Naples Federico across nine months. The patients were assigned to two treatment groups by means of balanced block randomization. The first group received education only as a main component of self-care protocol. While the second group received occlusal splints with no further information. The dentist evaluated each participant every three weeks during the treatment period. The outcome was accomplished by means of the repeated-measurements analysis of variance. This study contained clear and detailed inclusion and exclusion criteria for participant selection. It can be noticed that this random clinical trial study has fulfilled all terms of the experimental design except the presence of a control group; thus, it is wise not to call it a clinical trial study, it was a quasi-experimental one with a clear operational definition for the education, occlusal splints, and free pain. In addition, this study used a validated and piloted assessment tool for pain assessment.

Finally, the authors found that the effect of treatment on pain-free maximal jaw opening did not differ significantly between the two treatment groups. Finally, this study concluded that education was significantly more effective than an occlusal splint in treating spontaneous muscle pain. Education of patients as well as good communication between patients and doctors is more effective than an occlusal appliance. And in (2013), Kalamir, et al. decided to assess the clinical effectiveness of education and SC protocol as a stand-alone therapy and this was performed by utilizing outcome measures of pain at rest, upon mouth opening and clenching. The design was a randomized clinical trial. The study tried to compare two different conservative care modalities which are Intra-Oral myofascial therapy (IMT) and SC protocols. Intervention participants were randomized into one of two treatment groups, IMT or SC. This study contained well-defined inclusion and exclusion criteria, but the author did not give a satisfactory rationale for these criteria. The tool was validated and a reliable one. This study was a uni-blind experimental study, but there were no replication or control groups. This study argued that both treatment methods indicated positive effects over time. However, the short duration of the trial suggests that the results should be interpreted with caution.

With time, more attention was directed toward SC protocol and its effectiveness in managing TMJ pain. For that, Schiffman, et al. (2014) have compared the effectiveness of four treatment strategies which were medical management, rehabilitation, arthroscopy with rehabilitation, and arthroplasty with SC protocol. The participants were assigned randomly to one of these four treatment strategies. The inclusion and exclusion criteria for participation in the study was fully explained which stated that only 18 to 65 years of age patients and patients had daily pain in affected joints. On the other hand, patients who used steroids, muscle relaxants, or narcotics, and patients with systemic rheumatic, neurologic and endocrine were all excluded from the study.

The authors used the blindness technique in that the initial treatment randomization was concealed from patients and care providers until the enrollment procedure was completed.

The statistical analysis of the study data specified a priori as 'intention-to-treat', meaning that, for the primary analysis, all patient data would be analyzed according to each patient's randomized initial treatment strategy assignment. Consequently, patients who requested a change in treatment modality (after their 3-month follow-up) were not reassigned to a different treatment for the analysis.

The study found no clinically significant differences between the treatment strategies that were utilized as the initial treatment for TMJ pain. The study also found that there is no difference between these treatment strategies by using other reliable and valid global measures for pain and dysfunction. In other words, SC protocol has the same effects as rehabilitation when combined with other TMJ treatment methods.

However, the objectives of Alencar et al. (2014) were to compare the effectiveness of adding cyclobenzaprine (CYC), tizanidine (TZA), or placebo to a self-care management program for patients with jaw pain upon awakening. The study was a double-blind, placebo-controlled clinical trial. This study design was already used and tested in another study in the past, thus, this gives the opportunity for this study to be based on the tested study design, in addition, to take advantage of the outcome compared with the published study. The sample consisted of volunteer patients who were seeking treatment for chronic orofacial pain at the São Paulo State University. Although the patients in this study were selected purposively (not randomly). However, this study standardizes the type of patients who were included and excluded. The inclusion and exclusion criteria were set in a way that serves the nature of the diseases to reach a valid outcome. On the other hand, this study used both the history investigation and physical examination which consisted of digital palpation of muscles of mastication to detect trigger points that would reproduce the jaw pain (the patient's complaint) and to confirm the diagnosis of myofascial pain. This study showed that there were significant differences in pain-intensity measurements pre-and post-treatment in all groups; however, the post-treatment assessment revealed no differences among the groups. In other words, and based on the comparison of pre and post-scores, all three treatment groups had a reduction in pain symptoms and there was an improvement in sleep quality. However, no significant differences among the groups were observed at the posttreatment evaluation. The use of tizanidine or cyclobenzaprine in addition to SC management and patient education was not more effective than a placebo in TMJ-disordered patients.

