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Physical therapy for injuries of the temporomandibular joint

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Abstract: *injuries of the temporomandibular joint (TMJ) pose significant challenges to patients' well-being and require comprehensive treatment strategies. Physical therapy has emerged as a vital component in the management of TMJ injuries, with its efficacy increasingly recognized in clinical practice. This review provides a thorough summarize of physical therapy interventions for TMJ injuries, focusing on their role in restoring joint function and improving patient outcomes. Additionally, this review explores emerging trends and future directions in TMJ physical therapy, including advancements in technology and novel treatment modalities. Through a synthesis of current research and clinical evidence, the review explores various physical therapy modalities, including exercises, manual therapy techniques, and patient education programs. Additionally, the review discusses the mechanisms of action underlying physical therapy interventions and their impact on TMJ mobility, pain reduction, and overall quality of life. The relevance of physical therapy in the multidisciplinary approach to TMJ injury management is emphasized, highlighting its potential to complement other treatment modalities such as pharmacotherapy and surgical interventions. Furthermore, the review addresses considerations for optimizing physical therapy protocols, including patient selection, treatment duration, and therapist expertise. Overall, this review underscores the importance of physical therapy in the comprehensive care of TMJ injuries and provides insights into its implementation for clinicians and researchers alike. Considerations for patient-centered care and shared decision-making are also addressed, recognizing the importance of individualized treatment plans tailored to patient preferences and goals. By providing a comprehensive overview of physical therapy for TMJ injuries, this review aims to inform clinicians, researchers, and policymakers about the evolving landscape of TMJ management and promote evidence-based practice for improved patient outcomes and quality of life.*

Keywords: Temporomandibular Joint, Muscles, Pathology, Prevalence, Physical Therapy Modalities, Methods.

Introduction

In the modern world, where there is a high level of stress, injuries and pathologies of the musculoskeletal system, TMJ lesions are becoming more and more common. Insufficient physical activity, bite abnormalities and injuries are the main

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factors that lead to dysfunctions in this joint. The urgency of the problem is reflected in the increase in the number of patients who seek medical help due to pain and limitation of movements in the work of the jaw.

Temporomandibular joint (TMJ) disorders encompass a spectrum of conditions affecting the jaw joint and surrounding structures, often leading to significant pain and functional limitations. Physiotherapy, as a noninvasive therapeutic approach, plays a crucial role in the management of TMJ diseases. It involves the application of various modalities such as exercises, manual therapy techniques, and physical procedures aimed at alleviating symptoms, improving joint function, and enhancing overall quality of life for affected individuals. By targeting musculoskeletal imbalances, reducing inflammation, and promoting tissue healing, physiotherapy contributes to the comprehensive treatment of TMJ disorders.

Epidemiology of Temporomandibular Joint Disorders:

Temporomandibular joint disorders are prevalent in the general population, with studies indicating a considerable burden of disease worldwide. Estimates suggest that approximately 5-12% of the population experiences symptoms related to TMJ disorders, making it a common condition encountered in clinical practice. These disorders affect individuals across all age groups, although they are more commonly observed in adults aged 20 to 40 years. Furthermore, TMJ disorders exhibit a higher prevalence among females compared to males, with some studies reporting a female-to-male ratio of 2:1 or higher.

The multifactorial nature of TMJ disorders, involving both biomechanical and psychosocial factors, contributes to their widespread occurrence. Risk factors such as bruxism, malocclusion, trauma, stress, and parafunctional habits exacerbate the likelihood of developing TMJ-related symptoms. Additionally, comorbid conditions such as headache disorders, fibromyalgia, and anxiety disorders often coexist with TMJ disorders, further complicating their management.

Given the prevalence and impact of TMJ disorders on individuals' daily functioning and quality of life, effective management strategies are imperative. Physiotherapy, with its focus on noninvasive interventions and holistic patient care, plays a pivotal role in addressing the multifaceted nature of TMJ disorders, offering hope for improved outcomes and enhanced well-being for affected individuals.

Aim

Study physical therapy for lesions of the temporomandibular joint.

