

## MORPHOLOGY OF THE TEMPOROMANDIBULAR JOINT: STRUCTURE AND FUNCTION

Axmedova Malika Qilichovna

Asian International University.

Bukhara, Uzbekistan

*Email:* [malikaaxmedova855@gmail.com](mailto:malikaaxmedova855@gmail.com).

<https://doi.org/10.5281/zenodo.15013019>

**Abstract.** *The temporomandibular joint (TMJ) is one of the most complex and unique joints in the human body. It connects the mandible (lower jaw) to the temporal bone of the skull, allowing movements essential for chewing, speaking, and facial expressions. The morphology of the TMJ is distinct from other synovial joints due to its articulation with a fibrocartilaginous disc and its ability to perform both hinge and gliding motions. This article provides an in-depth analysis of the morphology of the TMJ, highlighting its structural components and functional significance.*

**Key words:** *temporomandibular joint, ligament, joint capsule, mandible, muscles associated.*

## МОРФОЛОГИЯ ВИСОЧНО-НИЖНЕЧЕЛЮСТНОГО СУСТАВА: СТРУКТУРА И ФУНКЦИЯ

**Аннотация.** *Височно-нижнечелюстной сустав (ВНЧС) является одним из самых сложных и уникальных суставов в организме человека. Он соединяет нижнюю челюсть с височной костью черепа, обеспечивая движения, необходимые для жевания, речи и выражения лица. Морфология ВНЧС отличается от других синовиальных суставов благодаря его сочленению с фиброзно-хрящевым диском и его способности выполнять как шарнирные, так и скользящие движения. В этой статье представлен углубленный анализ морфологии ВНЧС, с акцентом на его структурные компоненты и функциональное значение.*

**Ключевые слова:** *височно-нижнечелюстной сустав, связка, суставная капсула, нижняя челюсть, связанные мышцы.*

---

The TMJ comprises several key anatomical structures that contribute to its function:

### 1. Articular Surfaces

The TMJ is formed by the articulation of the mandibular condyle and the mandibular fossa of the temporal bone. These surfaces are covered with fibrocartilage rather than hyaline cartilage, which is more common in synovial joints. The fibrocartilage provides increased resistance to mechanical stress and better regenerative properties.

- **Mandibular Condyle:** The condyle is elliptical in shape and varies in size among individuals. It articulates with the temporal bone to facilitate jaw movements.

- **Temporal Bone (Mandibular Fossa and Articular Eminence):** The mandibular fossa forms the superior portion of the TMJ, while the articular eminence acts as a guiding surface during jaw movements.

## 2. Articular Disc

A critical component of the TMJ is the articular disc, a fibrocartilaginous structure that divides the joint cavity into upper and lower compartments. This disc plays a crucial role in cushioning mechanical forces and ensuring smooth articulation.

- **Anterior Band:** The thickest part of the disc that maintains stability.
- **Intermediate Zone:** The thinnest part that allows smooth gliding of the condyle.
- **Posterior Band:** Attached to the retrodiscal tissue and provides support to the disc.

## 3. Joint Capsule and Ligaments

The TMJ is enclosed by a fibrous joint capsule that stabilizes and protects the joint.

Several ligaments provide additional support:

- **Temporomandibular Ligament:** Reinforces the lateral aspect of the joint and limits excessive movement.
- **Sphenomandibular Ligament:** Connects the sphenoid bone to the mandible, assisting in jaw suspension.
- **Stylomandibular Ligament:** Extends from the styloid process to the mandible, preventing excessive protrusion of the jaw.

## 4. Muscles Associated with the TMJ

The TMJ is primarily controlled by the muscles of mastication, which facilitate jaw movement:

- **Masseter:** Provides strong elevation of the mandible.
- **Temporalis:** Elevates and retracts the mandible.
- **Medial Pterygoid:** Assists in jaw elevation and side-to-side movements.
- **Lateral Pterygoid:** Controls jaw depression and protrusion.

## Functional Morphology and Movements

The TMJ enables a combination of hinge (rotation) and gliding (translation) movements, making it a bicondylar joint. The primary movements include:

- **Opening and Closing (Hinge Movement):** The initial phase of mouth opening involves rotation of the condyle within the mandibular fossa.
- **Protrusion and Retrusion (Gliding Movement):** The mandibular condyle moves forward and backward along the articular eminence.

- **Lateral Excursion (Side-to-Side Movement):** The jaw shifts from side to side, allowing for efficient mastication.

