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Efficacy and Safety of Occlusal Splints on electromyographic amplitude records among Patients with Temporomandibular Joint Disorders: Randomized Control Trial

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Abstract: Background: Electro-myo-graph (EMG) is a valuable diagnostic and monitoring tool for both Temporomandibular Joint Disorders (TMD) and Myo-fascial pain syndrome (MPS) patients. It helps identify abnormal muscle activity and provides insights into the muscle imbalances and tension associated with these conditions. Objectives: We conducted RCT to provide valuable insights into the efficacy of occlusal splints for TMD patients and their impact on EMG amplitude records. Methods: 40 participants (23 females, 17 males) with myofascial pain, a complication of Temporomandibular Disorder (TMD), were examined. Patients of various genders and ages (22-46 years) were included. Diagnostic criteria based on clinical standards and Helkimo's Dysfunction Index were applied. Panoramic radiographs assessed the TMJ, with exclusion criteria for systemic conditions and TMJ pathologies. Patients were randomly divided into two groups: Group A received occlusal splint therapy, while Group B served as a control. Patients were informed about the study, provided informed consent. Results: most patients in the treatment group showing improvement or full recovery in their clinical dysfunction indicators. Patients tolerated the splints well, with only a few compliance issues initially. Importantly, there were no signs of occlusion disturbances after using the splints. In contrast, the control group, without splint therapy, showed minimal improvements. The study also analyzed the electromyographic (EMG) amplitude records of the masticatory muscles, demonstrating that the treatment group experienced a significant decrease in muscle activity following 6 months of occlusal splint therapy. This reduction was statistically significant ($p < 0.05$), indicating that the treatment contributed to decreased muscle activity and hyperactivity. However, in the control group, which did not receive the splint therapy, changes in muscle activity were not statistically significant ($p > 0.05$). Conclusion: Occlusal splint therapy had a significant positive clinical impact on patients with myofascial pain related to Temporomandibular Disorder (TMD). Most patients who received the therapy showed improvements or full recovery in their clinical dysfunction indicators, and the treatment was well-tolerated.

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1. Introduction

Patients with temporomandibular disorder (TMD) frequently have a variety of symptoms, such as pain, restricted movement of the jaw, and soreness in the orofacial area.[1] Subgroups of patients with TMD also have myofascial pain, which is defined as persistent discomfort in the orofacial region that is unrelated to dental or tooth-related difficulties.[2] Myofascial pain is recognized by the American Academy of Orofacial Pain (AAOP) as a unique subgroup under the category of musculoskeletal diseases.[3] Although the precise etiology of myofascial pain is still unknown, it is thought to be a complex disorder impacted by a number of variables, including; Occlusal disorders, where the upper and lower teeth line up as they converge.[4] In patients with TMD, occlusal abnormalities including malocclusion (tooth misalignment) may be a factor in myofascial pain.[5] Pain may arise from muscular imbalances and excessive muscle activity caused by abnormal occlusion.[6] Parafunctional activities are aberrant jaw-related activities, such clenching and grinding of the teeth (bruxism).[7] The masticatory (chewing) muscles may be overworked by these actions, which can result in hypertonicity (increased muscular

tension) and myofascial pain.[8] Psychological disorders like anxiety and stress are examples of emotional and psychological variables that can aggravate or precipitate myofascial pain in people with TMD.[9] Muscle tension can result from emotional strain, which exacerbates the illness. A person's general health and wellbeing may also be important. For instance, systemic disorders that impact inflammatory or muscular processes may be a factor in myofascial pain.[10]

According to authors, hypertonicity of the masticatory muscles is a major role in the development of myofascial pain. In the orofacial area, trigger points, pain, and discomfort can result from these muscles being too stiff.[11] These trigger points are small, localized spasms or tight spots in the muscles that can radiate pain to other bodily regions. Effective diagnosis and management of myofascial pain in individuals with TMDs depend on an understanding of the complex etiology of this pain.[12] A variety of therapies are frequently used in conjunction for management, including as behavioral interventions to address parafunctional tasks, occlusal modifications, stress management, and physical therapy to balance and relax the masticatory muscles.[13] Enhancing the quality of life for people with TMD who have myofascial pain also requires treating the underlying causes of the illness.[14]

