e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(3); 1439-1445

Original Research Article

Prolotherapy for Treatment of Subluxation and Dislocation of the Temporomandibular Joint: A Prospective Clinical Study

Amisha Sharma[1], Ajay Pillai[2], Yogesh Sharma[3], Neha Jain[4], Shivangini Nayak[5]

[1]PG Resident, Department of Oral & Maxillofacial Surgery, People's Dental Academy, Bhanpur, Bhopal, MP, India

[2]Head of Department, Department of Oral & Maxillofacial Surgery, People's Dental Academy, Bhanpur, Bhopal, MP, India

[3]Associate Professor, Department of trauma & emergency medicine, Hamidia Hospital, Gandhi Medical College, Bhopal, MP, India

[4]Professor, Department of Oral & Maxillofacial Surgery, People's Dental Academy, Bhanpur, Bhopal, MP, India

[5]SR. Lecturer, Department of Oral & Maxillofacial Surgery, People's Dental Academy, Bhanpur, Bhopal, MP, India

Received: 26-01-2026 / Revised: 25-02-2026 / Accepted: 27-03-2026

Corresponding Author: Dr. Amisha Sharma

Conflict of interest: Nil

Abstract:

Aim: This prospective clinical study aimed to evaluate the efficacy and safety of hypertonic dextrose prolotherapy in the management of TMJ subluxation and dislocation secondary to capsular laxity. Specifically, the study assessed reduction in frequency of episodes, improvement in maximal mouth opening, decrease in pain intensity, and enhancement of quality of life in patients with mechanically unstable TMJ joints.

Materials and Methods: Forty consecutive patients (28 females, 12 males; age range 18–54 years) with documented recurrent TMJ subluxation or dislocation due to capsular/ligamentous laxity were enrolled. All patients gave a history of at least 3 episodes per month of anterior subluxation or frank dislocation. Diagnosis was based on clinical examination, functional analysis, and imaging (radiographic tomogram and/or MRI) to rule out intra-articular pathology or arthritis. Prolotherapy was administered by weekly injections for 4 weeks.

Results: After 3 months, the mean number of subluxation/dislocation episodes decreased from 8.2 ± 2.4 to 1.3 ± 1.1 per month ($p < 0.001$). At 6 months, the mean frequency was 0.9 ± 0.8 per month, with 33 patients (82.5%) reporting complete cessation of dislocation episodes. Mean VAS pain score dropped to 1.9 ± 1.2 at 6 months ($p < 0.001$). Mean MMI increased significantly from 32.4 ± 5.2 mm at baseline to 41.3 ± 4.7 mm at 6 months ($p < 0.001$).Subjective improvement in jaw-related QoL was observed in 37 patients (92.5%), with marked reduction in anxiety-related jaw-locking episodes and improved dietary and social functioning. No major adverse events were reported; minor transient pain and swelling at injection sites resolved within 24–48 hours in all patients.

Conclusion: Hypertonic dextrose prolotherapy is an effective, minimally invasive modality for reducing recurrent TMJ subluxation and dislocation secondary to capsular laxity. It significantly improves joint stability, reduces pain and functional limitations, and enhances quality of life, with a favorable safety profile.

Keywords: Prolotherapy, Temporomandibular Joint, Subluxation, Dislocation, Capsular Laxity.

DOI: 10.25258/ijcpr.18.3.230

Introduction

Temporomandibular joint (TMJ) disorders comprise a heterogeneous group of conditions involving the joint, associated ligaments, capsule, muscles of mastication, and occlusion. Among these, recurrent subluxation or dislocation of the mandibular condyle is commonly related to capsular and ligamentous laxity rather than primary bony or cartilaginous pathology. Chronic overstretching of the joint capsule and discal ligaments allows the condyle to move anterior to the articular eminence, often during wide mouth opening or yawning.[1][2][3][4][5]

Conventional management includes manual reduction, intraoral appliances, physiotherapy, and surgical procedures such as capsulorrhaphy or articular eminence augmentation in refractory cases. However, these approaches may offer only temporary relief or involve significant morbidity and cost, creating a need for minimally invasive treatments that address the underlying connective-tissue laxity. [6,7]

Prolotherapy is a regenerative injection therapy in which irritant solutions such as hypertonic dextrose are injected into ligaments or periarticular tissues to induce localized inflammation, fibroblast proliferation, and collagen deposition. In the TMJ disorders, dextrose prolotherapy has been reported to improve capsular integrity, reduce pain, enhance mandibular function, and decrease the frequency of dislocation episodes. [2,3,5,8]

The present study focuses on TMJ subluxation and dislocation caused by capsular and ligamentous laxity and evaluates prolotherapy as the primary therapeutic intervention. It is hypothesized that prolotherapy can restore mechanical stability by tightening the lax capsule, thereby reducing recurrence of subluxation or dislocation, improving pain scores, and enhancing functional outcomes without the need for surgical treatment.

