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ღიანიანი შეკისრიანი შესაძლო განვითარება სტატუსში არ გამოიყენდება.
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TEMPOROMANDIBULAR JOINT DISORDERS AND THE WAY OF THEIR OPTIMIZATION: A LITERATURE REVIEW

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Abstract.

The literature review aims to investigate temporomandibular joint disorders and modern approaches to their treatment. An extensive literature search was performed using Scopus, ScienceDirect, and PubMed databases to identify the most relevant published articles. The year of publication was limited to over the past 5 years. The language was limited to English. More than 200 articles were found and analyzed. At first, abstracts were reviewed. After that 40 of the most relevant articles were selected and included.

Systematical literature revision revealed that temporomandibular joint dysfunction is an essential public health issue worldwide due to its high prevalence and associated incapacity.

Approximately one-third of the adult population worldwide suffers from at least one symptom of temporomandibular joint dysfunction. The etiology of this disease is considered to be multifactorial. Main risk factors include postural and parafunctional habits, several types of traumas, psychological distress, and occlusal factors. Temporomandibular disorder encompasses several pathological conditions. Based on the currently available evidence, chronic pain is frequently observed and results in lower quality of life. Proper diagnosis is crucial for successful treatment planning and outcomes of temporomandibular joint disorders, multidisciplinary treatment for the complete remission of all symptoms should be focused on the pain experience, jaw, and psychosocial functioning of the patients.

Key words. Temporomandibular joint dysfunction, orofacial pain, oral health, healthy lifestyle.

Introduction.

Temporomandibular joint dysfunction is an essential global public health issue due to its high prevalence and associated incapacity. One-third of the adult population is suffering from temporomandibular joint dysfunction worldwide [1]. The term “temporomandibular disorder” describes a group of clinical disorders that are observed in the musculoskeletal components of the masticatory system and has been used since the early 1980s [2]. Approximately one-third of the adult population worldwide meet at least one symptom of temporomandibular joint dysfunction [1].

There is no doubt that the temporomandibular joint is one of the most complex joints in the human body [3]. Temporomandibular disorder encompasses several pathological conditions affecting both: the hard and soft tissues of the joint [4]. Temporomandibular joint dysfunction results from musculoskeletal and temporomandibular joint diseases, often presenting chronic orofacial pain. The etiology of this disease is considered to be multifactorial. Main risk factors include postural and parafunctional habits, several types of traumas, psychological distress, and occlusal factors [5,6]. Several study results show that the prevalence of painful temporomandibular joint disorders is 36% in the age group of 20-49 years. Permanent feeling of pain in the myofascial area leads to limitations in the main daily activities and results in reduced oral health-related quality of life [5]. Based on the currently available evidence, chronic pain is associated with several environmental factors, including socioeconomic conditions. In addition, living with pain results in lower quality of life [7]. Marital status also influences chronic pain in patients with temporomandibular joint dysfunction [8]. Moreover, some studies concluded that modulations in endogenous brainstem pain-modulation circuit functioning are crucial for the promotion and/or sustentation of pain [9]. The results of several studies demonstrated that migraine and headache frequency are associated with painful temporomandibular joint disorders in adolescents [10]. Disk derangement pathologies, idiopathic condylar resorption, and osteoarthritis are observed in about 5-12% of the population [11]. Partial or total mandibular condyle displacement might occur due to an imbalance of neuromuscular function or a structural deficit. Luxation is painful and most of the patients need to be treated in emergency rooms [12].

75% of individuals with temporomandibular joint disorders are observed to have serious psychological problems [1,13]. General or local disorders increase risk, however neurological, psychiatric, and rheumatological diseases may influence the function of the temporomandibular joints [14]. Temporomandibular joint disorders might be associated with several systemic diseases, like epileptic seizures which cause transmission of excessive load to the dental arches and temporomandibular joint [14]. New approaches to prosthetic rehabilitation often include changes in vertical occlusal dimension. Raising of vertical occlusal dimension varies from minimum to high and besides facial esthetical changes, often results in changes in temporomandibular joint function. Patients with increased vertical occlusal dimension often report at least temporary signs and symptoms of temporomandibular
joint dysfunction [15,16]. Several study results confirm correlations between awake and sleep bruxism and symptoms of temporomandibular joint dysfunction and pain complaints [17,18]. However, there is no significant evidence: questionnaire studies supported correlations between sleep bruxism and temporomandibular joint dysfunction, but instrumental studies did not [19].