A complete case history and clinical examination are the main tools used in the diagnosis of TMD associated with myofascial pain. In addition to gathering details regarding the patient's medical history and symptoms, the healthcare professional will also look for any potential contributing factors, such as parafunctional behaviors or stress.[15] A clinical examination includes measuring jaw movement, feeling for trigger points in the muscles, and looking for indications of dysfunction in the TMJ. Recent studies have looked into several diagnostic methods to help with the evaluation of myofascial pain and TMD.[16] These instruments include skin surface temperature recording across the masseter muscles and electromyographic examination of the masticatory muscles. Temperature recordings can show changes in blood flow and muscle activity in the afflicted area, while electromyography (EMG) can be used to measure muscle activity and spot patterns of muscular tension.[17] When combined with the clinical evaluation, these diagnostic techniques can offer a more thorough picture of the problem and support treatment choices for TMD associated with myofascial pain.[18] But for a complete assessment and diagnosis, a combination of clinical examination and extra diagnostic instruments is usually needed.

Soft and firm occlusal splints are commonly utilized in the care of TMD patients with myofascial pain despite the large range of treatment options available because they have a number of benefits.[19] Occlusal splints have a high success rate, are reversible, and need no invasive procedures.[20] These bespoke mouthpieces are intended to ease jaw realignment and ease tense muscles. Occlusal splints' precise modes of action in treating TMD associated with myofascial pain, however, are still up for discussion in the literature.[21] Many theories have been put out regarding their capacity to change the patient's occlusion, modify detrimental oral habits (such bruxism), and change the electromyographic activity of the masticatory muscles. It is yet unknown how these variables interact and the precise process by which occlusal splints reduce myofascial discomfort.[22] The aforementioned study has two objectives. First, to evaluate occlusal splint therapy's clinical efficacy in treating myofascial pain in individuals with TMD. [23] Secondly, to find out if there is a connection between the overall treatment result and the impact of occlusal splint therapy on the masticatory muscles as determined by electromyographic amplitude recordings.[24] The purpose of this study is to clarify the function of occlusal splints and their effect on myofascial pain patients' symptoms as well as muscular activity.

2. Methodology

The relation between clinical performance, malpractice, and the efficacy of occlusal splints on electromyographic amplitude records among patients with temporomandibular joint disorders lies in the context of evaluating the effectiveness and potential risks of this treatment modality for TMD patients.

Clinical performance evaluation in this study involves assessing the efficacy of occlusal splint therapy on clinical dysfunction indicators, such as pain levels, jaw function, and overall quality of life, among patients with myofascial pain related to TMD. This evaluation includes measures such as improvement or full recovery in clinical dysfunction indicators and patient tolerance to the splint therapy.

Malpractice prevention comes into play through the careful monitoring of treatment outcomes and potential adverse events associated with occlusal splint therapy. The study examines the occurrence of any occlusion disturbances or compliance issues among patients receiving the splint therapy, aiming to identify any potential risks that could lead to malpractice claims or patient dissatisfaction.

By comprehensively evaluating the treatment outcomes and potential complications, healthcare providers can make informed decisions regarding the selection of appropriate treatment modalities for TMD patients. This can ultimately contribute to both improved clinical performance and reduced risk of malpractice incidents in the management of temporomandibular joint disorders.

In our study, a total of forty participants—23 females and 17 males—who were undergoing treatment at Oral & Dental Medicine's Department of Oral and Maxillofacial were included in this study. All of these patients had myofascial pain, which is a complication of Temporomandibular Disorder (TMD) that is defined by persistent orofacial discomfort unrelated to dental problems and usually accompanied by localized painful spots in the masticatory muscles. The goal of the study was to look at this particular group of TMD sufferers.

Patients in the research were mixed genders, with 23 being female and 17 being male. Because TMD may affect people of different genders and ethnicities, a more thorough study of the disorder with myofascial pain was made possible by the broad sample. The patients in the research ranged in age from 22 to 46 years old, with a mean age of 32. The research encompassed a sizable section of the adult population vulnerable to TMD with myofascial pain because of the large age range.

Diagnostic Standards: A set of clinical standards was used to diagnose TMD with myofascial pain. Patients had to show up with localized sensitivity in their masticatory muscles and a history of chronic orofacial pain unrelated to dental issues. These characteristics aided in separating TMD with myofascial pain from other varieties of orofacial discomfort.