Materials and methods

For this review, special scientific and methodical literature, as well as information sources, were analyzed to gather comprehensive insights into the role of physical therapy in the management of temporomandibular joint (TMJ) injuries. The following approach was employed:

Literature Search: A systematic search was conducted across various databases, including PubMed/MEDLINE, Web of Science, Scopus, Cochrane Library, and Google Scholar. Keywords related to TMJ disorders, physical therapy, rehabilitation, and treatment modalities were used to identify relevant studies and review articles.

Selection Criteria: The search was limited to peer-reviewed articles published in English, focusing on the efficacy of physical therapy interventions for TMJ injuries. Studies encompassing randomized controlled trials, observational studies, systematic reviews, and meta-analyses were considered. Additionally, textbooks, guidelines, and reputable professional organizations' websites were consulted to supplement the literature search.

Review and Discussion

The problem of physical therapy to restore the mobility of the temporomandibular joint is highlighted in many scientific studies of domestic and foreign scientists S. Armijo-Olivo, R.L.Gauer, A Shimada. This question has long been in the field of view of such Ukrainian researchers as M.H. Aravitska, V.F. Makeev, R. Ozhogan, M. Rozhko, Z.R. Ozhohan, H. I. Tabaka. Although many aspects of this problem have already been investigated, many important questions have not been adequately resolved/

The temporomandibular joint (TMJ) is a complex joint mechanism in the human body. The instability of intra-articular interactions occurs due to the incompatibility of the joint surfaces, which is related to the relationship of the tooth rows and the state of the muscles for chewing. Dysfunction

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of the masticatory muscles and disruption of its innervation play a key role in the occurrence of pathological changes in the TMJ. This leads to the discoordination of masticatory function and TMJ movements, and also contributes to the formation of traumatic occlusion.

Scientists R. Ozhogan, M. Rozhko, Z.R. Ozhohan believe that the cause of TMJ and masticatory muscle dysfunction is a violation of the functional occlusion and parafunction of the masticatory muscles. With this problem, the study of the state of the maxillofacial system in patients with dentition defects, which affect occlusion disorders and the development of pathology in the TMJ, as well as the development of effective methods of diagnosis, treatment and prevention, remains relevant (Ozhogan, 2023).

The authors M.S. Drogomyretska, R.O. Mirza recommend combining the orthopedic treatment of all forms of temporomandibular joint (TMJ) meniscus dislocation with electrical stimulation of the masticatory muscles in order to shorten the duration of treatment and ensure the stability of the achieved results. In the complex treatment of the pain syndrome of TMJ dysfunction, masticatory muscle hyper tonus, and an unmanageable disc dislocation, it is possible to use electrical stimulation of the masticatory muscles effectively. This is particularly useful in cases where there is a distal location of the articular head associated with bruxism or limited opening with a non-posterior position of the articular head without compression. After reaching the optimal therapeutic position of the articular head and the height of the gnathic part of the face, this approach can help to shorten the treatment period or eliminate complications significantly (Drogomyretska, 2018).

Electrostimulation of the masticatory muscles, in particular the chin muscles (chin-hyoid and anterior belly of the biceps muscle), using sinusoidally modulated and bipolar pulses, effectively reduces local pain syndrome, improves the locomotor function of the temporomandibular joint, restores fun functional activity of the muscles of the maxillofacial region and neck muscles, and in some cases acts on manifestations of bruxism (Makeev, 2020).

It has been studied that the condition of the lateral muscle can undergo changes under the influence of stressful situations, hormonal disorders, the use of pharmacological agents, physical therapy, electrical stimulation of the masticatory muscles, as well as immediately after anesthetic blocking.

Thus, the modern method of electromyography (Titan) allows you to objectively assess the condition of the temporal and masticatory muscles. At the same time, the lateral pterygoid muscle, which is directly important for movements in the temporomandibular joint, is characterized by a certain difficulty in objectifying its functional state due to the peculiarities of its topography. Visualization of this muscle on magnetic resonance imaging in the axial projection can be caused by certain difficulties.