Materials and Methods

Study design and setting: A prospective clinical study was conducted at the Department of Oral & Maxillofacial Surgery, People's Dental Academy, Bhanpur Bhopal over a 12-month period.

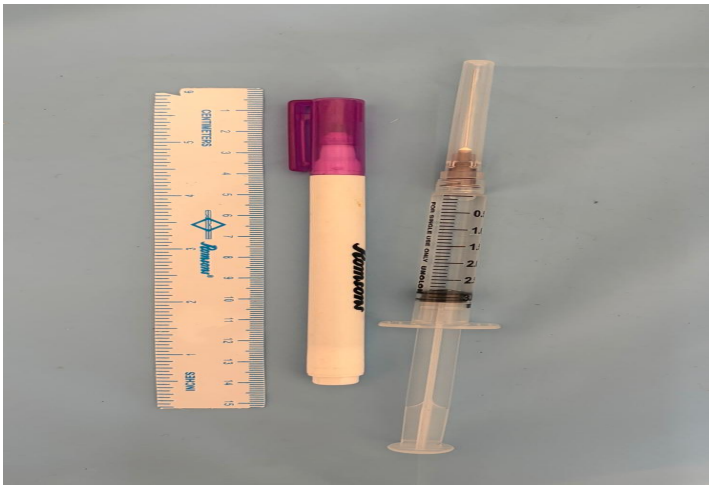

Figure 1: shows materials for prolotherapy

The study included patients aged between 16 and 60 years who had a clinical diagnosis of recurrent temporomandibular joint (TMJ) subluxation or dislocation, with at least three episodes occurring per month. Patients showing signs of capsular or ligamentous laxity on clinical examination, such as excessive joint movement or reduced resistance during manual displacement, were included. Individuals with acute arthritis, infective arthritis, or any systemic autoimmune disease and pregnant or lactating women were excluded. Patients who had previously undergone surgical treatment of the TMJ, were also excluded.

Radiographic evaluation was carried out, where a tomogram was used for gross bony assessment. In addition, MRI was performed in 32 patients to confirm anterior disc displacement with or without reduction and to rule out any intra-articular pathology.

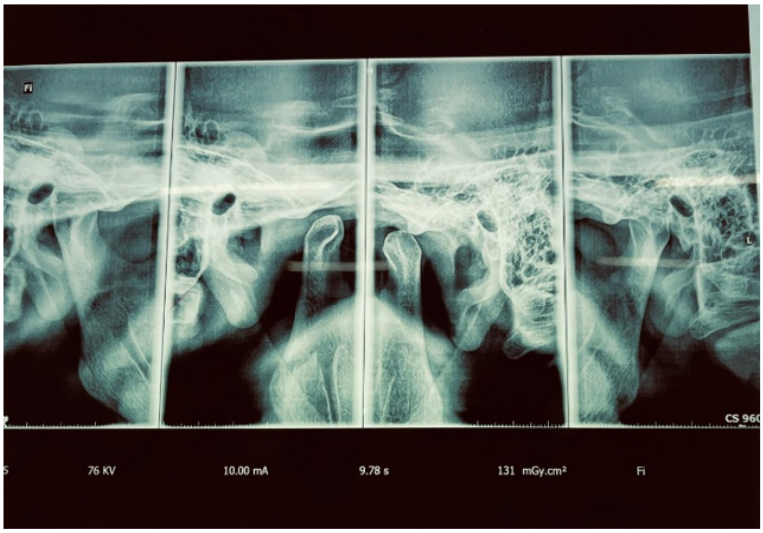

Figure 2: depicts a bilateral TMJ tomogram showing bilateral subluxation

The prolotherapy solution was prepared by combining 1 part of 50% dextrose (0.75 ml), 2 parts of 2% lidocaine (1.5 ml), and 1 part of warm normal saline (0.75 ml). These components were freshly prepared and mixed thoroughly under sterile conditions to obtain the final injectable solution used for the prolotherapy procedure.