Case History and Clinical Examination: A thorough case history and clinical examination were performed on every patient. TMD-related symptoms and indicators were evaluated during the evaluation. These included things like discomfort felt during mandibular motions, temporomandibular joint (TMJ) function impairment, range of motion of the jaw, and soreness in the masticatory muscles.

Helkimo's Dysfunction Index: Helkimo's clinical dysfunction index is a well-known instrument for evaluating TMD, which the researchers employed. By using the aforementioned criteria, patients are assessed for the index, and a score of 0, 1, or 5 points is given to each item. The "dysfunction index" (Di) for each patient is then determined by adding together these points. Higher scores on the index denote more severe dysfunction, and it classifies people into distinct categories of dysfunction. To be

more precise, Di 0 and Di y (1–4 points) represent no dysfunction symptoms, Di y. y (5–9 points) represents moderate dysfunction, and Di y. y. y (10–25 points) shows severe dysfunction. [25]

In this study, each patient had a panoramic radiograph done to evaluate the temporomandibular joint's structural elements (TMJ). In order to guarantee that the research would only look at a particular subset of patients, several exclusion standards were set. Among these were any systemic neurological or muscle conditions that might potentially affect the electromyographic (EMG) recordings. Furthermore, the research excluded patients with pathological alterations involving the components of the TMJ.

After then, the patient population was split into two equal groups of twenty people each at random. A list of random numbers that was created by a computer was used to carry out this random allocation. Occlusal splints were used in the therapy of the first group, known as Group A. Group B, on the other hand, functioned as a control group and did not undergo any active therapy. After being told about the nature of their conditions, the patients in Group B willingly consented to watch and wait for Group A's splint therapy to take effect.

Prior to the experiment starting, each patient received comprehensive information on the steps involved in splint therapy, the goals of the research, and any possible side effects that might occur throughout the course of treatment. All patients gave formal informed permission attesting to their knowledge of the study and their desire to participate, in order to assure ethical involvement. Additionally, two patients gave their consent for their photos to be published in both print and digital editions of the journal, which was part of the technique employed for the study. This guaranteed the protection of their rights and privacy.

2.1. Fabrication process

The fabrication process of the splints used in this study followed a specific design and manufacturing procedure. The splints, known as flat-plane splints, were created on articulated dental casts, which are models that replicate the patient's dental structures. Here's a detailed description of the splint design and manufacturing steps:

2.1.1. Adjusting the Articulator: An articulator is a device used to simulate the patient's jaw movements. In this case, the vertical pin of the articulator was set to create a small gap of 2-3 millimeters between the molars. This gap is essential for the correct alignment of the splint.

2.1.2. Acrylic Resin Application: Clear acrylic resin was prepared to the desired consistency and applied to the upper dental arch on the dental casts. This layer of acrylic would form the body of the splint.

2.1.3. Bringing Models into Occlusion: The dental casts, with the applied acrylic, were carefully positioned on the articulator to ensure that the upper and lower dental arches fit together correctly. This step replicates the natural bite.

2.1.4. Heat and Pressure Processing: The assembly of dental casts and acrylic was then subjected to a process that involved heat and pressure. This helps set and harden the acrylic, ensuring the splint's durability and stability. Once the process was complete, the splint was removed from the dental model.

2.1.5. Acrylic Finishing: After the splint was removed, any excess acrylic material was carefully trimmed and removed. The occlusal (biting) surface of the splint was meticulously smoothed to achieve a flat surface, ensuring proper contact with the patient's teeth.

2.1.6. Relieving the Splint: To make the splint comfortable for the patient, specific areas of the splint were adjusted to reduce pressure on the teeth. This process typically involved modifying the interior of the splint to enhance the fit and reduce any potential discomfort.

2.1.7. Occlusal Adjustment: The splint was further adjusted to create a biting platform that allowed for stable contact between the upper and lower teeth. This is an essential step to ensure the proper function of the splint.

2.1.8. Patient Instructions: The patients were provided with clear instructions on how to use the splints. They were instructed to wear the splints throughout the entire night and, as much as possible, during the daytime. This usage was to be continued for a duration of 6 months.