### **Developmental and Evolutionary Aspects**

The morphology of the TMJ evolves throughout an individual's lifespan. During infancy, the joint is underdeveloped, with increased mobility. As mastication patterns change with age, the TMJ has adapted to different dietary habits in mammals, with herbivores exhibiting a more pronounced articular eminence for grinding motions, while carnivores have a more constrained hinge mechanism for biting efficiency.

### **Clinical Implications**

TMJ disorders (TMD) arise due to various morphological and functional abnormalities, leading to pain, restricted movement, and joint noises. Some common conditions include:

- **Disc Displacement:** Misalignment of the articular disc resulting in clicking or locking of the jaw.

- **Osteoarthritis:** Degeneration of joint surfaces leading to pain and reduced mobility.

- **Bruxism:** Chronic grinding or clenching of teeth causing excessive stress on the TMJ.

Treatment for TMJ disorders may include physical therapy, occlusal splints, medication, or, in severe cases, surgical intervention.

### **Conclusion**

The temporomandibular joint exhibits a highly specialized morphology that allows for complex movements essential for daily functions. Its unique fibrocartilaginous structure, articulation with an interposed disc, and coordinated muscle action distinguish it from other synovial joints. Understanding the morphology of the TMJ is crucial for diagnosing and managing TMJ-related disorders, ultimately improving patient outcomes.

### **REFERENCES**

1. Qilichovna, A. M., Nematilloevna, X. M., & Ergashevich, I. I. (2024). THE ROLE OF CARIOGENIC AND PROTECTIVE FACTORS IN THE PREVENTION OF CARIES. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, 43(8), 45-51.
2. Qilichovna, A. M., Nematilloevna, X. M., & Ergashevich, I. I. (2024). KARIYESNING OLDINI OLISHDA KARIOGEN VA HIMOYA OMILLARNING ROLI. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, 43(8), 52-59.
3. Qilichovna, A. M. (2024). FACTORS CAUSING THE WIDE SPREAD OF DENTAL CARIES. *EUROPEAN JOURNAL OF MODERN MEDICINE AND PRACTICE*, 4(4), 154-160.
4. Nematilloevna, X. M., & Qilichovna, A. M. (2024). MORPHO-FUNCTIONAL CHANGES IN ACUTE FORMS OF APHTHOUS STOMATITIS: Yangi O'zbekiston



taraqqiyotida tadqiqotlarni o'rni va rivojlanish omillari. *Yangi O'zbekiston taraqqiyotida tadqiqotlarni o'rni va rivojlanish omillari*, 6(4), 177-186.

5. Qilichovna, A. M., & Nematilloevna, X. M. (2024). METABOLIK SINDROMI VA QON BOSIMI BOR BEMORLARDA O'ZGARISH XUSUSIYATLARI BAHOLASH: Yangi O'zbekiston taraqqiyotida tadqiqotlarni o'rni va rivojlanish omillari. *Yangi O'zbekiston taraqqiyotida tadqiqotlarni o'rni va rivojlanish omillari*, 6(4), 187-196.
6. Qilichovna, A. M., & Nematilloevna, X. M. (2024). TIBBIYOT TILI HISOBLANMISH LOTIN TILINI SAMARALI O'RGANISH OMILLARI: Yangi O'zbekiston taraqqiyotida tadqiqotlarni o'rni va rivojlanish omillari. *Yangi O'zbekiston taraqqiyotida tadqiqotlarni o'rni va rivojlanish omillari*, 6(4), 197-206
7. Qilichovna, A. M., & Vahidovna, K. N. (2024). FACTORS CAUSING DISEASES OF PERIODONTAL TISSUES. *JOURNAL OF HEALTHCARE AND LIFE-SCIENCE RESEARCH*, 3(5), 196-201.
8. Qilichovna, A. M., & Abdumutalib o'g'li, U. A. (2024). KARIES PROFILAKTIKASI NAZARIYASI VA AMALIYOTI. *JOURNAL OF HEALTHCARE AND LIFE-SCIENCE RESEARCH*, 3(5), 202-209.
9. Vahidovna, K. N., & Qilichovna, A. M. (2024). FACTORS CAUSING PERIODONTAL TISSUE DISEASES. *JOURNAL OF HEALTHCARE AND LIFE-SCIENCE RESEARCH*, 3(5), 185-195.
10. Qilichovna, A. M. (2024). THEORETICAL FUNDAMENTALS OF CARIES PREVENTION. *Journal of Science in Medicine and Life*, 2(5), 222-226.
11. Qilichovna, A. M., & Safarboy o'g'li, T. S. (2024). 4-AVLOD ADGEZIV SISTEMA. *JOURNAL OF HEALTHCARE AND LIFE-SCIENCE RESEARCH*, 3(5), 307-313.
12. Axmedova, M. (2024). CONDITION OF THE ALVEOLAR PROCESS AND PERIOSTE WHEN USING REMOVABLE DENTURES. *EUROPEAN JOURNAL OF MODERN MEDICINE AND PRACTICE*, 4(11), 528-538.
13. Qilichevna, A. M. (2024). COMPARATIVE ANALYSIS OF NUTRITIONAL DISPARITIES AMONG PEDIATRIC POPULATIONS: A STUDY OF CHILDREN WITH DENTAL CAVITIES VERSUS THOSE IN OPTIMAL HEALTH. *Central Asian Journal of Multidisciplinary Research and Management Studies*, 1(2), 30-34.
14. Qilichovna, A. M. (2024). CLINIC FOR PATIENTS WITH DENTURES COMPARATIVE DIAGNOSIS AND PATHOGENESIS. *TADQIQOTLAR*, 30(3), 127-135.
15. Ahmedova, M. (2023). COMPARATIVE ANALYSIS OF NUTRITIONAL DISPARITIES AMONG PEDIATRIC POPULATIONS: A STUDY OF CHILDREN

