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MUNDARIJA CONTENTS СОДЕРЖАНИЕ

MUNDARIJA

MUNDARIJA СОДЕРЖАНИЕ CONTENTS

UTILISATION OF MECHANOTHERAPY IN DENTAL AND MAXILLOFACIAL SURGICAL PRACTICES (LITERATURE ANALYSIS)

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Abstract: This review article explores several techniques for using mechanotherapy in the treatment of temporomandibular joint (TMJ) disorders. Data from both national and international scientific research focused on the use of mechanotherapy in the holistic management of TMJ diseases were examined. The principal advancements associated with this therapeutic approach were emphasised, and evidence supporting the effectiveness of mechanotherapy in diverse TMJ disorders was gathered. The examination of mechanotherapy's use with arthrocentesis for internal dysfunctions of the temporomandibular joint.

Aim of the study. Enhance the efficacy of treating individuals with TMJ disorders by the suggested mechanotherapy method with arthrocentesis.

Methods and results. Databases of scientific literature in Russian (eLIBRARY, CyberLeninka) and English (PubMed/MEDLINE, ClinicalKey, Elsevier, Google Scholar) were used to gather information. A comprehensive evaluation was conducted on 38 pertinent papers, including 20 foreign journals. Subgroup analysis was performed to examine the origins of heterogeneity.

Results. Examination of the gathered data demonstrated the significant efficacy of mechanotherapy in addressing masticatory muscle contractures, mandibular fractures, arthrosis, TMJ ankylosis, and internal derangements of the temporomandibular joint.

Conclusion. The use of mechanotherapy enhances therapeutic effectiveness across many kinds of TMJ disorders: masticatory muscle contractures, arthrosis, TMJ ankylosis, and internal TMJ derangements. Mechanotherapy is used to alleviate localised ischaemia, enhance proprioception, break fibrous adhesions, produce synovial fluid, and mitigate discomfort in internal derangements of the TMJ. Nonetheless, discrepancies in statistically significant findings presented by various researchers, along with a lack of comprehensive studies on the impact of mechanotherapy when paired with other treatment modalities, underscore the need to improve mechanotherapy procedures and augment their effectiveness.

Key words: mechanotherapy, joint aspiration, joint visualisation, internal disruptions, temporomandibular articulation.

Annotatsiya: Ushbu sharh maqolasida chakka-pastki jag‘ bo‘g‘imi (CPJB) kasalliklarini davolashda mexanoterapiyadan foydalanishning bir qator usullari ko‘rib chiqilgan. CPJB kasalliklarini kompleks davolashda mexanoterapiyadan foydalanishga bag‘ishlangan mahalliy va xorijiy ilmiy tadqiqotlar ma’lumotlari tahlil qilindi. Mazkur terapevtik yondashuv bilan bog‘liq asosiy yutuqlar yoritilib, CPJBning turli kasalliklarida mexanoterapiyaning samaradorligini tasdiqlovchi dalillar umumlashtirildi. Shuningdek, chakka-pastki jag‘ bo‘g‘imining ichki disfunksiyalarida mexanoterapiyani artrotsentez bilan birgalikda qo‘llash masalasi ko‘rib chiqildi.

Tadqiqot maqsadi. CPJB kasalliklari bo‘lgan bemorlarni artrotsentez bilan birgalikda taklif etilgan mexanoterapiya usuli yordamida davolash samaradorligini oshirish.

Metodlar va natijalar. Ma’lumotlarni to‘plash uchun rus tilidagi (eLIBRARY, CyberLeninka) va ingliz tilidagi (PubMed/MEDLINE, ClinicalKey, Elsevier, Google Scholar) ilmiy adabiyotlar bazalaridan foydalanildi. Jami 38 ta tegishli ilmiy maqola, jumladan, 20 ta xorijiy jurnal maqolasi kompleks tahlil qilindi. Geterogenlik manbalarini aniqlash maqsadida kichik guruhlar tahlili amalga oshirildi.