Frequently temporomandibular joint disorders are chronic processes and pathogenesis is not well understood. It can imitate odontogenic pain leading to unnecessary dental treatment and financial burden [20]. The aim of the study is to deeply analyze existing evidence-based information about temporomandibular joint disorders. This will encourage dental practitioners in diagnosing and treating of patients with temporomandibular joint disorders. Besides, this article will demonstrate the gap of existing knowledge and will be an important base for future clinical studies.

Materials and Methods.

Literature Search Strategy:
An extensive literature search was performed using Scopus, ScienceDirect, and PubMed databases. The phrases such as “Temporomandibular joint disorders”, “Temporomandibular joint dysfunction”, “orofacial pain”, “oral health”, “healthy lifestyle”, “Temporomandibular joint treatment”, and “Physical therapy” were searched. The language was limited to English. The year of publication was limited to over the past 5 years in order to capture the most relevant and recent findings. More than 200 articles were found and analyzed.

Inclusion and Exclusion Criteria:
At first, abstracts were reviewed. 40 most relevant articles were selected and included based on their relevance to the topic. Original research, reviews and case reports were incorporated. Exclusion criteria included articles that did not address directly to temporomandibular joint disorders.

Data extraction and analyze:
The most relevant data was extracted about etiology, symptoms, diagnostic methods, pathogenesis, treatment approaches and the ways of optimization of temporomandibular joint disorders. Obtained information was categorized and organized to facilitate previous analyzes, new trends, consensus, and existing knowledge gap in this field.

Results and Discussion.

Etiology:
The etiology of Temporomandibular joint dysfunction is complex [21]. It includes pathological occlusion, bruxism, teeth grinding, oral habits such as nail and lip biting, stress, anxiety, spasms in muscles, inflammation of the joint capsule, and abnormalities of the intraarticular disk [1,22]. Mechanical overloading and genetic vulnerability also are common etiological factors [23].

There is abundant scientific evidence to support the correlation between parafunctional habits and temporomandibular joint dysfunction [22]. Anterior open bite is considered to be the most prevalent type of malocclusion associated with Temporomandibular joint dysfunction [24]. Several types of traumas may cause deformation of the joint. Micro and macro trauma may cause disk displacement without reduction. In this case, the displaced disk from the condyle does not get back to its normal position during the movements of the mandibular. This may result in increased pain in the temporomandibular joint region and limited opening of the mouth. Also, acute, or chronic painful closed locks may be developed according to the duration of locking [25]. Patients with epilepsy are at higher risk of developing temporomandibular joint disorders compared to healthy individuals. Patients diagnosed with epilepsy get antiepileptic drugs, which negatively affect the bone metabolism. Side effects like osteoporosis and osteomalacia lead to the destruction of the periodontium and jaw joint. Such patients often lose their teeth earlier which may result in occlusal inconsistency and joint involvement [14].

Symptoms:
Pain, abnormal movement of the lower jaw, and clicking in the region of the temporomandibular joint are common symptoms of Temporomandibular joint dysfunction, particularly when osteoarthritis occurs [26]. Pain is often observed in front of the ear, cheeks, or temporal area [27,28]. One of the most essential clinical symptoms is muscular pain triggered by palpation which is observed in about 90% of patients [14]. Headache is a very common symptom, particularly Tension-type headache, migraine, and headache associated with temporomandibular joint disorder. In addition, patients often report pain in the cervical area [29]. Sudden onset painful and limited mouth opening is one of the symptoms in patients who experience disk displacement without reduction [30]. As mandibular jaw movements are determined by complex and interrelated activities of both temporomandibular joints, there might occur asymmetries in mandibular movements in patients with temporomandibular joint disorders [31]. Limitations in the movement of the mandibula and the presence of sound while functioning of the joint are often reported by patients with temporomandibular joint disorders [28]. Nonpainful symptoms, such as unpleasantness, tension, soreness, stiffness, or tiredness are also often observed [18].