- WITH DENTAL CAVITIES VERSUS THOSE IN OPTIMAL HEALTH. *International Bulletin of Medical Sciences and Clinical Research*, 3(12), 68-72.
16. Ahmedova, M. (2023). DIFFERENCES IN NUTRITION OF CHILDREN WITH DENTAL CARIES AND HEALTHY CHILDREN. *International Bulletin of Medical Sciences and Clinical Research*, 3(12), 42-46.
17. Ахмедова, М. (2023). TISH KARIESINING KENG TARQALISHIGA SABAB BO'LUVCHI OMILLAR. *Центральноазиатский журнал образования и инноваций*, 2(12), 200-205.
18. Ахмедова, М. (2023). ИСПОЛЬЗОВАНИЕ КОМПЬЮТЕРНЫХ ТЕХНОЛОГИЙ НА ЭТАПАХ ДИАГНОСТИКИ И ПЛАНИРОВАНИЯ ОРТОПЕДИЧЕСКОГО ЛЕЧЕНИЯ НА ОСНОВЕ ЭНДОССАЛЬНЫХ ИМПЛАНТАТОВ. *Центральноазиатский журнал образования и инноваций*, 2(11 Part 2), 167-173.
19. Ahmedova, M. (2023). USE OF COMPUTER TECHNOLOGY AT THE STAGES OF DIAGNOSIS AND PLANNING ORTHOPEDIC TREATMENT BASED ON ENDOSSEAL IMPLANTS. *International Bulletin of Medical Sciences and Clinical Research*, 3(11), 54-58.
20. Ахмедова, М. (2020). НАРУШЕНИЯ ЭНДОТЕЛИАЛЬНОЙ ФУНКЦИИ ПРИ РАЗВИТИИ АФТОЗНОГО СТОМАТИТА. *Достижения науки и образования*, (18 (72)), 65-69.
21. Ahmedova, M. (2023). THE IMPACT OF SOCIOCULTURAL FACTORS ON THE PERVASIVENESS OF DENTAL CARIES AS A COMPLEX HEALTH CONDITION IN CONTEMPORARY SOCIETY. *International Bulletin of Medical Sciences and Clinical Research*, 3(9), 24-28.
22. Ахмедова, М. К. (2024). ОБЩИЕ ПРИЧИНЫ КАРИЕСА ЗУБОВ. *Лучшие интеллектуальные исследования*, 14(4), 77-85.
23. Qilichovna, A. M. (2024). CLINICAL SIGNS WHEN ACCOMPANIED BY DENTAL DISEASES AND METABOLIC SYNDROME. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, 39(5), 116-24.
24. Ахмедова, М. К. (2024). Профилактика Стоматологических Заболеваний У Беременных. *Research Journal of Trauma and Disability Studies*, 3(3), 66-72.
25. Ахмедова, М. К. (2024). ОСНОВНЫЕ ПРОФИЛАКТИЧЕСКИЕ МЕТОДЫ ТКАНЕЙ ПАРОДОНТА У ДЕТЕЙ И ПОДРОСТКОВ. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, 41(5), 254-260.