The authors H. I. Tabak, G. O. Stelmakh, T. G. Bakaliuk described in the study about the use of the method of volumetric pneumopressing (OPP), which involves exposure to compressed air through special cuffs, the pressure of which is regulated by a computer (BIO device -1). As part of the device, a unique pneumatic cuff «Cap» is used to perform pneumatic pressing on the head (craniopressure). This method was developed by I. V. Tarshinov and Yu. I. Ilyuk and received a patent in Ukraine (Tabaka, 2019).

Due to the gradual injection of air into the pneumatic compartments, a massage effect is provided on the muscles of the head and the muscles surrounding the temporomandibular joint. Patients received OPP head sessions lasting 12 min, performing eight such procedures every other day.

The assessment of rehabilitation effectiveness was the decrease in the degree of expression of muscle and joint dysfunction.

Thus, the use of volumetric pneumopressing in the form of a «gentle» cranial manipulation technique contributes to the establishment of the craniomandibular system and the muscles that interact when opening and closing the mouth. The proposed correction of TMJ muscle dysfunction will improve the quality of dental care for the population.

Authors M.G. Aravitska, L.M. Sheremet, S.I. Danylchenko. developed a program of physical therapy to correct the functional status of the temporomandibular joint in arthrosis. The program included therapeutic exercises, in

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particular exercises with support and stretching, aimed at mimic and masticatory muscles, neck and cervical collar zone muscles, with self-monitoring of symmetry and correctness of their performance in front of a mirror (three times a week). It also included 10 sessions of paraffin therapy (local applications to the TMJ area) before therapeutic exercises at the beginning of the program, 10 massage sessions of the area of the masticatory muscles, TMJ, neck and cervical collar zone, 10 sessions of post-isometric relaxation of the masticatory muscles and neck muscles. In addition, kinesiological taping of the TMJ area, masticatory muscles, and neck was used. The patient was also taught about the correction of daily motor and functional load on the joint, including the limitation of wide opening of the mouth, prolonged chewing and other recommendations, such as the elimination of bad habits (clicking seeds, nuts, holding objects with the teeth, etc.) (Aravitska, 2021).

The goal of physical therapy in patients with arthrosis of the temporomandibular joint is to reduce the load on the joint, as well as to eliminate and reduce such manifestations as pain, synovitis, and myalgia, in order to improve the function of the joint. Also important goals are stimulation and activation of metabolic processes in cartilage and bone tissues, normalization of blood flow and improvement of quality of life.

The use of physical therapy in the main group statistically significantly improved the functional activity of the jaw area and the functioning of the temporomandibular joint. This was manifested in a decrease in the number of people who complained about pathological sounds during jaw movements and their auscultatory detection, a decrease in discomfort during chewing, and also in an increase in the size of the mouth opening.

Thus, physical therapy significantly improves the functional capacity of the temporomandibular joint in the complex recovery of patients with arthrosis, compared to monotherapy with nonsteroidal anti-inflammatory drugs.

In recent years, the utilization of laser therapy in the treatment of temporomandibular joint disorders (TMD) has gained increasing attention due to its potential therapeutic benefits. Low-level laser therapy (LLLT), also known as photobiomodulation therapy, involves the application of low-intensity lasers to target tissues, aiming to reduce pain, inflammation, and promote tissue healing. Here, we discuss the current evidence regarding the use of laser therapy in the management of TMD.

Several studies have investigated the efficacy of laser therapy as an adjunctive treatment modality for TMD, showing promising results in alleviating symptoms and improving functional outcomes. LLLT has been shown to exert anti-inflammatory effects by reducing pro-inflammatory cytokines and modulating immune responses in the temporomandibular joint. Additionally, laser therapy has been reported to enhance tissue repair mechanisms, stimulate collagen synthesis, and improve microcirculation, contributing to the resolution of TMJ dysfunction.

One of the key advantages of laser therapy is its noninvasive nature and minimal risk of adverse effects, making it a safe option for patients with TMD, including those who may not tolerate conventional treatments or medications. Moreover, laser therapy can be easily administered in outpatient settings, offering convenience and accessibility for patients seeking alternative or complementary therapies for TMD.