Natijalar. To‘plangan ma’lumotlar tahlili mexanoterapiyaning chaynash mushaklari kontrakturalari, pastki jag‘ sinishlari, artroz, CPJB ankilozi va chakka-pastki jag‘ bo‘g‘imining ichki buzilishlarini davolashda yuqori samaradorlikka ega ekanligini ko‘rsatdi.

Xulosa. Mexanoterapiyadan foydalanish CPJB kasalliklarining turli shakllarida, jumladan, chaynash mushaklari kontrakturalari, artroz, CPJB ankilozi va bo‘g‘imning ichki buzilishlarida davolash samaradorligini oshiradi. Mexanoterapiya mahalliy ishemiyani kamaytirish, propriosepsiyani yaxshilash, fibroz bitishmalarni parchalash, sinovial suyuqlik ishlab chiqarilishini rag‘batlantirish hamda CPJBning ichki buzilishlarida noqulaylik va og‘riqni kamaytirishga xizmat qiladi. Shu bilan birga, turli tadqiqotchilar tomonidan keltirilgan statistik jihatdan ahamiyatli natijalardagi tafovutlar hamda mexanoterapiyaning boshqa davolash usullari bilan birgalikdagi ta’sirini o‘rganuvchi kompleks tadqiqotlarning yetarli emasligi mexanoterapiya usullarini takomillashtirish va ularning samaradorligini oshirish zarurligini ko‘rsatadi.

Kalit so‘zlar: mexanoterapiya, bo‘g‘im aspiratsiyasi, bo‘g‘imni vizualizatsiya qilish, ichki buzilishlar, chakka-pastki jag‘ bo‘g‘imi.

Аннотация: В данной обзорной статье рассматриваются различные методы применения механотерапии при лечении заболеваний височно-нижнечелюстного сустава (ВНЧС). Проанализированы данные отечественных и зарубежных научных исследований, посвящённых применению механотерапии в комплексном лечении заболеваний ВНЧС. Освещены основные достижения, связанные с данным терапевтическим подходом, и обобщены данные, подтверждающие эффективность механотерапии при различных патологиях ВНЧС. Также рассмотрено применение механотерапии в сочетании с артроцентезом при внутренних дисфункциях височно-нижнечелюстного сустава.

Цель исследования. Повышение эффективности лечения пациентов с заболеваниями ВНЧС посредством предложенного метода механотерапии в сочетании с артроцентезом.

Методы и результаты. Для сбора информации использовались базы научной литературы на русском языке (eLIBRARY, CyberLeninka) и английском языке (PubMed/MEDLINE, ClinicalKey, Elsevier, Google Scholar). Проведён комплексный анализ 38 соответствующих научных публикаций, в том числе 20 публикаций из зарубежных журналов. Для изучения источников гетерогенности был проведён анализ подгрупп.

Результаты. Анализ собранных данных продемонстрировал высокую эффективность механотерапии при лечении контрактур жевательных мышц, переломов нижней челюсти, артроза, анкилоза ВНЧС и внутренних нарушений височно-нижнечелюстного сустава.

Заключение. Применение механотерапии повышает эффективность лечения различных заболеваний ВНЧС, включая контрактуры жевательных мышц, артроз, анкилоз ВНЧС и внутренние нарушения сустава. Механотерапия способствует уменьшению локальной ишемии, улучшению проприоцепции, разрушению фиброзных спаек, стимуляции выработки синовиальной жидкости и снижению дискомфорта при внутренних нарушениях ВНЧС. Вместе с тем различия в статистически значимых результатах, представленных различными исследователями, а также недостаток комплексных исследований влияния механотерапии в сочетании с другими методами лечения свидетельствуют о необходимости совершенствования методов механотерапии и повышения их эффективности.

Ключевые слова: механотерапия, аспирация сустава, визуализация сустава, внутренние нарушения, височно-нижнечелюстной сустав.