26. Qilichovna, A. M. (2024). PREVENTION OF PERIODONTAL DISEASES IN CHILDREN AND TEENAGERS. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, 41(5), 234-239.
27. Qilichovna, A. M. (2024). PREVENTION OF PERIODONTAL AND GUM DISEASES IN PREGNANT WOMEN. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, 41(5), 240-245.
28. Qilichovna, A. M. (2024). HOMILADOR AYOLLARDA TISH VA PARADONT KASALLIKLARINING OLDINI OLISH. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, 41(5), 246-253.
29. Ахмедова, М. К. (2024). ИЗУЧЕНИЕ ПРИЧИННЫХ ФАКТОРОВ ПАРОДОНТИТА. *Journal of new century innovations*, 49(3), 47-53.
30. Qilichovna, A. M. (2024). TO STUDY THE FACTORS THAT CAUSE PERIODONTITIS. *Journal of new century innovations*, 49(3), 40-46.
31. Qilichovna, A. M. (2024). THE ROLE OF PATHOGENESIS IN THE GROWTH FACTORS OF PERIODONTITIS DISEASE. *Journal of new century innovations*, 49(3), 25-32.
32. Qilichovna, A. M. (2024). TISH KARIYESI BO'LGAN BOLALAR VA SOG'LOM BOLALARNING OVQATLANISHIDAGI FARQLAR. *Ta'limning zamonaviy transformatsiyasi*, 6(2), 213-223.
33. Ахмедова, М. К. (2024). РАЗЛИЧИЯ В ПИТАНИИ ДЕТЕЙ С КАРИЕСОМ ЗУБОВ И ЗДОРОВЫХ ДЕТЕЙ. *Ta'limning zamonaviy transformatsiyasi*, 6(2), 224-234.
34. Ergashevich, I. I., Bahronovich, B. F., & Qilichevna, A. M. (2024). ASTMATIK STATUSDAN BEMORLARNI CHIQRISHNING ZAMONAVIY TAMOYILLARI. *ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ*, 43(8), 36-44.
35. Axmedova, M., & Neymatov, D. (2025). TERAPEVTIK STOMATALOGIYADA BEMORLARNI QO'SHIMCHA TEKSHIRISH USULLARI (PARAKLINIK USUL). *Modern Science and Research*, 4(1), 268-278.
36. Axmedova, M., & Neymatov, D. (2025). TERAPEVTIK STOMATALOGIYADA BEMORLARNI ASOSIY TEKSHIRISH USULLARI. *Modern Science and Research*, 4(1), 257-267.
37. Ахмедова, М., Кузиева, М., & Курбанова, Н. (2025). ЗАБОЛЕВАНИЙ ВИСОЧНО-НИЖНЕЧЕЛЮСТНОГО СУСТАВА И ФОРМУЛИРОВАНИЕ ДИАГНОЗА. *Modern Science and Research*, 4(1), 279-289.



38. Axmedova, M. (2025). DISEASES OF THE TEMPOROMANDIBULAR JOINT AND FORMULATION OF DIAGNOSIS. *Modern Science and Research*, 4(1), 290-3.
39. Axmedova, M., Кузиева, М., & Халилова, Л. (2025). СОСТОЯНИЕ АЛЬВЕОЛЯРНОГО ОТРОСТКА И ПЕРИОСТА ПРИ ИСПОЛЬЗОВАНИИ СЪЕМНЫХ ПРОТЕЗОВ. *Modern Science and Research*, 4(1), 301-310.
40. Кузиева, М., Axmedova, M., & Халилова, Л. (2025). СОВРЕМЕННЫЕ АСПЕКТЫ ВЫБОРА МАТЕРИАЛА ДЛЯ ОРТОПЕДИЧЕСКОГО ЛЕЧЕНИЯ БОЛЬНЫХ, НУЖДАЮЩИХСЯ В ПРОТЕЗИРОВАНИИ ЗУБОВ. *Modern Science and Research*, 4(1), 322-333.
41. Кузиева, М., Axmedova, M., & Халилова, Л. (2025). ГАЛЬВАНОЗ И МЕТОДЫ ЕГО ДИАГНОСТИКИ В КЛИНИКЕ ОРТОПЕДИЧЕСКОЙ СТОМАТОЛОГИИ. *Modern Science and Research*, 4(2), 203-212.
42. Axmedova, M. (2025). CONDITION OF THE ALVEOLAR PROCESS AND PERIOSTA WHEN USED REMOVABLE DENTURES. *Modern Science and Research*, 4(2), 195-202.
43. Axmedova, M. (2024). CONDITION OF THE ALVEOLAR PROCESS AND PERIOSTE WHEN USING REMOVABLE DENTURES. *EUROPEAN JOURNAL OF MODERN MEDICINE AND PRACTICE*, 4(11), 528-538.
44. Axmedova, M. (2025). FEATURES OF THE ANATOMICAL STRUCTURE OF THE TEMPOROMANDIBULAR JOINT AND ITS BONE FORMATIONS. *Modern Science and Research*, 4(2), 175-182.
45. Axmedova, M. (2025). ОСОБЕННОСТИ АНОТОМИЧЕСКОГО СТРОЕНИЯ ВИСОЧНО-НИЖНЕЧЕЛЮСТНОГО СУСТАВА И ЕГО КОСТНЫХ ОБРАЗОВАНИЙ. *Modern Science and Research*, 4(2), 167-174
46. Axmedova, M., & Shavkatov, D. (2025). BIRINCHI PASTKI MOLARLARNING QO'SHIMCHA TIL ILDIZI. *Modern Science and Research*, 4(2), 1456-1466.
47. Axmedova, M., & Ergasheva, D. (2025). TISH KARIESINI DAVOLASH VA OLDINI OLISH. *Modern Science and Research*, 4(2), 959-967.
48. Ravshanovna, X. L. (2021, June). MINIMALLY INVASIVE METHODS OF TREATMENT OF DENTAL CARIES IN ADULTS. In " ONLINE-CONFERENCES" PLATFORM (pp. 118-119).
49. Khalilova, L. (2024). GLASS IONOMER CEMENTS USED IN DENTISTRY. *Modern Science and Research*, 3(12), 443-450.

