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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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THE EFFECTIVENESS OF OSTEOPATHIC CORRECTION IN THE COMPLEX REHABILITATION OF PATIENTS WITH TEMPOROMANDIBULAR JOINT DYSFUNCTION

Tigran G. Makichyan[1], Elena V. Gusakova[2], Zurab S. Khabadze[3]*, Albert R. Sarkisian[4].

[1]*Medical clinic «Osteopolyclinic», Bld. 7k4, Bolshaya Tatarskaya Street, Moscow, Russia 115184.*

[2]*Central State Medical Academy by the Russian President Administration, Bld. 19kA, Marshala Timoshenko St., Moscow, Russia 121359.*

[3]*Department of Operative Dentistry, Peoples' Friendship University of Russia named after Patrice Lumumba (RUDN University), Institute of Medicine, Miklukho-Maklaya str. 6, Moscow 117198, Russia.*

[4]*Dental clinic "Dilos", bld. 6, Bolshoy Nikolopeskovsky lane, Moscow Russia, 119002.*

Abstract.

Introduction: Temporomandibular joint dysfunction (TMJD) is a prevalent condition characterized by pain and clicking in the joint, restricted mouth opening, chewing difficulties, tension and soreness in the masticatory muscles, headaches, and tinnitus. In dental rehabilitation for TMJD, Transcutaneous Electrical Nerve Stimulation (TENS) is used to relax the masticatory and temporalis muscles prior to splint therapy. Osteopathic correction, in contrast, addresses not only these muscles but also extraocclusive disorders—somatic dysfunctions outside the stomatognathic system that affect mandibular biomechanics and muscle tone. Despite the high prevalence and complex etiology of TMJD, the integration of osteopathic correction into dental rehabilitation remains underexplored. The objective of this study was to evaluate the effectiveness of comprehensive dental rehabilitation through the application of osteopathic correction in patients with TMJD.

Materials and methods: The study was conducted from January 2024 to March 2025, involving 90 patients aged 19 to 61 years with TMJD and extraocclusive disorders. All participants were examined by a dentist and an osteopath, then assigned to two groups: Group No. 1 received both dental and osteopathic treatment; Group No. 2 received dental treatment only. Dental care included splint therapy; osteopathic correction targeted extraocclusive disorders and somatic dysfunctions. Efficacy was assessed using the Hamburg test, electromyography (EMG), osteopathic examination, VAS scale, and pharmacotherapy if needed. All patients participated in myohymnastics. Statistical analysis was performed using Statistica v4.6.3, with $p < 0.05$ considered significant.

Results: After 8 weeks, Group No. 1 showed statistically significant ($p < 0.05$) improvements compared to Group No. 2 in Hamburg test scores, EMG results, somatic dysfunction frequency and severity, and VAS scores for pain.

Conclusion: In TMJD patients with extraocclusive disorders, osteopathic correction should be incorporated into the interdisciplinary rehabilitation protocol combining dental and osteopathic care.

Key words. Osteopathic correction, temporomandibular joint dysfunction, splint therapy, electroneuromyography, somatic dysfunction.

Introduction.

Temporomandibular joint dysfunction (TMJD) is a prevalent disorder affecting approximately 34% of the adult population. TMJD manifests with a combination of various symptoms and complaints, including pain and clicking in the joint, limited mouth opening, chewing difficulties, tension and tenderness in the masticatory muscles, tinnitus, headaches, and neck pain [1,2].

The literature increasingly highlights the relationship between TMJD, bruxism, and headaches. Bruxism, defined as the parafunctional tension of the masticatory muscles, can exacerbate pre-existing headaches when combined with TMJD. Thus, tension in the masticatory muscles may influence the pathophysiological processes of all three conditions. Furthermore, bruxism is considered one of the contributing factors to TMJD, while TMJD itself is a known contributor to headaches [3,4].

This pathological relationship must be considered in the dental rehabilitation of patients with TMJD, which involves interdisciplinary collaboration at various stages. The foundation of this rehabilitation is splint therapy utilizing an occlusal splint, complemented by myogymnastics [5,6]. To facilitate a change in the functional position of the mandible prior to the fabrication of an occlusal splint, a session of transcutaneous electrical nerve stimulation (TENS) therapy is conducted to relax the masticatory muscle group and establish physiological occlusion [7].