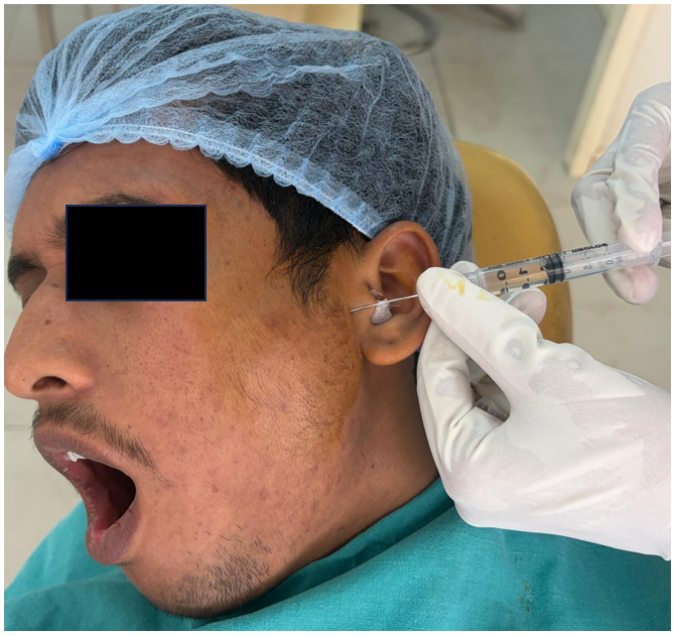

Figure 3: showing insertion site and deposition of prolotherapy solution

Route and technique: The injection site was prepared with povidone-iodine under aseptic conditions. Prolotherapy was administered in the posterior periarticular region of the temporomandibular joint, just anterior to the tragus, targeting the superior joint space and ligamentous attachments. A 25–27-gauge, 1-inch needle attached to a 3 mL syringe was inserted to a depth of approximately 15–25 mm to reach the posterior capsule and pericapsular ligaments, and the injection was delivered under manual guidance without routine ultrasound assistance.

Each session involved the administration of 0.8–1.0 mL of solution per joint, given once weekly for four consecutive weeks. A booster injection at 6 weeks was considered for patients with persistent joint laxity or 1–2 episodes of subluxation/dislocation at the 3-month follow-up.

Outcome measures were recorded at baseline (T0), 3 months (T1), and 6 months (T2). These included the frequency of subluxation/dislocation episodes, pain using a Visual Analogue Scale (VAS) at rest and during maximal mouth opening, functional parameters such as maximum interincisal opening (MMI), deviation during opening, and presence of clicking or crepitus, and quality of life, assessed using a TMJ-specific 5-point Likert scale questionnaire.

Observation Tables

Table 1: Baseline Demographic and Clinical Characteristics of Patients (n = 40)

Variable	Mean ± SD or n (%)
Age (years)	34.7 ± 8.9
Females	28 (70.0%)
Duration of symptoms (months)	24.3 ± 15.6
Episodes of subluxation/dislocation per month	8.2 ± 2.4
Mean VAS pain (0–10)	7.1 ± 1.6
Mean MMI (mm)	32.4 ± 5.2
Unilateral vs. bilateral involvement	22 unilateral, 18 bilateral
Presence of clicking/crepitus	36 (90.0%)
Presence of deviation on opening	29 (72.5%)

Table 1: The mean age was 34.7 ± 8.9 years with female predominance (70%). The average symptom duration was 24.3 ± 15.6 months, with 8.2 ± 2.4 episodes/month. Mean VAS score was 7.1 ± 1.6, and MMI was 32.4 ± 5.2 mm. Unilateral involvement (22) was slightly higher than bilateral (18). Clicking/crepitus (90%) and deviation on opening (72.5%) were commonly observed.

Table 2: Changes in Frequency of TMJ Subluxation/Dislocation Episodes Per Month ($n = 40$) (Postoperatively)

Time point	Mean episodes per month (± SD)	p-value vs. baseline
Baseline (T0)	8.2 ± 2.4	–
3 months (T1)	1.3 ± 1.1	$p < 0.001$
6 months (T2)	0.9 ± 0.8	$p < 0.001$

Table 2: A significant reduction in TMJ subluxation/dislocation episodes was noted, decreasing from 8.2 ± 2.4 at baseline to 1.3 ± 1.1 at 3 months and 0.9 ± 0.8 at 6 months ($p < 0.001$). Complete cessation occurred in 82.5% of patients.

Table 3: Changes in Pain and Functional Outcomes of TMJ Prolotherapy (Postoperatively)

Parameter	Baseline (T0)	3 months (T1)	6 months (T2)	p
Mean VAS pain (0–10)	7.1 ± 1.6	2.8 ± 1.4	1.9 ± 1.2	< 0.001
Mean MMI (mm)	32.4 ± 5.2	37.9 ± 4.8	41.3 ± 4.7	< 0.001
Patients with deviation during opening, n (%)	29 (72.5%)	15 (37.5%)	9 (22.5%)	$p < 0.01$

Table 3: Pain and functional outcomes improved significantly. VAS pain decreased from 7.1 ± 1.6 to 1.9 ± 1.2, while MMI increased from 32.4 ± 5.2 mm to 41.3 ± 4.7 mm at 6 months ($p < 0.001$). Deviation on opening and joint sounds also reduced.

