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Effectiveness of Digitally Fabricated Versus Conventional Stabilizing Splints in Temporomandibular Disorders: A Randomized Controlled Trial Protocol

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ABSTRACT

Background

Temporomandibular disorders (TMD) represent a frequently encountered group of conditions that affect the muscles and joints of the stomatognathic system. Patients experiencing TMD present with pain, joint dysfunction, and impaired mandibular function. Stabilization splints are generally used as one of the first-line conservative treatments. Fabrication of conventional splints using heat-cured acrylic resin is technique-sensitive and is susceptible to variability and inaccuracies. In contrast, digital workflows use computer-aided design (CAD) & computer-aided manufacturing (CAM) followed by additive manufacturing may offer improved standardization, reproducibility, precision, and

accuracy. Despite these potential advantages, high-quality clinical evidence comparing digitally fabricated and conventional stabilization splints remains limited.

Participants & Methodology

This is a single-center randomized controlled trial. The trial comprises two parallel groups: a conventional stabilization splint group and a digitally fabricated stabilization splint group. The allocation ratio of participants is 1:1. A blinded assessor will perform outcome assessment. A total of 120 participants will be recruited. The Age group will be 18-40 years. Participants will be screened using Diagnostic Criteria for TMD Axis I (DC/TMD). Participants will be randomly assigned to each group. All splints will be standardized in design and occlusion. The primary outcome is the change in characteristic pain intensity (CPI), which is derived from the Graded Chronic Pain Scale (0–100). The outcomes will be assessed from baseline to three months post-intervention. Secondary outcomes include pain-related disability, maximum mouth opening, jaw functional limitation, temporomandibular joint clicking, oral health-related quality of life, and Patient's compliance. Participants' data will be analyzed according to their original group allocation. It will be independent to treatment adherence or abandonment from the intervention. Primary outcome analysis will be done using Linear mixed-effects models.

Discussion

The objective of this trial is to provide strong clinical evidence on the comparative efficacy of digitally fabricated and conventional stabilization splints in the management of TMD. The findings may contribute to evidence-based decision-making. It will also support the integration of digital technologies into routine conservative management of TMD.

Trial registration:

Prospectively Registered at ClinicalTrials.gov. Trial registry number is (NCT07566936)

INTRODUCTION

Temporomandibular disorders (TMD) comprise a group of musculoskeletal conditions that affect the temporomandibular joint, the masticatory muscles, and related structures. These disorders usually present with pain, joint sounds, restricted mandibular movement, and functional limitation.[1] Ultimately, these conditions adversely affect the patients' oral health–related quality of life (OHRQoL).[2] Among the available conservative therapies, stabilization splints are widely used to reduce muscle hyperactivity, redistribute occlusal forces, and decrease joint loading.[3] As a result, they may help reduce pain intensity and improve mandibular function.[4]

Conventional stabilization splints are typically fabricated using heat-cured polymethyl methacrylate through a multi-step laboratory process. The Conventional workflow involves impression making, cast articulation, and occlusal adjustment. However, the process is technique-sensitive, time-consuming, and subject to variability.[5] These limitations are largely related to operator skills and manual laboratory procedures.

Advances in digital dentistry have introduced computer-aided design and manufacturing (CAD/CAM) workflows for fabricating stabilization splints.[6] Additive manufacturing and milling technologies now allow the production of digitally fabricated splints with greater standardization and reproducibility.[5,6] Compared with conventional methods, digital workflows may reduce fabrication time and improve the precision of fit. More accurate occlusal contacts and improved appliance consistency may also contribute to better patient compliance and clinical outcomes.[7]
However, despite the increasing adoption of digital technologies in prosthodontics, high-quality clinical evidence directly comparing digitally fabricated and conventionally fabricated stabilization splints in patients with TMD remains limited.[8,9,10] Most existing studies are either in vitro, observational, or limited by methodological heterogeneity. Existing evidence remains limited and inconsistent because of variations in fabrication methods, study protocols, and outcome measures.[10]

According to recent systematic reviews and meta-analyses[9,10], a meaningful research gap exists regarding whether digitally fabricated stabilization splints provide improved clinical outcomes compared with conventional splints. Clarifying this is important for evidence-based clinical decision-making and for defining the practical role of digital workflows in TMD management.
The present randomized controlled trial has therefore been designed to compare digitally fabricated and conventionally fabricated stabilization splints in patients with TMD. The primary objective is to evaluate changes in pain intensity, with secondary assessment of functional outcomes and oral health-related quality of life.