Diagnosis:
Proper diagnoses are crucial for successful treatment planning and outcomes of temporomandibular joint disorders. Besides crepitus can be detected by palpation which suggests degenerative joint disease, imaging is considered to be an essential diagnostic method. In addition, magnetic resonance imaging is standard for the assessment of disk displacement, also changes in surrounding soft tissues [32]. High resolution of magnetic resonance imaging allows to make difference between tissues of temporomandibular joint components, also to observe anatomy and possible disorders [33]. Cone-beam computed tomography and plain digital radiography are also used for diagnostic reasons. Functional imaging, such as PET or PET-CT imaging is very useful to identify malignant disorders of the joint [20]. Pressure algometry is often used in the diagnosis and is considered to be a reliable measure of pain in joints, muscles, tendons, and ligaments, it is correlated with the degree of myofascial pain. Significantly lower pressure pain threshold
is observed in patients with temporomandibular joint disorders than in patients with muscle tenderness. Special questionnaires are often useful [14]. Limited jaw movements, noises, or locking in the joint are also useful criteria for diagnosing [21]. However, there are several barriers to diagnosing including patients' subjectivity of pain descriptions, variety of symptoms and their overlap, variety in pain experience, radiation of pain, as well as lack of visible findings during clinical and radiographic examination [34].

Pathogenesis:
Temoromandibular joint disorders are considered to be complicated diseases demonstrating various symptoms and pathological changes, including inflammation, degeneration, deviant angiogenesis in joint tissues, and abnormal cell biological behaviors [18]. Pathological changes are closely linked to each other, forming a destructive circle in the joint. Pathogenesis of different sections of the joint involves lots of molecules and signalling pathways, so it may tend to potential targets to support finding effective therapeutic procedures for several kinds of dysfunction. The activation of T-cells provides secretion of various cytokines. Cytokines are involved related with the regulation of autoimmune response, inflammation, and destruction. All chemokines (CXC, CC, C, CX3C) promote joint inflammation. Expending of proteoglycans from articular cartilage leads to degradation of the collagen fibrils. High levels of neutrophil extracellular traps might be observed in synovial tissue. Besides the fact that in-vivo and in-vitro models of temporomandibular joint disorders, including osteoarthritis have been successfully created in several ways, it is urgent to establish models that will be closer to human joints. Modern medical opportunities, including technologies, materials, and treatment approaches, also the role of genetic factors need further investigation [11,26].

Treatment approaches:
Nowadays the preference for Temporomandibular Joint Dysfunction treatment is given to the approach of a multidisciplinary treatment for the complete remission of all symptoms. It should be focused on the pain experience, jaw, and psychosocial functioning of the patients. Reversible conservative therapy is suggested as first line of treatment. This approach is based on the evidence of risks and benefits. In this way remission within the first 6-15 months is observed in most cases [35].

A common approach is treatment using dental occlusion splints, which are selected for patients considering the clinical situation. They correct the alignment of antagonist teeth of the upper and lower jaws. Besides the high cost of non-occluding splints, they are used in several clinical situations for mouth opening, reducing muscle tension, and grinding of teeth [1]. Michigan splint is successfully used in the treatment of painful disorders [36]. Hard acrylic or soft polyethylene occlusion splints are worn on upper or lower teeth and provide full coverage of occlusal surfaces. In addition, physical therapy, acupuncture, or behavioral medicine is often included in the treatment of Temporomandibular Joint Dysfunction [35]. Unfortunately, removable splints are not applicable in patients with frequent epileptic seizures due to the increased risk of aspiration [14]. The common approach to treatment includes conservative treatment, physical movement exercise, and laser therapy particularly. Physical therapy reduces pain, recovers motor functions, improves mobility, reduces inflammation, and relieves the symptoms. This type of treatment includes various exercises: Recabado, Goldfish, range of motion exercises, joint mobilization, and soft tissue mobilization. However, in the case of osteoarthritis, treatment with current conservative therapy might be ineffective and lead to limitations in jaw movement [26]. Exercises of the cervical spine inhibit complaints of pain in patients with temporomandibular joint disorders and headaches. However, home exercises might not be so effective, and it is considered that at least one supervised training should be done to get optimal outcomes that will last longer [29]. Acupuncture treatment is also used to improve the occlusal force and relieve pain. A traditional medical intervention – acupuncture influences the neuromuscular activity of an activated muscle, so it has an opportunity to change the tension within the muscle and promote relaxation and elongation [37,38].