Osteopathy is recognized as a promising non-pharmacological treatment method that provides both local and systemic effects on the body, thereby enhancing adaptive resources and the body's ability to self-correct [8]. Unlike TENS therapy, osteopathic correction techniques aim not only to relax the masticatory muscles but also to address extra-occlusal disorders—somatic dysfunctions outside the stomatognathic system that impact mandibular biomechanics and, consequently, the tension in the masticatory muscle group [9].

An increasing number of scientific studies have demonstrated the positive effects of osteopathic intervention at various stages of dental treatment for patients with TMJD [10]. However, the collaborative efforts of dentists and osteopaths specifically at this stage of dental rehabilitation remain insufficiently studied and relevant.

The objective of this study was to evaluate the effectiveness of comprehensive dental rehabilitation through the application of osteopathic correction in patients with TMJD.

Materials and Methods.

Study design: A prospective cohort study was conducted from January 2024 to March 2025 at the Department of Therapeutic Dentistry of the Patrice Lumumba Peoples' Friendship University of Russia (RUDN University), the dental clinic

"Dilos" LLC, and the medical center "Osteopathic Treatments Rus" LLC. A total of 90 patients aged 19 to 61 years with TMJD and identified extraocclusal disorders were selected and participated in the study.

Inclusion criteria	Exclusion criteria
• Age 18 to 65 years. • Presence of TMJD. • Presence of extra-occlusal disorders. • Consent to dental and osteopathic treatment.	• Undergoing orthodontic or prosthetic treatment at the time of the study. • Contraindications to osteopathic treatment. • Pregnancy. • Congenital anomalies or history of trauma of the maxillofacial system. • Diseases of the central nervous system.

All participants underwent comprehensive dental and osteopathic examinations, along with a brief "Hamburg" test and an assessment for identifying extra-occlusal disorders. Following the examinations, the patients were randomly assigned to two groups that were comparable in terms of sex and age (see Table 1): the main group, which received osteopathic correction prior to splint therapy, and the control group, which underwent transcutaneous electrical nerve stimulation (TENS) therapy before splint therapy.

Table 1. *Distribution of Patients by Sex and Age.*

Indicator	The Main Group (n=45)	The Control Group (n=45)	p
Age			
M, SD	39,29 (11,35)	39,82 (12,43)	0,837
Me (Q1-Q3)	39 (29,5 - 48,0)	39 (29,5 - 51,0)	
Min, max	20; 60	19; 61	
Sex			
Men	17 (37,8%)	21 (46,7%)	0,393
Women	28 (62,2%)	24 (53,3%)	

Description of the Medical Intervention:

To prepare for dental treatment and assess the condition of the temporomandibular joints (TMJs), all patients underwent cone-beam computed tomography (CBCT) of the TMJs. Dental treatment included splint therapy lasting 8–10 weeks. In the control group, TENS was used to determine the mandibular reference position before impressions were taken for occlusal splint fabrication. In the experimental group, osteopathic correction was performed instead.

Osteopathic treatment focused on correcting extraocclusal imbalances and identified somatic dysfunctions. It included soft tissue, articulatory, muscle energy, and fascial techniques [11]. The first session was held one week prior to taking impressions, the second—on the day of impression taking (with no more than two hours between the osteopathic session and impression procedure). The third and, if necessary, subsequent sessions were conducted during the course of treatment at intervals of no less than two weeks. On average, each patient underwent 3–5 osteopathic sessions.

To assess treatment effectiveness, a short version of the "Hamburg" test, EMG of the masticatory muscles, and osteopathic examination findings were used. The normalization of mandibular movement trajectory was evaluated using photographic documentation.

All patients performed myogymnastics aimed at reducing hypertonicity in the masticatory muscle group and normalizing mandibular movement during mouth opening and closing [12,13].

In cases of pain, patients were prescribed nonsteroidal anti-inflammatory drugs (NSAIDs). They were also instructed in self-massage techniques for trigger points to relieve muscle tension and associated pain.

Study Outcomes and Outcome Assessment Methods:

The study outcomes included reduction of TMJD symptoms, decreased mandibular asymmetry during mouth opening, and relief of pain syndrome (if present).