Participants Eligibility Criteria

Participants will be included in the trial if they are adults aged 18–40 years with a diagnosis of temporomandibular disorder (TMD) established according to the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) (Axis I).[11] Eligible participants must present with a maximum unassisted inter-incisal mouth opening between 20 and 30 mm and a history of TMD-related symptoms. Patients should have a history of TMJ pain for at least three months before enrollment. Only those participants will be included who will stipulate written informed consent. All participants must provide written informed consent and agree to observe the protocol of the study. Excluded participants will be those who have a primary diagnosis of myofascial pain, a history of temporomandibular joint trauma or prior TMJ surgery, or evidence of degenerative joint disease such as osteoarthritis. Additional exclusion criteria include craniofacial anomalies affecting occlusion or mandibular function, ongoing orthodontic treatment, and use of occlusal splints within the preceding three months. Individuals with systemic joint disorders, those taking medications that may significantly influence pain perception or neuromuscular function, and those who are pregnant or lactating will also be excluded. Furthermore, any participant with a medical or psychological condition that, in the opinion of the investigator, may compromise adherence to study procedures will not be enrolled.

Objectives

Change in the characteristic Pain intensity (CPI) is the primary objective of this randomized controlled trial. It will be measured using the Graded Chronic Pain Scale[11,12], from baseline to three months, between participants receiving digitally fabricated stabilization splints and those receiving conventionally fabricated stabilization splints.

It is hypothesized that digitally fabricated stabilization splints will result in a greater reduction in pain intensity compared to conventional splints at 3 and 6 months post-intervention.

Secondary objectives include evaluating changes in pain-related disability, maximum mouth opening, jaw functional limitation, temporomandibular joint clicking, oral health-related quality of life, and compliance with splint use. It is further hypothesized that digitally fabricated splints will demonstrate superior or comparable improvements in these secondary outcomes relative to conventional splints.

Methodology:

Trial Design (Model Description)

This study is designed as a prospective, parallel-group randomized controlled clinical trial with a 1:1 allocation ratio. After recruitment participants will be screened by using TMD/DC Axis I diagnostic criteria[11]. Eligible participants will be randomly allocated to two groups. It will be either to the digitally fabricated splint group or the conventionally fabricated splint group via a computer-generated randomization sequence.

Blinding (Masking)

The trial will employ a single-blind design in which outcome assessors are blinded to group allocation.. Each participant will receive only one intervention and will remain in the assigned group throughout the study period. There will be no crossover or switching the allotted group.

Due to the intrinsic differences in fabrication workflows, blinding of participants and operators is not practical. However, participants will not be openly informed of the fabrication method used, and efforts will be made to standardize communication and clinical procedures across both groups to minimize performance bias. Blinding will be maintained by ensuring that the assessor is not involved in the fabrication or delivery of the splints and has no access to allocation records.

Outcome assessments will be conducted at baseline and at three months post-intervention under standardized clinical conditions. The study is specifically designed to isolate the effect of fabrication technique by maintaining consistency in splint design, occlusal scheme, and usage protocol across both groups.

Randomization and Allocation Concealment

A computer-based random number generator will be used to create the randomization sequence. To ensure standard allocation and minimize predictability, variable block sizes will be used. An independent investigator who is not executing the participant recruitment, intervention delivery, or assessment of outcomes, will generate this randomization sequence.

Allocation will be disguised using opaque, numbered and sealed envelopes. Each envelope will contain the group allocation. It will be opened only after the participants enrollment and assessment of baseline outcome measures. This approach is planned to preclude selection bias. It will also ensure that group allocation remains masked until the point of assignment.

Study setting

This randomized controlled trial will be conducted at the Department of Prosthodontics, Shifa College of Dentistry, Shifa Tameer-e-Millat University, Islamabad, Pakistan. The institution is a tertiary care academic dental center equipped with clinical facilities for the diagnosis and management of temporomandibular disorders and access to both conventional laboratory and digital dental workflows.

Participants will be recruited from patients presenting to the outpatient dental clinics of the institution. All clinical procedures, including assessment, intervention delivery, and follow-up evaluations, will be performed within the same facility under standardized conditions.