INTRODUCTION

Mechanotherapy, the discipline focused on using mechanical apparatus for therapeutic and rehabilitative aims, originates from Gustaf Zander (1835-1920), a distinguished Swedish physiotherapist who was a trailblazer in this domain in Europe. From the outset of his profession, Zander focused on the creation and execution of specialised devices that allowed accurate exercise targeting for certain muscle groups [1].

In a restricted definition, mechanotherapy pertains to the treatment of patients conducted by movement aided by specialised mechanical apparatuses. A wide variety of mechanical devices was developed to encompass an extensive range of motions [1]. Systems based on the biomechanical tenets of joint motion need specific consideration [1]. The alterations and technical details of early devices are evident in modern mechanotherapy equipment used today [2].

Mechanotherapy is categorised into two forms: active and passive [1]. Active mechanotherapy depends on the patient's inherent motor talents and competencies, enabling them to execute activities autonomously. Passive mechanotherapy, on the other hand, employs the energy from dynamic components (mechanical, electromechanical, electromagnetic, hydraulic, and pneumatic training apparatus) to induce forced movement of the patient's limbs, aiming to rehabilitate compromised joint mobility.

Mechanotherapy is used in several medical disciplines (such as traumatology, orthopaedics, cardiology, neurology, endocrinology, pulmonology, paediatrics, cancer, gerontology, and dentistry) with oversight of the circulatory system (including heart rate, blood pressure, and SpO_2).

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In the last ten years, the efficacy of rehabilitation for individuals with musculoskeletal conditions has markedly improved owing to the advent of robotic mechanotherapy techniques. Mechanotherapy is used in the treatment of knee osteoarthritis. Robotic mechanotherapy (RM) using biofeedback has become prevalent in rehabilitation for administering regulated loading and offering supplementary support during movement performance. Active mechanotherapy for youngsters using the Thera-Vital apparatus aimed at enhancing limb flexion and extension capabilities [6].

Mechanotherapy is used in the holistic management of individuals with musculoskeletal conditions, resulting in enhanced blood circulation and nourishment to muscles and other affected tissues, therefore improving the efficacy of motor function rehabilitation. Mechanotherapy has also been used in individuals with cerebral palsy [9].

In the fields of dentistry and maxillofacial surgery, modern mechanotherapy apparatuses are founded on concepts introduced by local researchers in the early 1900s (A.A. Limberg, TheraBite) [1]. These apparatuses equally allocate pressure across the dentition and, importantly, facilitate both active and passive motions of the mandible (mouth opening and shutting) [1]. Mechanotherapy is advised subsequent to physiotherapeutic interventions [1]. To alleviate muscular tension and diminish scar tissue prior to mechanotherapy, it is recommended to use massage methods (such as stroking, rubbing, and gentle kneading) in conjunction with heat therapy [1].

LITERATURE REVIEW

Mechanotherapy in the maxillofacial area is recommended for a variety of conditions: masticatory muscle contractures, arthrosis, temporomandibular joint ankylosis, and internal derangements of the TMJ. In a research conducted in 2012, A.N. Sidorenko reported findings on mechanotherapy in a cohort of 17 individuals suffering from TMJ fibrous arthrosis [10]. The effectiveness of the treatment was assessed by clinical evaluation, TMJ MRI, and immune blood tests [10]. Mechanotherapy was performed for a duration of 1 to 2 months until a complete mouth opening of 4.0 to 4.2 cm was attained [10]. The restoration of temporomandibular joint function was achieved in 15 patients; nevertheless, 2 individuals exhibited mandibular deviation toward the afflicted side during opening.

Mechanotherapy is used in mandibular fractures after the consolidation of the fracture when masticatory muscle contracture occurs [11]. The use of mechanotherapy shortened the period of mandibular immobilisation to 1-2 weeks [11]. Contractures of the masticatory muscles were seen in individuals with mandibular fractures [11]. After extensive therapy that included mechanotherapy, mandibular functionality was restored in all subjects [11].