Fifty- two women were recruited to the TMD/Occlusion Clinic of the School of Dentistry (São Paulo State University) by Gui, et al. (2018) study to investigate the impact of self-care and education on the masticatory performance of women with painful TMD. It was a double-blind, short-term randomized clinical trial. The participants were interviewed to determine the main complaint, pain characteristics (quality, installation time, duration, aggravating and mitigating factors, frequency, and intensity) and medical history. In addition, clinical and functional examinations are necessary to make the TMD diagnosis and classification according to the Research Diagnostic Criteria for Temporomandibular Disorders (RDC-TMD). The inclusion criteria were being a woman with an age ranging between 18 and 65 years, presenting a diagnosis of muscle TMD according to the RDC-TMD, and pain should be recurrent or constant for more than 3 months.

The education instructions about TMD and self-care therapies were transmitted through a video recording ensuring that all participants received the same information.

In addition, women received printed illustrative material containing the information passed in the video on TMD education and the sequence of self-care procedures that should be made daily at home, until the end of the study. This study found that there are no significant differences among the groups after 30 days of treatment, indicating that the masticatory performance of participants who did not receive treatment (control group) was like the masticatory performance of participants who received educational and self-care therapies (education group and self-care and education group). While Durham, et al. (2016), which recruited 11 international experts via the Delphi approach, confirmed that SC is a core part of all TMD pain management methods this study also built that SC is a necessary protocol

over time which must be provided as the first step; after diagnosis; to all TMJ-disordered patients. And it can be said that SC is a continuous management method, and the patient can use it when he/she needed throughout their life.

De Resende, et al. 2021 study aimed to evaluate the effectiveness of different conservative therapies in the short term, considering the quality of life, sleep quality, and pain in TMD patients.

The study was conducted at the Integrated Center for Care of Stomatognathic Dysfunction at the Federal University of Rio Grande do Norte from March 2016 to July 2017. The population were Twenty-four TMD patients who were divided into four treatment groups: occlusal splint (OS); manual therapy (MT); counselling (C); and occlusal splint associated with counselling (OSC).

A blind randomized controlled clinical trial was performed. Patients were evaluated in two steps: before treatment application and 30 days after completion of each therapy by a single examiner. The study groups were evaluated for pain, sleep quality, quality of life and the impact of oral health on quality of life. The sample was selected for convenience, and the patients were allocated to each group through systematic block randomization.

The blocks were composed of 4 therapeutic possibilities.

Inclusion criteria: 65 years of age; and report of untreated orofacial pain in the last 3 months. Exclusion criteria: impairment of cognitive ability; history of head trauma; intracranial disorders; no TMD headaches; use of medications in the last 3 months for TMD, muscle pain or interference with sleep quality.

All questionnaires presented adequate metric properties and have been translated and validated into Portuguese. The data was analyzed through the Statistical Package for Social Science 22.0. Descriptive data analysis was performed, addition to the Split Plot ANOVA statistical test was used to observe the difference between the groups over time and within the group, with a 95% confidence level.

There was a statistically significant reduction in patient pain over time ($p < .001$) in all groups. This reduction was attributed to time was 27.7% (eta = 0.277) with a high therapeutic effect. Eat is the effect size (small: 0.01 to 0.06, medium: 0.07 to 0.12, large: > 0.13). There was a reduction in sleep disturbances in all groups after 30 days of completion of the therapies ($p = .001$). However, there was no significant difference between the groups ($p = .097$). The reduction attributed to the time was 11.9% (eta = 0.119) with a medium therapeutic effect. There was a decrease in the impact of oral health on quality of life ($p < .001$) over time in all groups, but there was no significant difference between the groups ($p = .961$). This increase attributed to the time was 48.9% (eta = 0.489) with a great therapeutic effect. All therapies were effective over time, improving pain ($p< .001$), SQ ($p=.001$), QLOH ($p< .001$), and QL ($p= .006$), but not between them. The conclusion was that the four management methods were effective in improving pain, SQ, and quality of life; however, no therapeutic group was superior to the other (see notes about this article in annexe no.3).