However, despite the growing interest in laser therapy for TMD, there is still a need for well-designed randomized controlled trials and systematic reviews to establish its efficacy and optimal treatment parameters. Variability in laser parameters, such as wavelength, power density, treatment duration, and frequency, among studies makes it challenging to draw definitive conclusions regarding its effectiveness in TMD management.

Furthermore, the mechanism of action underlying laser therapy in TMD remains to be fully elucidated, and its long-term effects and durability of treatment outcomes warrant further investigation. Additionally, the cost-effectiveness of laser therapy compared to other conventional treatments for TMD needs to be evaluated to inform clinical decision-making and healthcare resource allocation.

In conclusion, while laser therapy holds promise as a noninvasive and potentially effective treatment modality for TMD, further research is needed to establish its efficacy, safety, and optimal use in

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clinical practice. Collaborative efforts between researchers, clinicians, and healthcare policymakers are essential to advance our understanding of laser therapy in TMD management and its integration into comprehensive treatment approaches for this complex condition.

Conclusions

These studies and publications have revealed the great importance of physical therapy for temporomandibular joint (TMJ) injuries. The analysis of the available data allows us to define this method as effective and justified in the context of restoring joint functions and improving the quality of life of patients.

Research indicates that physical therapy helps reduce pain, restore mobility, and promote tissue regeneration in the temporomandibular joint. Special attention should be paid to the effect of physical therapy on the masticatory muscles, since the dysfunction of this element is crucial in pathological processes in TMJ.

Therefore, taking into account the obtained results, it can be concluded that the use of physical therapy in the treatment of lesions of the temporomandibular joint is a promising and effective direction. Additional research and development in these areas and may contribute to further optimization of physical therapy methods and improvement of treatment outcomes for patients with similar problems.

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Conflict of interest

Authors declare no conflict of interest.

Consent to publish

Consent for publication of this work has been obtained from all patients relevant to your manuscript.

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Фізична терапія при ураженнях скронево-нижньощелепного суглобу

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Анотація: *травми скронево-нижньощелепного суглоба (СНЩС) створюють значні проблеми для благополуччя пацієнтів і вимагають комплексної стратегії лікування. Фізична терапія стала життєво важливим компонентом у лікуванні травм СНЩС, і її ефективність все більше визнається в клінічній практиці. У цьому огляді представлено ретельний аналіз фізіотерапевтичних втручань при травмах СНЩС, зосереджуючись на їх ролі у відновленні функції суглобів і покращенні результатів лікування пацієнтів. Крім того, у цьому огляді досліджуються нові тенденції та майбутні напрямки фізіотерапії СНЩС, включаючи досягнення в технології та нові методи лікування. Завдяки синтезу поточних досліджень і клінічних доказів огляд досліджує різні методи фізичної терапії, включаючи вправи, техніки мануальної терапії та програми навчання пацієнтів. Крім того, в огляді обговорюються механізми дії, що лежать в основі фізіотерапевтичних втручань, і їх вплив на рухливість СНЩС, зменшення болю та загальну якість життя. Підкреслюється актуальність фізичної терапії в мультидисциплінарному підході до лікування травми СНЩС, підкреслюючи її потенціал для доповнення до інших методів лікування, таких як фармакотерапія та хірургічні втручання. Крім того, огляд розглядає міркування щодо оптимізації протоколів фізіотерапії, включаючи відбір пацієнтів, тривалість лікування та досвід терапевта. Загалом, цей огляд підкреслює важливість фізіотерапії в комплексному лікуванні травм СНЩС і дає уявлення про її застосування для клініцистів і дослідників.*

Також розглядаються міркування щодо догляду, орієнтованого на пацієнта, і спільного прийняття рішень, визнаючи важливість індивідуальних планів лікування, адаптованих до вподобань і цілей пацієнта. Надаючи вичерпний огляд фізичної терапії травм СНЩС, цей огляд має на меті поінформувати клініцистів, дослідників і політиків про зміну ландшафту лікування СНЩС і сприяти науково-обґрунтованій практиці для покращення результатів і якості життя пацієнтів.

Ключові слова: скронево-нижньощелепний суглоб, м’язи, патологія, поширеність, методи фізичної терапії