Interventions

Digital splint group

Maxillary and mandibular arches will be recorded using an intraoral scanner. Digital impressions will be used to design the splint using Blue sky software. It is a validated computer-aided design (CAD) software. Splints will be fabricated using additive manufacturing through digital light processing (DLP) Three dimensional (3D) printer , with a biocompatible photopolymer resin. Following fabrication, all splints will undergo standardized post-processing procedures. This includes cleaning and light curing according to manufacturer recommendations.

Conventional splint group

Maxillary and mandibular impressions will be obtained using elastomeric impression materials. Dental casts will be poured and mounted on an articulator with the help of a facebow. Heat-cured polymethyl methacrylate (PMMA), will be used for the fabrication of conventional splints following standardized and laboratory protocols.

Intervention standardization

To ensure standardization between groups, all splints will be fabricated with the same design features and occlusal scheme. Each appliance will be a maxillary full-coverage stabilization splint. Occlusion will be designed with uniform bilateral contacts in centric relation. During eccentric movements, canine-guided occlusion will be provided. The thickness of the splints will be maintained at approximately 2–3 mm.

Intraoral insertion and adjustments will be done by a single calibrated operator using a standardized occlusal equilibration protocol. Adjustments will be performed at delivery and, if required, during follow-up visits to maintain uniform occlusal contacts.

Wear protocol and compliance

Participants will be instructed to wear the splint during sleep for a minimum of 8 hours per night throughout the study period.

Outcomes

Primary outcome

The primary outcome is the change in characteristic pain intensity (CPI), derived from the Graded Chronic Pain Scale.[12] CPI is calculated as the mean of current, worst, and average pain intensity scores, each measured on a 0–10 numerical rating scale and multiplied by 10 to yield a score ranging from 0 to 100. Higher scores indicate greater pain intensity.

Outcome measure: Mean change in CPI score from delivery of stabilization splint to 3 months post-intervention as the primary endpoint.
Time Frame: From Baseline and three months postintervention.

Secondary outcomes

Pain-related disability

Pain-related disability will be assessed using the disability component of the GCPS. This includes three items measuring interference with daily activities, social activities, and work. Each item is scored on a 0–10 scale and averaged, then multiplied by 10 to yield a score from 0 to 100, with higher scores indicating greater disability[12].

Outcome measure: Mean change in disability score from delivery of stabilization splint to 3 months post-intervention as the primary end point.

Time Frame: From Baseline and three months postintervention.

Maximum mouth opening (MMO)

Maximum mouth opening will be calculated as the maximum unaided inter-incisal distance in millimeters using a calibrated digital Vernier caliper. Measurements will be recorded to the nearest 0.1 mm under standardized clinical conditions.

Outcome measure: Mean change in MMO.

Time Frame: From Baseline and three months postintervention.

Jaw functional limitation

Jaw function will be measured using the Jaw Functional Limitation Scale (JFLS-20).[13] The scale consists of 20 items evaluating mastication, vertical jaw mobility, and communication-related functions. Every item is scored on a 0–10 scale.[13] The total score is calculated as the mean of all items. Higher scores indicate greater limitation in jaw function.

Outcome measure: Mean change in JFLS-20 score

Time Frame: From Baseline and three months postintervention.

Temporomandibular joint clicking

TMJ clicking will be assessed clinically during opening and closing of mandible. The presence of clicking will be determined based on audible or palpable joint sounds during at least one of three consecutive opening–closing cycles and recorded as a dichotomous variable (present/absent).

Outcome measure: Proportion of participants with resolution of clicking.

Time Frame: From Baseline and three months postintervention.

Oral health-related quality of life (OHRQoL)

Oral health-related quality of life will be assessed using the Oral Health Impact Profile (OHIP-14).[14] The instrument consists of 14 items scored on a 5-point Likert scale (0 = never to 4 = very often). Total scores range from 0 to 56. Higher the scores, poorer will be (OHRQoL).

Outcome measure: Mean change in OHIP-14 score.
Time Frame: From Baseline and three months postintervention**.**

Compliance with splint use

Compliance will be assessed based on self-reported daily wear time (hours per night). Participants will maintain a compliance diary throughout the study period, which will be reviewed at follow-up visits.

Outcome measure: Average nightly wear time over the three months.
Time frame: Continuous recording, summarized at three months.

Outcome assessment and standardization

All outcome assessments will be performed by a trained and calibrated examiner who is blinded to group allocation. Standardized measurement protocols will be followed to minimize inter- and intra-examiner variability. Calibration will be conducted before study initiation.