Forty-four TMD patients were recruited for Xu, et al. study (2021). The aim of their study was to determine the dominant oral behaviours in patients with TMD and to assess the impact of education on such behaviours. The participants' inclusion criteria were patients with TMD pain. On the hand, patients were excluded if they had a history of head and face trauma in the past 10 years, systemic diseases, such as psoriatic arthritis or any diseases affecting the masticatory system and inflammatory, oncologic, or viral diseases of the face, jaw, spine, or skeletal muscles. The patients were divided into three subgroups of 3 months, 6 months, and 9 months for analysis.

During the first session of the treatment, the patients completed oral behaviours checklists (OBC) at the Rehabilitation Department at Shanghai Jiao Tong hospital. OBC was used to identify the possible risk factors (e.g., teeth clenching and chewing gum) for TMD. Then all patients were educated on the causes, treatment options, and prognosis of TMD. In addition to the customized list of recommendations provided to the patients that covered the normal resting position of the TMJ, observing and reducing parafunctional habits, avoiding excessive mandibular movements, such as the wide opening of the mouth and maintaining a soft diet by cutting food into smaller pieces, and chewing carefully.

According to the evaluation results of OBC, the corresponding content of patient education was emphasized. For example, if the patient is used to clenching the teeth, the therapist will explain more to the patient how to keep the jaw relaxed. The study outcomes were analyzed by the Wilcoxon signed-rank test to compare the frequency of each OB pre- and post-treatment. This study showed a significant improvement in the maximum painless mouth opening ($P ≤ 0:001$). In other words, the patients who avoided bad oral behaviours such as clenching became more able to open their mouths freely without pain in the TMJ region. In conclusion, patient SC and education can facilitate the management of oral behaviours which in turn decreases pain symptoms in the TMJ region (see notes about this article in annex no.4).

4. Discussion

The scope and purpose of this rapid review was to synthesize the literature about self-care protocols for managing TMJ disorders pain. In the beginning, it is worth saying that the etiological factors of TMJ disorders and the structures that might be affected by these disorders are different (Martins, et al.,2016), thus the TMD management methods are not standardized.

The data that is used in this review are all quantitative in nature. These data were extracted from clinical trials, quasi-experimental studies, cross-sectional and Delphi techniques. However, the resulting data from these studies were non-homogeneous in the pattern since there were differences in the SC protocol operational definition. Also, there are differences in TMJ diagnostic approaches and pain scale measurements. In addition to the differences in the definitions of treatment success among the TMJ disordered patients, the evaluation of treatment successes is usually based on the patient's own reports of improvement. A patient's subjective impression of success may be aligned with the least stringent management methods which are assessed by these studies.

Squarely, the treatment components of TMJ disorders are invasive and non-invasive. Non-invasive methods are usually conservative and not surgical. SC protocol, medical treatment and cognitive behavioural therapy are the main non-invasive treatment approaches (Abouelhuda et al.,2018).

Indeed, the goal of TMJ disorder treatment is to improve, eliminate joint pain and return to normal TMJ function. In this context, SC protocol is a new habits-introducing approach that may be all that is required for TMJ-disordered patients to curb TMJ pain intensity. SC protocol also can be adopted to manage TMJ pain alone or may be part of a more complex multi-modal treatment plan (De Laat et al.,2003). And 75% to 90% of cases have a positive result with these conservative interventions. Thus, the current TMD treatment consists of strategies combination, such as counselling, manual therapy, pharmacotherapy, occlusal splints, laser therapy, and acupuncture (Gauer& Semidey, 2015).

Above all, SC is a first-line efficacious TMJ disorder management technique. SC components do not present as an isolated form of therapy, rather, it includes all the principles of self-regulatory behaviours which usually influence the overall human pain perception, in addition to the exercising approach (Durham et al.,2016).

Recent consistent findings have supported the stepped approach in order to manage patients with TMJ disordered. And this can be achieved by starting with SC strategy as diet and nutrition advice with self-massage therapy. The second line of treatment will be medical management. Then if a patient needs additional care, comprehensive non-surgical rehabilitation should be applied. However, a significant number of random clinical trials have shown that providing palliative treatment (as domestic self-care) with medical management has offered a noticeable pain reduction at least for a short period of time and the patient can extend the periods of pain reduction by complying continuous regular SC strategies as avoiding talking for a long time. Also, it was found that the use of medical management in conjunction with palliative strategies can give a better outcome than when using self-care and education strategies or medical management alone.