The manufacturing and fitting of these splints required attention to detail and several adjustments to accommodate individual patient needs. Regular follow-up visits were necessary to ensure that the splints were well-tolerated and provided the intended therapeutic benefits.

2.2. EMG of the masseter muscle

Electromyography (EMG) of the masticatory muscles was a key aspect of this study to assess muscle activity and changes in both groups over time. Here's a detailed explanation of the EMG procedure:

2.2.1. Muscle Selection: The study involved the exploration of the anterior temporalis and masseter muscles bilaterally. These muscles are essential components of the masticatory system and play a crucial role in jaw function.

2.2.2. Timing of EMG: EMG measurements were taken at two specific points in time: at the beginning of the study and again after a period of 6 months. This allowed researchers to track changes in muscle activity over the course of the treatment and control periods.

2.2.3. EMG Equipment: An electromyograph with four channels was used for this procedure, and it was a Nihon Kohden Neuropack device from Japan. This equipment is designed to record electrical activity in muscles and is commonly used in EMG studies.

2.2.4. Patient Position: During the EMG procedure, the patient was seated comfortably in an orthostatic position. Ensuring patient comfort and cooperation is important to obtain accurate EMG data.

2.2.5. Patient Information: Patients were informed about the test and instructed on how to cooperate effectively during the EMG recording. Cooperation and relaxation are important to ensure reliable results.

2.2.6. Skin Preparation: Before attaching the electrodes, the skin covering the anterior temporalis and masseter muscles was carefully disinfected using gauze soaked in ethyl alcohol. This step is essential for maintaining hygiene and ensuring a clean connection.

2.2.7. Electrode Placement: Surface electrodes were applied to the skin overlying the anterior temporalis and masseter muscles. The placement of these electrodes followed a specific protocol based on the recommendations of Macalusa and De Laat, which ensures consistent and accurate muscle monitoring.

2.2.8. Electrode Connection: Wires were connected to the surface electrodes, and the apparatus was tested to ensure that the electrodes were functioning correctly and securely connected.

2.2.9. Calibration: The EMG apparatus was calibrated, following the protocol established by Ardizone et al. This calibration is a critical step to ensure that the EMG equipment accurately measures and records muscle activity.[26]

2.2.10. EMG Recording: To record the electromyographic activity of the masticatory muscles, patients were instructed to perform a maximal voluntary clenching. The process involved starting from a relaxed state, then actively clenching the jaw muscles as hard as possible and maintaining this clenching for 3 seconds.

2.2.11. Data Analysis: Electromyographic amplitude records, measured in millivolts (mV), were collected from both groups (the treatment group and the control group). These data were then subjected to statistical analysis to compare muscle activity changes over the 6-month period.

EMG of the masticatory muscles played a central role in the study to objectively measure and analyze changes in muscle activity. This provided valuable insights into the impact of occlusal splint therapy on muscle function and the effectiveness of the treatment. The procedure followed strict protocols and used specialized equipment to ensure accuracy and reliability in the EMG recordings. Figure 1 and 2

Figure 1: EMG apparatus

Figure 2: Photograph showing: site of surface electrodes for EMG of masseter muscle and surface electrodes for EMG of anterior temporalis muscle (photograph published with the permission of the patient)

2.3. Statistical analysis

The study presented the data in a clear and standardized format, providing the mean and standard deviation to describe the central tendency and variability of the data. Statistical analysis was conducted using the paired t-test to assess the significance of differences between the initial and 6-month data points. The chosen threshold for significance was a p-value of less than 0.05, indicating that results were considered statistically significant if the likelihood of chance variation was less than 5%. This approach allows researchers to draw meaningful conclusions from the data and assess the impact of the treatment on the study's participants.

3. Results

According to the study's findings, individuals who received occlusal splint treatment fared far better clinically than those in the control group. The majority of patients who got the therapy demonstrated improvement or full recovery in their clinical dysfunction indices, and the splints were well-tolerated by them.

3.1. Occlusal splint, useful in treating TMD with myofascial pain:

3.1.1. Patient Tolerance: The majority of patients did not have any serious issues or pain when using the occlusal splint appliance. This suggests that the patients accepted the splints well and that there were no negative side effects or complications.