Sample Size:

The sample size for this randomized clinical trial was calculated using **G*Power software 3.1.9.7**. The parameters and clinical estimates were guided by the findings of:

Berntsen et al (2018)[4]. Clinical comparison of conventional and additive manufactured stabilization splints. *Acta Biomaterialia Odontologica Scandinavica, 4*(1), 81–89. https://doi.org/10.1080/23337931.2018.1514614

Sample Size Calculation Parameters

Parameter	Value
Confidence level (α)	0.05 (two-tailed)
Statistical power (1–β)	0.80 (80%)
Effect size (Cohen's d)	0.70 (moderate-to-large effect)
Test type	Independent samples t-test
Groups	2 (3D Printed vs Conventional)
Required total sample	60 participants (30 per group)

Effect Size Rationale

From Berntsen et al., the reported:

- **Mean difference** between groups ≈ 5.6 units (e.g., material or occlusal accuracy)
- **Pooled SD** ≈ 8.0
  → Yielding a **Cohen's d**:
- **5.6/8.0=7.0**

This effect size is acceptable for detecting clinical significance in splint performance and adaptation.

Adjustment for Attrition (30%)

To account for **dropouts, protocol violations, or non-compliance**, an **additional 30%** of participants were added to the calculated sample size:

Adjusted Sample Size = 60/1-0.30,= 85.7= 90 Participants

Final Target Sample Size

Group	Sample Size
3D Printed Splints	45
Conventional Splints	45
Total	**90**

This adjusted sample ensures the study maintains sufficient power despite possible **loss to follow-up or non-compliance**.

Statistical analysis

IBM SPSS Statistics (version 26.0; IBM Corp., Armonk, NY, USA) will be used to perform all statistical analysis. A two-sided p-value < 0.05 will be considered statistically significant.

Baseline characteristics will be calculated using descriptive statistics. Mean ± standard deviation or median and interquartile range, will be presenting the continuous variables. The Shapiro–Wilk test will be used to assess the normality of the data. Categorical variables will be shown as frequencies and percentages. Interim analyses will not be executed due to the short duration of follow-up, modest sample size, and low-risk nature of the interventions.

Primary analysis

Linear Mixed effects model will be used for the analysis of the primary outcome which is change in characteristic pain intensity. Fixed effects in the model will be treatment group, time and group-by-time interaction. The eligible participants will be included as random effects to explain within-subject correlation. We are using this model to allow us the inclusion of all available data and missing observations under the assumption of missing at random.

Secondary analyses

Similar linear mixed-effects models will be used to analyze the secondary continuous outcomes, including pain-related disability (GCPS disability score), maximum mouth opening (mm), jaw functional limitation (JFLS-20 score), and oral health-related quality of life (OHIP-14 score), will be analyzed.

The categorical outcome (resolution of temporomandibular joint clicking) will be analyzed using chi-square or Fisher's exact test for between-group comparisons at 3 months. Intragroup changes over time will be assessed using McNemar's test.

Compliance with splint use will be summarized using descriptive statistics (mean hours per night). Exploratory analyses will assess the effect of compliance as a covariate in the mixed-effects model.

Additional analyses

Where appropriate, secondary analyses using independent-samples t-tests (or non-parametric counterparts) will be performed on change scores to compare with previous literature.

Analysis of population and missing data

All analyses will respect the intention-to-treat principle. Missing data will be handled using mixed-model estimation methods. Sensitivity analyses will be done where appropriate to assess the strength of the findings.

Trial Status

The current protocol version is Version 1.0. The anticipated recruitment period is till July 2026, with an expected sample size of 120 participants. Data collection is expected to be completed within Oct 2026, followed by data analysis and dissemination of results.

Trial Registration

This clinical trial has been registered with ClinicalTrials.gov, prospectively. The registration number is NCT07566936, and the date of registration is 26.04.26. The trial will be directed in accordance with the principles of the Declaration of Helsinki and pertinent national and institutional ethical guidelines.

Data Quality Assurance: Data entry will be monitored for accuracy and completeness. Periodic checks will be performed to identify inconsistencies, missing values, or outliers. Any discrepancies will be resolved by cross-verification with source documents.

Data Retention: All study data will be kept securely for a minimum of **3–5 years after study completion**, in agreement with institutional and regulatory guidelines.

Ethical Considerations: Ethical approval for this study has been obtained from the Institutional Review Board (IRB) of Shifa Tameer-e-Millat University (Approval No: 243-25). The study will be directed in accordance with the principles of the Declaration of Helsinki and pertinent institutional and national guidelines.