S.A. Goncharenko (2012) described the results of comprehensive treatment of patients with fractures of the mandibular condylar process combined with mechanotherapy [12]. In the postoperative period, 2 out of 82 patients (2.4%) presented with complications involving marginal mandibular branch facial nerve neuritis, and 3 patients (3.6%) developed TMJ contractures [12]. These problems were decreased during a treatment and rehabilitation plan that included mechanotherapy [12].

International writers also utilise mechanotherapy in the rehabilitation of patients with mandibular fractures [13]. As indicated, mechanotherapy may be commenced after the conclusion of the immobilization period after bone tissue has developed at the fracture site [13]. A variety of specific exercises for the masticatory muscles (including dynamic motions performed at maximal range, even in the midst of moderate to severe pain) helps patients to overcome current TMJ functional limits [13]. However, experts note that mechanotherapy and passive mandibular motions should not be administered simultaneously with splinting, as this may contribute to non-union/pseudoarthrosis development [13].

Mechanotherapy is effectively used in the rehabilitation process after orthognathic surgeries [14]. Six months after the operation, 93% of patients exhibited mandibular function and articular disc structure nearing normal parameters [14]. Observations indicate that six months post-surgical intervention for congenital maxillary and mandibular abnormalities, the condition of the disc showed improvement, deviations were nonexistent, and no clicks or crepitus were detected during auscultation [14]. The mouth opening was likewise within standard parameters [14].

In the management of TMJ internal derangements, mechanotherapy was used after arthroscopy (V.V. Bekreev et al., 2013) [15]. Regulated mandibular motions post-arthroscopy seek to rehabilitate articular disc and joint functionality, avert the development of intra-articular fibrous adhesions, and rectify remaining disc abnormalities. In instances where mechanotherapy was inadequate, arthrocentesis accompanied by hydraulic disc relocation was conducted under ultrasound supervision [15]. In the thorough treatment of TMJ internal derangements through the use of splints, hydraulic disc repositioning, and arthroscopy accompanied by mechanotherapy, 119 out of 218 patients (83.8%) experienced either normalisation or considerable enhancement in disc position, along with complete restoration of mandibular mobility range.

A.N. Kuznetsov (2016) reported findings from an extensive treatment of 30 individuals suffering from TMJ internal derangements via mechanotherapy [16]. All patients achieved a return to normal mouth opening measurements by mechanotherapy [16].

In her thesis, T.V. Bykovskaya (2021) recommended using active mechanotherapy after TMJ arthroscopy in conjunction with an occlusal splint, hydraulic disc repositioning, and the "TheraBite" jaw motion rehabilitation apparatus [17]. The protocol adhered to the "rule of three sevens" (seven repetitions per day, seven activities, seven seconds each) [17]. The main objective of mechanotherapy was to enhance the mobility of the articular disc, alleviate muscular contracture, and reduce the duration of postoperative rehabilitation [17]. Findings indicated that postoperative mechanotherapy expanded oral aperture by 3-4 mm weekly throughout the training regimen [17]. The author determined that mechanotherapy is significant in the postoperative management of chronic TMJ disc dislocation by improving disc mobility and averting new intra-articular fibrous adhesions [17].

A.V. Yatsuk et al. (2023) delineated a triadic therapeutic model for TMJ internal derangements [18]. The first stage included anti-inflammatory drugs and sedatives in conjunction with physiotherapy and mechanotherapy [18]. If the outcomes at level one were inadequate, patients advanced to level two (splint treatment) [18]. Insufficient progress after level two constituted a basis for surgical intervention [18]. The authors did not distinguish certain treatment results only for the mechanotherapy aspect.

P.G. Sysolyatin et al. (2001) observed the practicality of mechanotherapy in the multifaceted treatment of inflammatory TMJ disorders with physical therapy [19].