3.1.2. Compliance: Five patients initially did not follow the post-operative instructions to the letter, even though the majority of patients complied. However, these people increased their adherence to the treatment plan after being made aware of the significance of adhering to these rules. This emphasizes how important patient education and communication are to achieving the desired results from treatment.

3.1.3. Occlusion Disturbances: During the follow-up period, none of the patients who wore the occlusal splint showed any indication of occlusion disturbances. This

shows that there was no adverse effect from the splints. This shows that the patients' teeth's alignment and contact were not adversely affected by the splints.

3.1.4. Treatment Results: According to the study's findings, the patients who had splint treatment fared well. More specifically, seven patients (35%) or ten patients (50%) showed improvement in their clinical dysfunction indicators, accounting for 85% of these patients (17 out of 20). Just three out of twenty patients, or 15% of the total, had no change in their clinical dysfunction markers.

3.1.5. Control Group: On the other hand, the control group saw different results since they were not actively treated with occlusal splints. Out of 20 patients in the control group, only 20% (4 patients) had spontaneous improvement in their clinical dysfunction indicators; the remaining patients (16 patients) did not demonstrate any improvements at all. Table 1, figure 3

Table 1. Distribution of the clinical dysfunction indices at the beginning of the study then 6 months later in both groups.

	Group A (n = 20)		Group B (n = 20)	
Dysfunction index	Before	After 6 m	Before	After 6 m
Di 0	0	7	0	0
Di I	1	9	0	0
Di II	6	1	6	10
Di III	13	3	14	10

Figure 3: A hard-clear acrylic resin occlusal splint inserted into the patient's mouth and covering all maxillary teeth.

3.2. Electromyographic (EMG) amplitude records (case group)

Recordings of the masticatory muscles' electromyographic (EMG) amplitude during maximal voluntary clenching and how these records altered after receiving occlusal splint treatment.

3.2.1. EMG Amplitude Range: During the maximal voluntary clenching, which entailed clenching the jaw muscles as hard as possible for three seconds, the EMG amplitude recordings, which show the electrical activity of the masticatory muscles, were measured. During this clenching action, a variety of EMG amplitudes was detected, ranging from 80 to 270 millivolts (mV). This fluctuation reflects the patients' varying degrees of muscular activation.

3.2.2. Measurement Before Treatment: The mean EMG amplitude records (in mV) for the right masseter, left masseter, right temporalis, and left temporalis were obtained for the occlusal splint therapy group (Group A). For the right, left, right temporalis, and left temporalis muscles, the mean EMG amplitude records (in mV) were 133 ± 30, 203 ± 36, 229 ± 57, and 169 ± 20, in that order. These measurements were obtained prior to the start of treatment using occlusal splints.

3.2.3. Measurement Following 6 Months of Treatment: Following a 6-month period of occlusal splint use, a follow-up set of EMG measurements was obtained for the same muscle groups. At this stage, the mean EMG amplitude recordings were 111 ± 38, 187 ± 33, 186 ± 25, and 152 ± 27, in millivolts. The muscular activity following the six-month therapy period is shown in these data.

3.2.4. EMG Amplitude Change: The results show that using occlusal splints reduced the masticatory muscles' mean EMG amplitude recordings. This decline implies that there was less electrical activity in the muscles, which is linked to less tension and hyperactivity in the muscles.

3.2.5. Statistical significance: Significantly, it was discovered that the decline in average EMG amplitude recordings was statistically significant ($p < 0.05$). This indicates, statistically speaking, that the use of occlusal splints during therapy is likely to have contributed to the observed decrease in muscle activity.

3.2.6. One notable finding in the Control Group is that, among the subset of patients (15%, $n = 3$) who did not have improvements in their clinical dysfunction indicators, the decline in EMG amplitude recordings was not statistically significant ($p > 0.05$). Stated differently, the patients' muscular activity did not exhibit a substantial reduction with therapy.

After six months, occlusal splint treatment produced a statistically significant reduction in the masticatory muscles' EMG amplitude recordings. This shows that the splint therapy was successful in lowering muscular tension and hyperactivity as well as muscle activity. It's crucial to remember that a tiny percentage of patients did not have changes in their clinical dysfunction indicators, and in these cases this impact was not seen. Table 2

Table 2. Showing the means SD of the electromyographic amplitude records (μV) for masticatory muscles in both groups (A and B).