Informed Consent: All participants are required to provide written informed consent before enrollment. Detailed information regarding the study objectives, procedures, potential risks, and benefits will be provided to the participants. They will be informed of their right to withdraw from the study at any time without any effects on their treatment.

Confidentiality and Data Protection: All participant data will be masked with using an exclusive study identification numbers. Individual identifiers will be stored independently from study data to ensure confidentiality. Electronic data will be saved in encoded, password-protected systems. Access will only be provided to authorized research personnel. Data handling procedures will comply with institutional data protection policies.

Risk–Benefit Assessment: The study involves minimal risk, as both interventions represent standard or widely accepted treatment modalities. Any adverse events will be documented and managed according to institutional clinical protocols. Data entry will be monitored for accuracy and completeness. Periodic checks will be performed to identify inconsistencies, missing values, or outliers. Any discrepancies will be resolved by cross-verification with source documents.

All study data will be saved securely for a minimum of **3–5 years after study completion**. It will be in accordance with institutional and regulatory guidelines.

Protocol Amendments: Any alterations in the study protocol, including changes to objectives, eligibility criteria, outcomes, or statistical methods, will be updated with a revised version number and date. All revisions will be submitted for approval to the Institutional Review Board prior to execution. Updates will also be replicated in the trial registry. It will also be reported transparently in succeeding publications.

Discussion

This trial has been designed to compare digitally fabricated and conventionally fabricated stabilization splints in the management of temporomandibular disorders within a standardized clinical setting. Though both approaches are used in practice, direct comparisons are still limited. Moreover, available evidence is often inconsistent in design and outcomes[16,17,18]. Addressing this gap is important, particularly as digital workflows are increasingly adopted in routine prosthodontic care.

On the basis of in vitro studies and various case reports[10,20] it can be concluded that Digital fabrication offers many advantages. That includes, improved reproducibility,

standardization of design, and potentially greater efficiency. Whether these advantages translate into meaningful clinical benefit, however, is still uncertain. This study focuses on outcomes that are directly relevant to patient care—pain intensity, functional limitation, and quality of life rather than purely technical measures.

Several features of the study design aim to strengthen internal validity. These are random allocation and assessor blinding to reduce the risk of bias. While standardization of splint design and occlusion helps isolate the effect of fabrication technique. The use of validated outcome measures further supports the reliability of the findings. In addition, the planned use of mixed-effects modeling allows for a more appropriate statistical analysis of repeated measures data over time.

At the same time, our randomized controlled trial has patent limitations too. One of the limitations is its single-centre project. It will limit the generalizability of the results. Nevertheless, in future, the next phase can be a multicenter study. The follow-up period is relatively short and does not capture long-term outcomes. Compliance is assessed through self-report, which introduces the possibility of reporting bias despite efforts to reinforce adherence during follow-up.

Overall, this trial is expected to contribute clinically relevant evidence on the role of digital versus conventional fabrication methods in TMD management. The findings may help refine whether the adoption of digital workflows offers measurable benefit beyond procedural convenience.

Declarations:

1. Funding Statement:
This research was supported by the Shifa Tameer-e-Millat University Research Grant (Grant No. 053-2025). The funding body had no role in the study design, data collection, data analysis, interpretation of data, manuscript preparation, or the decision to submit the manuscript for publication.

2. Data Availability Statement:
The datasets generated and/or analyzed during the current study will be available from the corresponding author upon reasonable request.

3. **Author Contributions:**
Dr Aysha Sadaf conceived, designed and registered the Protocol on clinic.gov and drafted the manuscript.

4. **Ethics Approval:**
Ethical approval for this study was obtained from the Institutional Review Board of Shifa Tameer-e-Millat University, Islamabad (Approval No 243-25). All procedures are being

conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants prior to enrollment.