Furthermore, half of the closed-lock TMJ patients who were treated with medical management responded as positively as patients assigned to the other treatment strategies, and additional rehabilitation was as effective as either surgery. In other words, TMJ pain can be reduced by applying SC protocol same as when applying medical management (Schiffman, et al.,2014).

On the other hand, recent studies recommended deferring any type of TMJ surgery for six to seven months to allow time for healing to occur. In addition, it gives the propensity to implement non-invasive management methods which may give good results in reducing TMJ pain and the patient may not need surgical intervention. In this way, the patient will avoid both the risk and the cost of the operations. Also, it was found that the surgical operations in the TMJ region gave better outcomes in patients who complied with SC protocols before the surgery by 6 months.

Patient education is the main component of the self-care protocol. Patient education can bring substantial improvements in pain symptoms during mouth opening and jaw function, especially if applied in combination with physical exercise.

Certain oral behaviours such as tightening, tensing muscles, chewing gum, grinding teeth during waking hours, and sustained talking, can increase the risk of TMD. But most patients have reported that after educational sessions, there is a noticeable decrease in these unacceptable oral behaviours. In other words, oral behaviours can be influenced and decreased by educational sessions (Michelotti, et al.,2010).

Patient education has worked on increasing attention toward these harmful oral behaviours, in addition to that patient education may work on improving the understanding of TMJ diseases and their etiology which in turn may alleviate the fear of TMJ diseases (Xu, et al.,2021).

Education is slightly more effective than dental occlusal appliances in treating spontaneous TMJ muscle pain. Therefore, teaching patients that the overuse of the jaw muscles could be the major cause of their pain. In support of this hypothesis, it was found that habit reversal was as effective as a splint therapy for TMD-related pain. This finding could confirm that the key to achieving a good outcome in TMD management seems to be in educating the patient about TMJ disorders and in enhancing and applying SC protocol (Conti, et al.,2012).

Parafunction behaviours assessment and monitoring is the main aspect of SC protocol. Current evidence suggests that parafunctional activities may pervade during life day (Ohrbach, et al.,2013). And these parafunctional activities play a major role in TMD initiation and development. Thus, SC protocol explicitly states the potential causal relationships between presumed parafunctional habits and the patient's pain. This parafunction behaviours assessment and monitoring will be effective in TMJ pain curbing, especially when combined with other SC components (Giro, et al.,2018).

The main objectives of SC are reducing pain and improving patients' quality of life. Thus, SC protocols should present with enough simplicity to allow the patient's control over this protocol and to enable healing and prevention of more injuries to the musculoskeletal system (De Laat, et al.,2003).

On the other hand, the main factors that could influence the outcome of SC protocol are self-efficacy, depression, and physical activity. Also, SC protocols basically rely on a therapeutic alliance between clinician and patient, which requires patient cooperation and clinician commitment, such as monitoring and constant evaluation of the dysfunction's progression, to readapt the therapeutic alternatives (Giro, et al.,2018).

Finally, there is a triaging challenge in treating TMJ-disordered patients because doctors and dentists do not have evidence-based guidelines. Especially for patients with persistent TMJ disorders that significantly cause jaw pain, limited jaw movement, and functional impairment ability to eat (Schiffman, et al.,2014).

5. Conclusion

SC protocols are mostly used as initial treatment (acute phase) for patients with TMD pain. SC can boost and back other TMJ management methods when combine with them. However, a multi-modal treatment approach with SC protocol, physical therapy, cognitive-behavioural therapy, and orthotics can provide great support for healing.

In adaptive and fully motivated patients, SC protocol can be the best and most sufficient method to manage TMJ pain.

SC protocol has long-term positive effects on managing TMJ pain when the patient complies SC protocol regularly and continuously.

Recommendations

- It should consolidate the operational definition of SC protocol, diagnostic criteria, and tools for TMD.
- It is better to include control groups in futural studies because this provides a comparative evaluation of the differences between the patients and the healthy subjects. In turn, this will facilitate careful interpretation of the results.
- SC Protocol must contain education on the etiological factors, treatment options, and prognosis of TMD.
- Educational sessions must contain information about bad oral behaviours and how these habits can affect the health of TMJ. Behavioural changing techniques must be added to the educational sessions.
- Educational sessions must be in continuous manners, as it was found that the effects of educational sessions subsided after 9 months (Xu, et al.,2021).
- The long-term effects of the SC protocol should be evaluated in future studies.

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