The short version of the "Hamburg" test assessed the likelihood or presence of TMJD. The scoring system was as follows: 0–1 points — functionally healthy, 2 points — less than 40% probability of dysfunction, 3 points — confirmed TMJD [14].

Extraocclusal disorders were evaluated by measuring the mouth opening amplitude with a medical caliper in both the neutral head position and maximum cervical extension [15].

Symmetry of the masticatory and temporalis muscles, as a measurable parameter, was assessed via EMG using the "Kolibri" device [16].

TMJD pain level was evaluated using the VAS before and after treatment. The scale ranged from 0 (no pain) to 10 (unbearable pain) [17].

Osteopathic assessment was conducted in accordance with established clinical guidelines [18].

Photographic records of patients with open mouths were used to evaluate mandibular deviation from the midline. Reference values were based on the Helkimo Index [19].

Statistical Analysis:

Statistical analysis was performed using IBM SPSS Statistics version 26. Quantitative data between the two groups were compared using the Mann–Whitney U test. Quantitative variables were described using means (M), standard deviations (SD), medians (Me), and interquartile ranges (Q1–Q3).

To test the differences in frequency of categorical variables between groups, the Chi-square (χ^2) test was used (or Fisher's exact test when expected frequencies were ≤ 5). Intra-group comparisons were conducted using the Wilcoxon signed-rank test. Differences were considered statistically significant at $p < 0.05$.

Ethical considerations:

The study was conducted in accordance with the principles of the Declaration of Helsinki on ethical principles for medical research involving human subjects. All participants provided written informed consent prior to inclusion in the study. The study was approved by the local ethics committee.

Results.

Short Hamubrg test: According to the criteria of the Short Hamburg Test, following treatment, the majority of patients in the main group were classified as functionally healthy or as having a low probability of dysfunction (Figure 1). The most frequently reported symptoms included asymmetry during mouth opening, tenderness on palpation of the masticatory muscles, and the presence of intraarticular sounds during