M.K. Kadyrov et al. (2019) reported a clinical instance of successful mechanotherapy in the treatment and rehabilitation of a patient suffering from recurring TMJ fibrous ankylosis [20].

RESEARCH METHODOLOGY

Databases of scientific literature in Russian (eLIBRARY, CyberLeninka) and English (PubMed/MEDLINE, ClinicalKey, Elsevier, Google Scholar) were used to gather information. A comprehensive evaluation was conducted on 38 pertinent papers, including 20 foreign journals. Subgroup analysis was performed to examine the origins of heterogeneity.

ANALYSIS AND RESULTS

S.A. Yasonova et al. (2010) administered treatment to 42 paediatric patients between the ages of 3 and 15 suffering with TMJ bony ankylosis [21]. In a cohort of 19 patients, joint arthroplasty using a distraction osteogenesis apparatus was executed, followed by incremental mandibular elongation [21]. Mechanotherapy for these individuals started on postoperative days 2 to 3 and continued for a minimum duration of one year [21]. The ultimate results were assessed based on the extent of mouth opening after surgery and one year after therapy [21]. A good increase in mouth openness above 20 mm was attained in 79% of children [21]. The authors highlight that this technique is unsuitable for bilateral situations, as they need more intensive mechanotherapy, potentially hindering bone regeneration [21].

Global research underscores mechanotherapy as a crucial component in the treatment of TMJ ankylosis [22]. H. Singh et al. (2023) presented a case series including individuals with asymmetric Class II dentofacial deformities resulting from unilateral TMJ ankylosis [22]. The writers elucidated a method using two distractors to rectify the alignment of the proximal condylar segment [22]. The use of mechanotherapy to rectify maxillofacial asymmetry yielded consistent outcomes during a 3-year follow-up duration [22].

K.G. documented the outcomes of extensive therapy in 12 individuals suffering with chronic TMJ disc dislocation (with a disease duration exceeding one year). Seferyan, who suggested the implementation of involuntary mouth opening via a motor branch mandibular nerve block (Bershet-Dubov method) [23]. Active mechanotherapy resulted in a partial breakdown of intra-articular fibrous adhesions [23]. The manual method required the physician to position their index fingers on the lower incisal margins and their thumbs on the top incisal edges, exerting pressure to facilitate mouth opening [23]. If manual opening was unsuccessful, a mouth prop was used [23]. In four individuals, a progressive decrease of the disc was accomplished within a span of 6 to 8 days [23]. Subsequent to the detachment of adhesion during mechanotherapy, the disc repositioned onto the condylar surface, augmenting the interincisal distance during mouth opening to physiological standards (40-42 mm) [23].

A.E. Darkhanova (2022) assessed the efficacy of mechanised device treatment using the OpenWide apparatus for patients suffering from TMJ problems and limited mouth opening [24]. A total of twenty patients, ranging in age from 14 to 48 years, were assessed. Success benchmarks included attaining a standard mouth opening (40-45 mm interincisal distance), normalising masticatory muscle tone (assessed via electromyography), and alleviating pain intensity [24]. The writer created an algorithm that simulates three primary stages of mandibular motion: vertical, translational-forward, and altered sagittal [24]. The clinical experience underscored a wide array of applications for the OpenWide device: limited oral aperture, TMJ rigidity, TMJ osteoarthritis and ankylosis, recovery post-mandibular fractures, masticatory muscle tightness, and extensive rehabilitation after total joint replacement of the TMJ.

A.A. Eshieva (2019) performed therapy and rehabilitation on a cohort of 60 individuals suffering from traumatic arthritis. Extensive treatment using mechanotherapy was conducted for two months after the accident, resulting in measurable enhancements in mouth opening for all patients [25]. The writer further assessed results in individuals with inflammatory masticatory muscle contractures resulting from maxillofacial phlegmons (63 patients) [25]. Following the removal of the splint, patients need postoperative rehabilitation with mechanotherapy owing to inflammatory contracture (grades 2-3, interincisal distance 2.5-3.5 cm) [25]. Nonetheless, hardly 20% of these individuals exhibited a decrease in contracture (achieving an interincisal distance of 3-4 cm) [25].