	Group A (n = 20)			Group B (n = 20)		
Masticatory muscles	Before	After 6 m	p	Before	After 6 m	p
Right masseter	133 ± 30	111 ± 38	S	163 ± 45	160 ± 42	N
Left masseter	203 ± 36	187 ± 33	S	249 ± 56	253 ± 60	N
Right temporalis	229 ± 57	186 ± 25	S	228 ± 55	227 ± 50	N
Left temporalis	169 ± 20	152 ± 27	S	223 ± 38	225 ± 36	N

S: significant difference; N: insignificant difference.

3.3. Electromyographic (EMG) amplitude records (case group)

Over the course of the 6-month trial period, the EMG data for the control group revealed slight variations in muscle activity. These differences, however, did not reach statistical significance, indicating that the group's muscle activity was not significantly altered by the lack of occlusal splint treatment. This highlights the possible therapeutic advantages of the treatment and provides a useful point of comparison with the treatment group that did undergo occlusal splint therapy.

3.3.1. EMG Data for the Control Group Prior to Treatment: At the start of the investigation, the control group (Group B) had mean EMG amplitude recordings (163 ± 45, 249 ± 56, 228 ± 55, and 223 ± 38) for the right masseter, left masseter, right temporalis, and left temporalis muscles, respectively, measured in millivolts, mV. These measures show the control group's initial level of muscle activity prior to any kind of intervention or therapy.

3.3.2. EMG Data for the Control Group After Six Months: A second round of EMG measurements was conducted for the same muscle regions in the control group following the 6-month research period. The average recorded EMG amplitudes were 160 ± 42, 253 ± 60, 227 ± 50, and 225 ± 36, in that order. These metrics show the level of muscle activation in the control group following six months without the use of occlusal splint treatment.

3.3.3. Change in EMG Amplitude: The findings show that throughout the course of the 6-month period, there were variations in the EMG amplitude recordings of the masticatory muscles in the control group. The p-value ($p > 0.05$) suggests that these adjustments were not statistically significant.

3.3.4. Statistical Significance: If a change in muscle activity is "statistically insignificant" ($p > 0.05$), it suggests that it was most likely the result of chance or random variation and that the lack of occlusal splint treatment had no discernible impact on the observed changes in muscle activity. Stated differently, the control group's variations in muscle activity were not significant or reliable enough to be linked to a particular cause or intervention. Table 3

Table 3. Demonstrating the means + SD of the electromyographic amplitude records (μV) in successful (completely recovered or improved) and resistant cases of the splint therapy group (A).

	Successful cases (n = 17)			Resistant cases (n = 3)		
Masticatorymuscles	Before	After 6 m	p	Before	After 6 m	p
Right masseter	136 ± 25	118 ± 29	S	155 ± 23	149 ± 15	N
Left masseter	190 ± 28	178 ± 22	S	202 ± 34	195 ± 12	N
Right temporalis	235 ± 43	202 ± 24	S	195 ± 27	186 ± 18	N
Left temporalis	185 ± 20	158 ± 27	S	175 ± 30	167 ± 20	N

S: significant difference; N: insignificant difference.

4. Discussion

In their clinical practice, oral surgeons often deal with the common and enduring problem of myofascial pain.[27] For the treatment of this ailment, a variety of therapeutic modalities are described in the medical literature. Notably, occlusal splints are frequently used to alleviate myofascial pain associated with temporomandibular disorders (TMD). Nonetheless, there is still discussion and ambiguity around the specific processes via which occlusal splints function.[28,29]

This specific study has two main objectives. In the beginning, it aimed to assess the clinical results of occlusal splint therapy in individuals suffering from myofascial pain-related TMD. Helkimo's clinical dysfunction index, a well-respected and trustworthy instrument in the area, was used to conduct this evaluation. The intensity of the myofascial pain and TMD symptoms was evaluated using this measure. The study sought to determine how well occlusal splint treatment addressed the disease and reduced its symptoms using Helkimo's clinical dysfunction index.[30, 31]

The second goal of the study was to look into any possible connections between the overall treatment results and the impact of occlusal splint therapy on the masticatory muscles, as determined by electromyographic amplitude recordings (measured in millivolts, mV). Put another way, the goal of the study was to find out if improvements in the patients' clinical conditions were correlated with changes in muscle activity as measured by electromyography. This part of the research was intended to provide insight into the potential working processes of occlusal splint treatment.