50. Кузиева, М. А. (2023). Клиникоморфологические Критерии Органов Ротовой Полости При Применении Несъемных Ортопедических Конструкций. *Research Journal of Trauma and Disability Studies*, 2(12), 318-324.
51. Abdusalimovna, K. M. (2024). THE USE OF CERAMIC MATERIALS IN ORTHOPEDIC DENTISTRY.(Literature review). *TADQIQOTLAR*, 31(3), 75-85.
52. Abdusalimovna, K. M. (2024). CLINICAL AND MORPHOLOGICAL FEATURES OF THE USE OF METAL-FREE CERAMIC STRUCTURES. *TA'LIM VA INNOVATSION TADQIQOTLAR*, 13, 45-48.
53. Abdusalimovna, K. M. (2024). THE ADVANTAGE OF USING ALL-CERAMIC STRUCTURES. *TA'LIM VA INNOVATSION TADQIQOTLAR*, 13, 49-53.
54. Abdusalimovna, K. M. (2024). MORPHO-FUNCTIONAL FEATURES OF THE METHOD OF PREPARATION OF DEPULPATED TEETH FOR PROSTHETICS. *SCIENTIFIC JOURNAL OF APPLIED AND MEDICAL SCIENCES*, 3(4), 301-307
55. Abdusalimovna, K. M. (2024). Clinical and Morphological Features of the Use of NonRemovable Orthopedic Structures. *JOURNAL OF HEALTHCARE AND LIFE-SCIENCE RESEARCH*, 3(5), 73-78.
56. Kuzieva, M. A. (2024). CARIOUS INFLAMMATION IN ADOLESCENTS: CAUSES, FEATURES AND PREVENTION. *European Journal of Modern Medicine and Practice*, 4(11), 564-570.
57. Kuzieva, M. A. (2024). Malocclusion–Modern Views, Types and Treatment. *American Journal of Bioscience and Clinical Integrity*, 1(10), 103-109.
58. Хайитова, М., & Тайлакова, Д. (2023). ВЗГЛЯД СТОМОТОЛОГА НА ГИГЕНУ ПОЛОСТИ РТА У ДЕТЕЙ. *Инновационные исследования в современном мире: теория и практика*, 2(23), 58-59.
59. Хайитова, М. Д. (2023). РАСПРОСТРАНЕННОСТЬ И РАСПРЕДЕЛЕНИЕ ТРЕЩИН НА ЗАДНИХ ЗУБАХ СРЕДИ ВЗРОСЛЫХ ПАЦИЕНТОВ (ОБЗОР ЛИТЕРАТУРЫ). *Лучшие интеллектуальные исследования*, 12(1), 186-195.
60. Dzhuraevna, K. M. (2024). Clinical and Morphological Aspects of Cracks on The Back Teeth in Adults. *Research Journal of Trauma and Disability Studies*, 3(5), 429-432.
61. Dzhuraevna, K. M. (2023). THE FREQUENCY OF DENTAL DISEASES IN CHILDREN (LITERATURE REVIEW). *Лучшие интеллектуальные исследования*, 12(1), 159-168.
62. Dzhuraevna, K. M. (2023). FEATURES OF THE OCCURRENCE OF DENTAL DISEASES IN CHILDREN. *Лучшие интеллектуальные исследования*, 12(1), 178-185.
63. Khayitova, M. (2025). GUIDELINES FOR DENTAL EMERGENCIES DURING A PANDEMIC. *Modern Science and Research*, 4(1), 827-835.