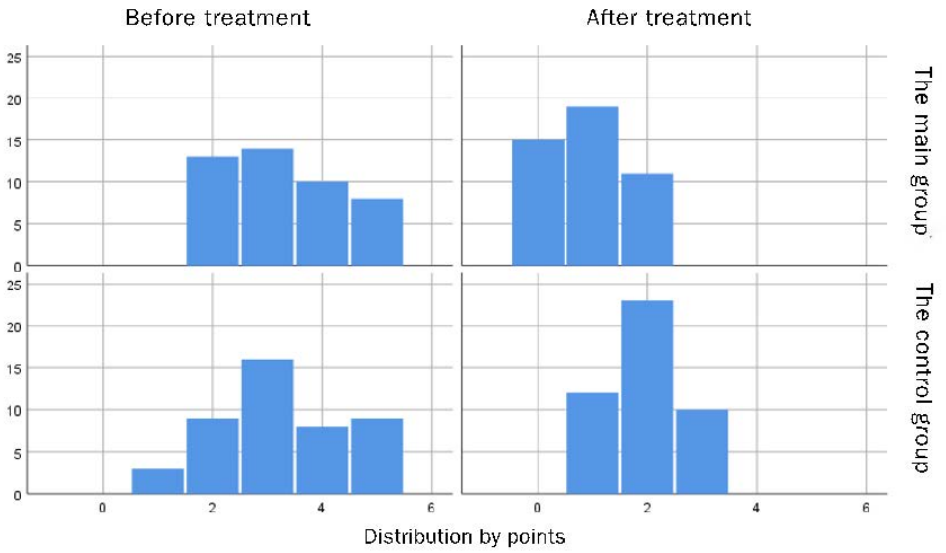

Figure 1. *Short Hamburg Test results.*

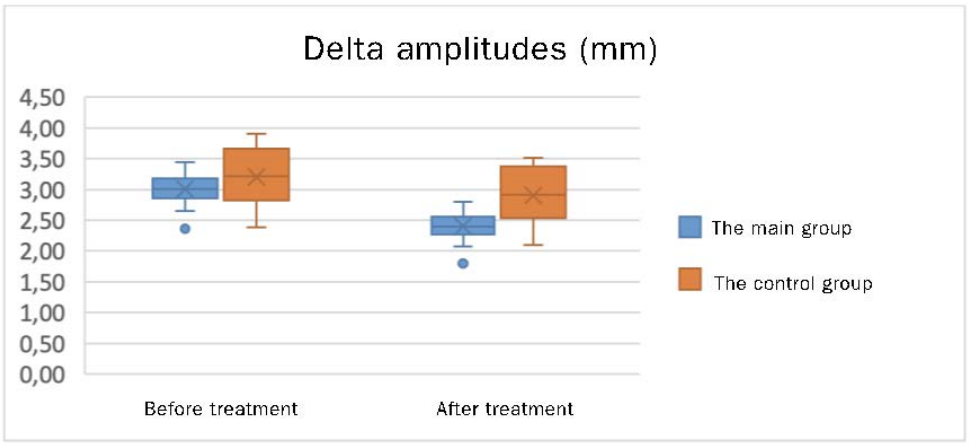

Figure 2. *Amplitude delta (mm).*

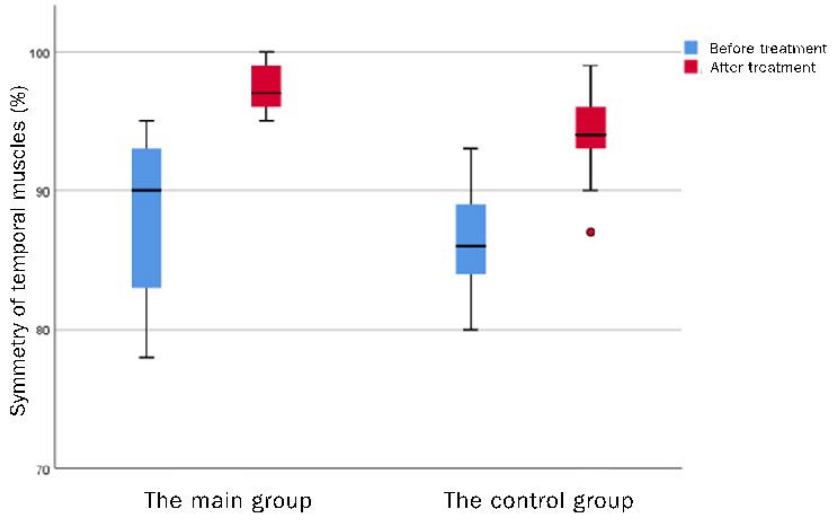

Figure 3. *Symmetry of the temporalis muscles (%).*

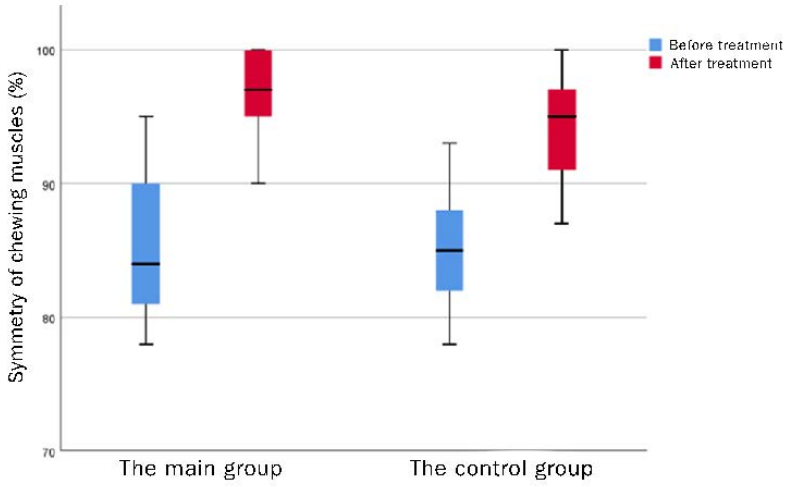

Figure 4. *Symmetry of the masseter muscles (%).*

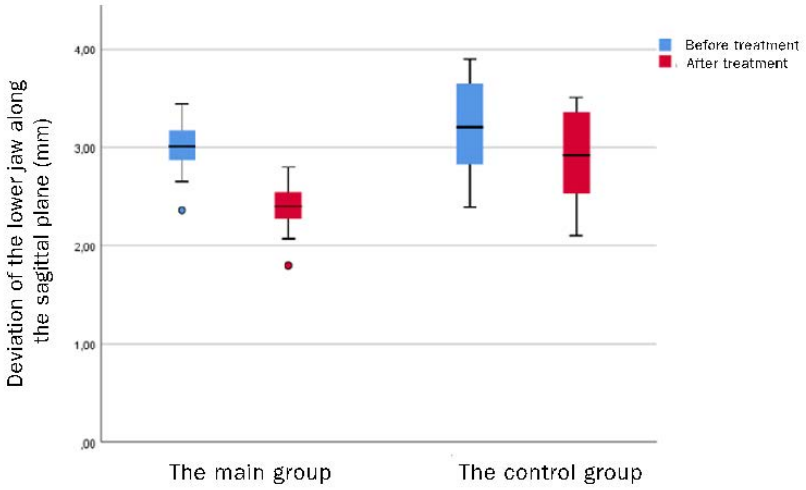

Figure 5. *Mandibular deviation in the sagittal plane (mm).*

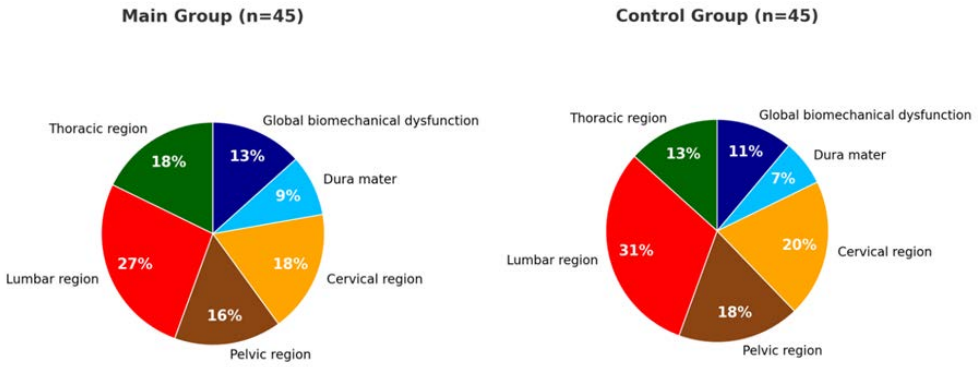

Figure 6. *Structure of dominant somatic dysfunctions in the main and control groups before treatment.*

jaw movement. Prior to treatment, there were no statistically significant differences between the groups ($p > 0.05$). However, post-treatment results in the main group differed significantly from those in the control group ($p < 0.05$).

Extraocclusal disorders: The test for detecting extraocclusal disorders was conducted before and after treatment by both a dentist and an osteopath. Figure 2 illustrates the changes observed in the control group, which were associated with altered biomechanics of the mandible following splint therapy and myogymnastics. Nevertheless, the amplitude delta in the control group did not return to normal, indicating the persistence of extraocclusal disturbances after treatment. In contrast, no extraocclusal disorders were detected in the main group following osteopathic correction. There were no statistically significant differences between the groups before treatment ($p > 0.05$), but significant differences were observed post-treatment ($p < 0.05$).

EMG: findings indicated symmetrical activity of the temporalis and masseter muscles. The examination was performed before the initiation of treatment and after completion of splint therapy. To ensure the accuracy of functional measurements, patients were instructed to clench their teeth during the procedure (Figures 3 and 4). There were no statistically significant differences between the groups prior to treatment ($p > 0.05$). However, following treatment, significant differences were observed between the groups ($p < 0.05$).

Table 2. *Predominant Muscles/Side.*

Predominant muscles	The Main group (n=45)		The Control group (n=45)	
	Right	Left	Right	Left
Temporalis muscles	16	29	18	27
Masseter muscles	16	29	18	27

In more than half of the cases in both the main and control groups, the dominant muscle activity was observed on the left side, as shown in Table 2. Following treatment, the dominant side remained unchanged; however, the degree of asymmetry decreased, as illustrated in the figures above.