References

1. AlSahman L, AlBagieh H, AlSahman R. Oral Health-Related Quality of Life in Temporomandibular Disorder Patients and Healthy Subjects-A Systematic Review and Meta-Analysis. Diagnostics (Basel). 2024;14(19):2183.10.3390/diagnostics14192183.
2. Zhang Y, Zhang H, Liu R, Jin S, Huo T, Wei H, Qin L. The efficacy of treatments for temporomandibular disorders with occlusal splints versus other conservative therapies: a meta-analysis of randomized controlled trials. Oral Surg Oral Med Oral Pathol Oral Radiol. 2025;139(5):509-520. 10.1016/j.oooo.2024.11.089
3. Gupta AK, Singh RK, Narula V. Centric stabilization occlusal splints versus other conservative therapies in the management of temporomandibular disorders: a systematic review and meta-analysis. Saudi Dent J. 2025;37(7-9):52.
4. Berntsen C, Kleven M, Heian M, Hjortsjö C. Clinical comparison of conventional and additive manufactured stabilization splints. Acta Biomater Odontol Scand. 2018;4(1):81-89.
5. Somogyi A, Végh D, Róth I, Hegedüs T, Schmidt P, Hermann P, Géczi Z. Therapy for temporomandibular disorders: 3D-printed splints from planning to evaluation. Dent J (Basel). 2023;11(5):126
6. Mureșanu SA, Hedeșiu M, Dinu C, Roman R, Almașan O. Digital occlusal splints for temporomandibular joint disorders: a systematic review. Rom J Stomatol. 2022;68(3):145-152.
7. Almansour FW, Alshammari K, Mohammed Alhajri D, et al. Digital versus conventional splints in patients with temporomandibular disorders: a systematic review and meta-analysis of randomized controlled trials. Cureus. 2026;18(3):e105977.
8. Mureșanu SA, Hedeșiu M, Dinu C, Roman R, Almașan O. Digital occlusal splints for temporomandibular joint disorders: a systematic review. Rom J Stomatol. 2022;68(3):145-152.
9. Hietaharju M, Näpänkangas R, Sipilä K, Teerijoki-Oksa T, Tanner J, Kemppainen P, et al. Importance of the Graded Chronic Pain Scale as a biopsychosocial screening instrument in TMD pain patient subtyping. J Oral Facial Pain Headache. 2021;35(4):303-316.

10. Schiffman E, Ohrbach R, Truelove E, Look J, Anderson G, Goulet JP, et al. Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) for clinical and research applications: recommendations of the International RDC/TMD Consortium Network and Orofacial Pain Special Interest Group. J Oral Facial Pain Headache. 2014;28(1):6-27.
11. Ohrbach R, Larsson P, List T. The jaw functional limitation scale: development, reliability, and validity of 8-item and 20-item versions. J Orofac Pain. 2008;22(3):219-230.
12. Kokkola, O · Suominen, AL · Qvintus, V ...Efficacy of stabilization splint treatment on the oral health-related quality of life-a randomized controlled one-year follow-up trial. *J Oral Rehabil.* 2018; 45:355-362.
13. Kelemen K, König J, Czumbel M, Szabó B, Hegyi P, Gerber G, et al. Additional splint therapy has no superiority in myogenic temporomandibular disorders: a systematic review and meta-analysis of randomized controlled trials. J Prosthodont Res. 2024;68(1):12-19.
14. Alajbeg IZ, Vrbanović E, Lapić I, Alajbeg I, Vuletić L. Effect of occlusal splint on oxidative stress markers and psychological aspects of chronic temporomandibular pain: a randomized controlled trial. Sci Rep. 2020;10(1):10981.
15. Dinsdale A, Atkins C, Golds L, Gough A, Jessen K, Forbes R. The effectiveness of conservative interventions on temporomandibular disorder-related kinesiophobia and pain catastrophizing: a systematic review. Musculoskelet Sci Pract. 2025;77:103328.
16. Orzeszek S, Waliszewska-Prosol M, Ettlin D, Seweryn P, Straburzynski M, Martelletti P, et al. Efficiency of occlusal splint therapy on orofacial muscle pain reduction: a systematic review. BMC Oral Health. 2023;23(1):180.
17. Gu J, Zhang Y, Ding W, Liu S. A retrospective evaluation of the clinical efficacy of occlusal splint therapy combined with manual therapy in patients with anterior disc displacement without reduction. J Oral Facial Pain Headache. 2025;39(3):133-144.
18. Mureșanu SA, Hedeșiu M, Dinu C, Roman R, Almașan O. Digital occlusal splints for temporomandibular joint disorders: a systematic review. Rom J Stomatol. 2022;68(3):145-152.
19. Albagieh H, Alomran I, Binakresh A, Alhatarisha N, Almeteb M, Khalaf Y, et al. Occlusal splints: types and effectiveness in temporomandibular disorder management. Saudi Dent J. 2023;35(1):70-79.