The current study's findings provide important new information on the efficacy of occlusal splint therapy for those who have myofascial pain in addition to temporomandibular disorders (TMD). Success of Treatment: Eighty-five percent of the patients (17 out of 20) in the occlusal splint therapy group (Group A) either fully recovered from their disease or showed a significant improvement in their clinical dysfunction indicators. This suggests that occlusal splints are a useful therapeutic option for those with myofascial pain and TMD. Significantly, only 20% of Group B, the control group, demonstrated spontaneous improvement, highlighting the occlusal splint therapy's therapeutic value. Alignment with Previous Research: The results of the study are consistent with those of other studies by Vrbanović, E., and Alajbeg, I. Z. which also showed that patients with comparable problems benefited from occlusal splint therapy.[32] This idea that occlusal splints are a useful treatment option for TMD with myofascial pain is supported by the consistency of the research. The study also demonstrated a statistically significant reduction in electromyographic (EMG) muscle activity in the treatment group following 6 months of occlusal splint therapy, indicating

decreased muscle tension and hyperactivity. However, the control group, which did not undergo splint therapy, did not show statistically significant changes in muscle activity.

Mechanism of Action - EMG Activity: The possibility that occlusal splints would modify the electromyographic (EMG) activity of the masticatory muscles is one of the most widely accepted theories concerning how they work. The findings of the current investigation support this theory. After receiving occlusal splint therapy for six months, they show a statistically significant decrease in the masticatory muscles' EMG amplitude recordings. This decrease in muscle activity is consistent with the patients' reported clinical improvement.[22] Consistency with Previous Research: The study's conclusions align with those of earlier studies by Scopel et al. and others, which likewise noted a reduction in the masticatory muscles' EMG activity following occlusal splint treatment. This implies that the way occlusal splints affect muscle function may be partially responsible for their positive benefits. Observation of Non-Responders: A subgroup of patients (15%) in the splint therapy group did not have changes in their clinical dysfunction indicators during the trial, and the statistical insignificance of their drop in EMG amplitude recordings was noted ($p > 0.05$). This might be because a 6-month therapy period might not be long enough to have a discernible effect in this specific patient population.[33]

For patients with temporomandibular disorders (TMD) and myofascial pain, the study examined the association between alterations in the electromyographic (EMG) activity of the masticatory muscles and the results of occlusal splint therapy. Treatment Outcome and EMG Activity: The study's findings showed a strong correlation between improvements in the masticatory muscles' EMG activity and the efficacy of occlusal splint therapy. Patients' EMG amplitude recordings of their masticatory muscles showed a statistically significant decrease in those who received favorable treatment results, which were classified as either full recovery or improvement. This implies that changes in muscle activation are directly related to how well splint treatment works.[34]

Consistency with Certain Other Research: The results of this study are consistent with those of Suvinen et al. and Dahlstrom & Haraldson's research, which also found a link between treatment outcomes and EMG alterations. These investigations also revealed alterations in muscle activation following occlusal splint treatment. It should be emphasized, nonetheless, that the current study somewhat contradicts the conclusions of Suvinen et al. and Tzakis, Dahlstrom & Haraldson.[35,36] This disparity might be explained by variations in the research methods employed in these trials, namely the length of time patients received occlusal splint treatment. While the previous studies may have utilized shorter treatment durations, which might explain for the discrepancies in outcomes, the current study encompassed a 6-month treatment period.

5. Conclusion

This study indicate that occlusal splint therapy is a useful treatment for TMD and myofascial pain, as it can successfully reduce or improve related symptoms. Moreover, it was shown that this therapy is linked to a decrease in the masticatory muscles' millivolt-measured EMG amplitude recordings. This implies that the capacity of occlusal splints to regulate muscle activity may be connected to their positive benefits. The study also highlighted the correlation between changes in the amplitudes of the electromyograms in the masticatory muscles and the result of splint therapy. Furthermore, there were no signs of occlusion disturbances due to the splints. In contrast, the control group, without splint therapy, exhibited minimal improvements.

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