Photographic Protocol: Asymmetry in masticatory muscle function was also documented through photographic records. Patients were asked to open their mouths while standing, in order to account for potential ascending influences of extraocclusal disorders on mandibular biomechanics. The change in mandibular deviation along the sagittal plane (Figure 5) after osteopathic correction was significantly lower in the main group ($p < 0.05$).

Pain Assessment (VAS): A subset of patients ($n = 15$) reported chronic pain in the TMJ region. The main complaints included pain during maximal mouth opening, pain while chewing on the affected side, and discomfort when chewing hard foods.

Notably, no patients in the sample reported VAS scores above six, indicating a moderate level of chronic pain. After treatment, pain-related dysfunction was reduced in both groups; however, the distribution of VAS scores was significantly lower in the main group. In this group, the majority of patients reported scores of 1 (46.6%), 0 (26.7%), and 2 (20%), indicating a substantial reduction in pain. In contrast, the control group had no patients with scores of 0 or 1 after treatment. This suggests that although some improvement was observed, the reduction in pain was minimal. Most patients in the control group had scores of 3 (86.7%) and 2 (13.3%).

Osteopathic Status: In both the main and control groups, only global biomechanical somatic dysfunctions (SDs) were identified at the global level. No global rhythmogenic or neurodynamic dysfunctions were detected in either group. All patients (100%) presented with local SDs at the level of the temporomandibular joint (TMJ). No other nonspecific local dysfunctions were observed.

Dominant SDs were recorded only before treatment, as they were no longer present in the main group following osteopathic correction, while in the control group they remained unchanged. In both groups, dominant SDs of the lumbar region were most prevalent. The structure of the identified dominant SDs is shown in Figure 6.

Table 3. *Pain intensity on the Visual Analogue Scale (VAS), measured in points.*

VAS	The Main group (n=15)		The Control group (n=15)	
	before treatment	*after treatment*,***	*before treatment*	*after treatment*,***
0	0 (0%)	4 (26,7%)	0 (0%)	0 (0%)
1	0 (0%)	7 (46,6%)	0 (0%)	0 (0%)
2	2 (13,3%)	2 (20,0%)	0 (0%)	2 (13,3%)
3	3 (20,0%)	1 (6,7%)	2 (13,3%)	13 (86,7%)
4	2 (13,3%)	0 (0%)	6 (40%)	0 (0%)
5	5 (33,4%)	0 (0%)	5 (33,3%)	0 (0%)
6	3 (20,0%)	0 (0%)	2 (13,3%)	0 (0%)

**Statistically significant change ($p < 0.05$) following treatment within each group.*

***Statistically significant difference ($p < 0.05$) between treatment outcomes of the main and control groups.*

In both groups, the most frequently identified SDs were located in the following regions: cervical (both structural and visceral components), thoracic (structural and visceral components), and lumbar (structural and visceral components). The frequency of region-level SDs (Table 4) before treatment did not differ significantly between the main and control groups ($p > 0.05$).

A follow-up assessment of osteopathic status was performed after treatment. In the main group, a statistically significant reduction in regional somatic dysfunctions (SDs) was observed ($p < 0.05$). In the control group, no statistically significant changes in this parameter were found ($p > 0.05$).

Discussion.

For over half a century, the field of medical rehabilitation in dentistry has maintained consensus that achieving physiological occlusion requires not only the correct positioning of the condylar heads [21-23], but also bringing the masticatory muscles into a state of physiological comfort and functional freedom [20]. This implies symmetry in muscle function as well.

Furthermore, the improvements we observed in EMG symmetry and Hamburg Test scores may stem from the modulation of proprioceptive input, fascial tension, and local circulatory dynamics within the masticatory system. Manual osteopathic techniques—such as muscle energy, myofascial release, and