N.V. Nikolaychik (2008) documented mechanotherapy for individuals with traumatic TMJ arthritis, indicating that extended, inflexible immobilisation during intra-articular bleeding may result in the development of fibrous adhesions [26]. To avert adhesions, one should use resolutive treatment succeeded by mechanotherapy (for instance, potassium iodide electrophoresis on days 3-4 after trauma, followed by mechanotherapy) [26].

F.A. Khamitova (2024) assessed the effectiveness of an integrated therapy approach for TMJ deforming arthrosis with transcutaneous electrical nerve stimulation (TENS) in a cohort of 42 patients (ages 18-75) [27]. A splint was first used to augment the interocclusal distance by 2-3 mm, then accompanied by TENS of the masticatory muscles (up to 3 mA using Transair-01) in conjunction with myogymnastics and mechanotherapy until a physiological mouth opening of 40-42 mm was attained. This intricate therapy reduced recovery duration by fifty percent.

Intelligent Automation. Zubarev and N.M. Dyuryagin (2006) documented a case with a 33-year-old man with a facial deformity resulting from burns [28]. Due to an electrical burn, the patient lacked the lateral wall of the right maxillary sinus and zygomatic arch, presenting with grade 1 keloid scar contracture of the neck [28]. To avert scar contracture, all phases of graft manipulation were conducted with the mouth ajar, subsequently followed by mechanotherapy postoperatively [28].

Postoperative limited mouth opening is prevalent after the excision of malignant tumours in the maxillofacial area. Preliminary rehabilitation that includes articulatory exercises and mechanotherapy seeks to reinstate mandibular mobility, mastication, deglutition, and respiratory processes, attaining as much as 80% recovery of TMJ functionality [29, 30]. K.A. Asatullaevich et al. (2019) conducted a retrospective analysis of 107 oncology patients with surgical maxillofacial abnormalities, establishing that postoperative mechanotherapy and myogymnastics facilitated functional recovery.

A.S. Kovaleva et al. (2016) examined trismus and soft tissue rigidity in scar contracture with surgical intervention supplemented with postoperative mechanotherapy, physiotherapy, and exercise [31].

In a study conducted by Susan Armijo-Olivo and colleagues (2015), both active and passive motions of the mandible were assessed in relation to TMJ problems [32]. Ninety percent of patients reported enhanced mouth opening and less discomfort [32]. Isotonic jaw-opening resistance training significantly contributed to alleviating muscular discomfort and enhancing mobility, mainly due to the inhibition of Golgi tendon organs [32]. Postural exercises aimed at alleviating cervical spine discomfort were also shown to relieve tension and rigidity in the face and masticatory muscles [32]. In a later comprehensive study and meta-analysis, S. Armijo-Olivo et al. (2016) revealed that mechanotherapy, which included postural and jaw exercises, significantly enhanced mouth opening and alleviated discomfort in myogenic and arthrogenic TMJ diseases [32].

L. Zhang (2021) performed a literature analysis of 6 trials (498 patients), showing that mechanotherapy alone was less effective than occlusal splint therapy for TMJ pain reduction, but their combination application gave better outcomes for mouth opening range [33].

N. Wadhawan et al. (2008) assessed the efficacy of mechanotherapy in conjunction with physiotherapy for TMJ dysfunction in a cohort of 12 children (ages 10-14) exhibiting Class II malocclusion, treated with Twin Block or Bionator devices. MRI assessment validated that the integration of mechanotherapy and physiotherapy alleviated joint discomfort, enhanced mobility, and facilitated mastication [34].