Botulism toxin type A is considered to be a successful treatment approach for muscle spasms and myofascial pain in patients with TMD. This method not only avoids pain but provides prolonged pain relief which may last for 3-6 months. Inhibition of muscular activity results in pain reduction. Botulism toxin type A also influences pain neurotransmitters and inflammatory mediators [39]. In patients with a wide range of disorders reconstruction with biocompatible alloplastic prosthesis is indicated [40]. Cooperation between dentists and neurologists is often useful, particularly in patients with epilepsy disease [14].

Optimization:
Temporomandibular joint disorders might be associated with several factors and also management of those disorders is not the same. So, the clinician dentist, or medical clinician have to decide what kind of diagnostics and treatment approaches will be optimal for each patient. Hence, there are three key determinants for the optimization of temporomandibular joint dysfunction: proper knowledge, training, and experience [1].

Conclusion:
Temporomandibular joint disorders remain to be a huge problem worldwide. Lots of people in several age groups suffer from symptoms of this disorder. The etiology is complex. Symptoms are various kinds and often result in a lower quality of life. Proper diagnosis is crucial for successful treatment planning and outcomes of temporomandibular joint disorders. Multidisciplinary treatment for the complete remission of all symptoms should be focused on the pain experience, jaw, and psychosocial functioning of the patients. There are three key determinants for the optimization of temporomandibular joint dysfunction: proper knowledge, training, and experience of the clinician.

REFERENCES


Summary
Temporomandibular joint disorders and the way of optimization: a literature review
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The literature review aims to investigate Temporomandibular joint disorders and modern approaches to their treatment. An extensive literature review was performed using Scopus, ScienceDirect, and PubMed databases to identify the most relevant published articles. The year of publication was limited to over the past 5 years. The language was limited to English. More than 200 articles were found and analyzed. At first, abstracts were reviewed. After that 40 most relevant articles were selected and included.

Systematical literature revision revealed that temporomandibular joint dysfunction is an essential public health issue worldwide due to its high prevalence and associated incapacity. Approximately one-third of the adult population worldwide suffers from at least one symptom of temporomandibular joint dysfunction. The etiology of this disease is considered to be multifactorial. Main risk factors include postural and parafunctional habits, several types of traumas, psychological distress, and occlusal factors. Temporomandibular disorder encompasses several pathological conditions. Based on the currently available evidence, chronic pain is frequently observed and results in lower quality of life. Proper diagnosis is crucial for successful treatment planning and outcomes of temporomandibular joint disorders. Multidisciplinary treatment for the complete remission of all symptoms should be focused on the pain experience, jaw, and psychosocial functioning of the patients.

Keywords: Temporomandibular joint dysfunction, orofacial pain, oral health, healthy lifestyle

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Цель исследования - выявление современных подходов к обследованию заболеваний височно-нижнечелюстного сустава и выявление современных методов их лечению. Для поиска актуальных научных публикаций обзор литературы проводился с использованием научных баз данных Scopus, ScienceDirect и PubMed для поиска актуальных научных публикаций. Были выбраны англоязычные статьи, опубликованные за последние 5 лет. Найдено более 200 статей. На первом этапе были рассмотрены тезисы ревалентных статей, после чего были отобраны 40 наиболее актуальных статей. Доступные данные были тщательно проанализированы и установлено, что заболевания височно-нижнечелюстного сустава является серьёзной проблемой во всём мире с высокой распространенностью и связанными с ней ограничениями. Примерно треть взрослого населения мира страдает, по крайней мере, от одного симптома дисфункции височно-нижнечелюстного сустава. Дисфункция мультиэтиологична и основными факторами риска являются парафункциональные вредные привычки, различные травмы, психологический стресс и окклюзионные факторы. Дисфункция височно-нижнечелюстного сустава сочетается с другими патологическими состояниями. По имеющимся данным, часто существует боль, снижающая качество жизни индивида. Точная диагностика необходима для разработки плана лечения и оптимального прогноза. Комплексное лечение для ремиссии симптомов должно быть направлено на облегчение болевого синдрома, на восстановление челюстной и психосоциальной функции пациента.