Table 4. *Frequency of region-level somatic dysfunctions, absolute number (%).*

Region/Component	Severity of Dysfunction, Points	The Main group*,**		The Control group	
		Before treatment (n=45)	After treatment (n=45)	Before treatment (n=45)	After treatment (n=45)
Head	0	28(62,2%)	39(86,7%)	27(60,0%)	28(62,2%)
	1	17(37,8%)	6 (13,3%)	18(40,0%)	17(37,8%)
	2	0	0	0	0
Cervical	0	33(73,3%)	45 (100%)	30(66,7%)	30(66,7%)
structural	1	10(22,2%)	0	12(26,7%)	12(26,7%)
	2	2 (4,4%)	0	3 (6,7%)	3 (6,7%)
visceral	0	27(60,0%)	42(93,3%)	28(62,2%)	29(64,4%)
	1	12(26,7%)	3 (6,7%)	11(24,4%)	11(24,4%)
	2	6 (13,3%)	0	6 (13,3%)	5 (11,1%)
Thoracic	0	26(57,8%)	37(82,2%)	28(62,2%)	29(64,4%)
structural	1	17(37,8%)	8 (17,8%)	15(33,3%)	14(31,1%)
	2	2 (4,4%)	0	2 (4,4%)	2 (4,4%)
visceral	0	36(80,0%)	45 (100%)	37(82,2%)	38(84,4%)
	1	3 (6,7%)	0	4 (8,9%)	3 (6,7%)
	2	6 (13,3%)	0	4 (8,9%)	4 (8,9%)
Lumbar	0	31(68,9%)	42(93,3%)	27(60,0%)	27(60,0%)
structural	1	6 (13,3%)	3 (6,7%)	9 (20,0%)	9 (20,0%)
	2	8 (17,8%)	0	9 (20,0%)	9 (20,0%)
visceral	0	33(73,3%)	44(97,8%)	33(73,3%)	34(75,6%)
	1	8 (17,8%)	1 (2,2%)	7 (15,6%)	6 (13,3%)
	2	4 (8,9%)	0	5 (11,1%)	5 (11,1%)
Pelvic	0	31(68,9%)	42(93,3%)	39(86,7%)	39(86,7%)
structural	1	11(24,4%)	3 (6,7%)	3 (6,7%)	3 (6,7%)
	2	3 (6,7%)	0	3 (6,7%)	3 (6,7%)
visceral	0	38(84,4%)	45 (100%)	35(77,8%)	35(77,8%)
	1	4 (8,9%)	0	5 (11,1%)	5 (11,1%)
	2	3 (6,7%)	0	5 (11,1%)	5 (11,1%)
Dura mater	0	35(77,8%)	45 (100%)	38(84,4%)	37(91,1%)
	1	6 (13,3%)	0	4 (8,9%)	5 (5,6%)
	2	4 (8,9%)	0	3 (6,7%)	3 (3,3%)

**Statistically significant change ($p < 0.05$) following treatment within each group.*
***Statistically significant difference ($p < 0.05$) between treatment outcomes of the main and control groups.*

soft tissue mobilization—have been shown to normalize muscle length–tension relationships, enhance microcirculation, and reduce nociceptive sensitization [24-25].

By addressing extraocclusal somatic dysfunctions that lie outside the stomatognathic system, osteopathic correction not only relaxes hypertonic muscles but also rebalances the postural sensor function of the jaw complex, thereby complementing conventional splint therapy with a neuromuscular approach.

The first osteopathic session was conducted one week prior to taking dental impressions, with the primary goal of identifying and correcting extra-occlusal dysfunctions. The second session was held on the day the impressions were taken and included both the correction of extra-occlusal dysfunctions and targeted work with elements of the stomatognathic system to prepare for impression-taking and to help establish physiological occlusion. The third and subsequent sessions (on average 3–5 visits) were conducted at intervals of several weeks. On average, each patient attended 3 to 5 sessions depending on their osteopathic and somatic status.

TENS therapy does not address extra-occlusal dysfunctions and exerts only local effects on specific muscle groups. As a result, once the therapy is completed, somatic dysfunctions outside the stomatognathic system continue to negatively affect mandibular biomechanics, which is supported by the study results. Extra-

occlusal dysfunctions can only be corrected through osteopathic methods. The reduction in the number of somatic dysfunctions in the main group directly influenced all measured parameters. Patients in the control group also demonstrated statistically significant improvements in many parameters, though to a much lesser extent compared to the main group.

Conclusion.

Osteopathic correction, when included in the comprehensive dental rehabilitation of patients with temporomandibular joint dysfunction and identified extra-occlusal disorders, contributes to a significantly greater reduction in dysfunction parameters compared to patients who received TENS therapy instead of osteopathic correction prior to splint therapy.

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