C.G. Stelea et al. (2021) used a passive jaw-mobilization apparatus positioned between the dental arches, progressively enhancing mouth openness by 1-2 mm every day over a span of 30-40 days without causing discomfort.

E. Kijak et al. documented instances of TMJ dysfunction addressed via regulated jaw exercises (linear opening in front of a mirror and manual resistance) [36]. Following a duration of six weeks, the Zebris JMA functional assessment indicated significant enhancements in mouth aperture (achieving 36.3 mm, almost a 9 mm augmentation) and lateral mobility (right: 8.8 mm, left: 7.6 mm) [36].

I.S. Waked et al. (2022) examined the effects of mechanotherapy in conjunction with kinesio taping on 30 patients who had TMJ surgery [37]. The research cohort (engaging in active/passive exercises for 20 minutes each session with kinesio taping three times a week for 14 days) demonstrated an 81.03% enhancement in mouth opening (compared to 30.27% in the control group), as well as a 23.75% decrease in face swelling and an 89.11% alleviation of discomfort [37].

L.B. Calixtre et al. (2015) examined decreased blood circulation in the masticatory system due to TMJ dysfunction resulting from hypertonic vasoconstriction, which causes metabolite buildup and discomfort [38]. Myofibroblasts that possess α-smooth muscle actin have a role in tissue tension and contraction dynamics [38].

CONCLUSION AND SUGGESTIONS

Consequently, the use of mechanotherapy enhances therapeutic effectiveness for a spectrum of TMJ disorders: masticatory muscle contractures, arthrosis, TMJ ankylosis, and internal derangements [1]. Mechanotherapy aims to reduce localised ischaemia, promote proprioceptive feedback, break down fibrous adhesions, increase synovial fluid synthesis, and relieve discomfort associated with internal TMJ disorders. Nonetheless, discrepancies in statistically significant results across researchers and the little literature on mechanotherapy's function within multi-modal approaches underscore the urgent need for further refining and standardisation of mechanotherapy methods.

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13.00.00 Pedagogika fanlari
13.00.01 Pedagogika nazariyasi. Pedagogik ta’limotlar tarixi
13.00.02 Ta’lim va tarbiya nazariyasi va metodikasi (sohalar bo‘yicha)
13.00.03 Maxsus pedagogika
13.00.04 Jismoniy tarbiya va sport mashg‘ulotlari nazariyasi va metodikasi
13.00.05 Kasb-hunar ta’limi nazariyasi va metodikasi
13.00.06 Elektron ta’lim nazariyasi va metodikasi (ta’lim sohalari va bosqichlari bo‘yicha)
13.00.07 Ta’limda menejment
13.00.08 Maktabgacha ta’lim va tarbiya nazariyasi va metodikasi
13.00.09 Ijtimoiy pedagogika
07.00.00 Tarix fanlari
19.00.00 Psixologiya fanlari
01.00.00 Fizika-matematika fanlari
02.00.00 Kimyo fanlari
03.00.00 Biologiya fanlari
09.00.00 Falsafa fanlari
10.00.00 Filologiya fanlari
11.00.00 Geografiya fanlari

MAKTABGACHA VA MAKTAB TA’LIMI

Mas’ul muharrir: Ramzidin Ashurov
Ingliz tili muharriri: Murod Xoliyorov
Musahhih: Alibek Zokirov
Sahifalovchi va dizayner: Iskandar Islomov

2026. №7(3)

“Maktabgacha va maktab ta’limi” jurnali 26.09.2023-yildan
O‘zbekiston Respublikasi Prezidenti Adminstratsiyasi huzuridagi
Axborot va ommaviy kommunikatsiyalar agentligi tomonidan
№C–5669363 reyestr raqami tartibi bo‘yicha ro‘yxatdan o‘tkazilgan.
Litsenziya raqami: № 136361.

Manzilimiz: Toshkent shahar, Yunusobod tumani
19-mavze, 17-uy.