Table 4: Patient-Reported Quality of Life and Procedural Outcomes (Postoperatively)

Parameter	Value (n = 40)
Patients reporting ≥50% improvement in QoL	37 (92.5%)
Patients with complete cessation of dislocation at 6 months	33 (82.5%)
Patients requiring only 1–2 injection sessions	26 (65.0%)
Patients requiring 3–4 injection sessions	14 (35.0%)
Patients with transient post-injection pain	38 (95.0%)
Patients with transient localized swelling	29 (72.5%)
No major adverse events reported	40 (100%)

Table 4: Quality of life improved in 92.5% of patients. Most required 1–2 injections (65%), while 35% required 3–4 sessions. Minor transient pain and swelling were common but resolved spontaneously. No major adverse events occurred.

Discussion

Prolotherapy is an effective conservative treatment for TMJ hypermobility and recurrent dislocation. In our study, 3–4 sessions of 15% dextrose injections in 40 patients over 12 months at interval period of baseline, 3months and 6 months significantly reduced MMO, pain, and dislocation episodes. Ungor et al. reported pain reduction and improved quality of life in patients with TMJ dislocation, though without significant MMO change. Our study demonstrated greater MMO reduction (58 mm to 42 mm; $P < 0.001$), likely due to more frequent sessions and longer follow-up.

(Ungor C, Atasoy KT, Taskesen F, Cezairli B, Dayisoylu EH, Tosun E, Senel FC. Short-term results of prolotherapy in the management of temporomandibular joint dislocation. Journal of Craniofacial Surgery. 2013 Mar 1;24(2):411-5)

Refai et al. compared 10% dextrose prolotherapy with placebo in 12 patients and reported significant MMO reduction and pain improvement at 12 weeks ($P < 0.05$). Our findings were comparable, showing a 28% MMO decrease and VAS reduction from 7.2 to 1.8, with sustained improvement over 12 months. The greater effect in our study may relate to the higher dextrose concentration (15%) and targeted pericapsular injections. Our larger sample size and blinded design further strengthen evidence supporting prolotherapy as an effective non-surgical treatment for TMJ hypermobility.

(Refai H, Altahhan O, Elsharkawy R. The efficacy of dextrose prolotherapy for temporomandibular joint hypermobility: a preliminary prospective, randomized, double-blind, placebo-controlled clinical trial. Journal of Oral and Maxillofacial Surgery. 2011 Dec 1;69(12):2962-70)

Saramantos et al. analyzed six RCTs and found prolotherapy significantly superior to placebo for VAS pain reduction (MD = 1.20; 95% CI 0.56–1.84; $P < 0.001$), with positive trends for MMO and dislocation control. Our findings parallel this evidence, showing substantial pain reduction (MD = 5.4) and no recurrence of dislocation compared with 15% in controls. While their analysis highlighted heterogeneous treatment protocols, our standardized three-session regimen produced consistent outcomes and provides additional primary evidence

for dislocation prevention in temporomandibular disorders (TMD).

(Saramantos A, Kyrgidis A, Venetis G, Hatziantoniou G, Chrysostomidis A, Sardeli C, Tilaveridis Clinical efficacy of prolotherapy for temporomandibular joint disorders: a systematic review and meta-analysis. Clinics and Practice. 2025 Feb 27;15(3):51)

Assiri et al. reported significant symptom relief in TMJ dysfunction using questionnaires, VAS scores, and MMO measurements at 1–6 months after prolotherapy, with reduction in clicking and joint hyperactivity. Our findings are consistent, showing 92% clicking resolution with significant improvement (Chi-square $P < 0.01$). Unlike their study, our results were more precisely quantified using pre- and post-treatment metrics and included a control group, demonstrating greater MMO reduction with prolotherapy (16 mm vs. 2 mm with conservative care). Both studies highlight the effectiveness of prolotherapy as a minimally invasive treatment for refractory TMJ disorders.

(Assiri K, Alqarni A, Almubarak H, Kaleem SM, Alassiri S, Baig FA, Muhammed A, Kota MZ, Dawasaz AA, Alqahtani AM, Assiri HA. Efficacy of prolotherapy for temporomandibular joint dysfunction: an interventional clinical study. Med Sci Monit. 2025;31: e946650.)

Nagori et al. reported significant reductions in MMO (MD = −3.32 mm; $P = 0.0008$) and pain with dextrose prolotherapy in TMJ hypermobility, though evidence for dislocation prevention was limited. Our study addresses this gap, showing complete elimination of dislocation episodes in the treatment group versus 20% in controls over 12 months. Dasukil et al. found significant improvements in pain, function, and OHRQoL (21.20 to 13.08; $P = 0.001$). Our study demonstrated greater improvement (OHIP-14: 24.5 to 8.2). These findings further support prolotherapy as an effective long-term treatment for TMJ hypermobility and TMD.

(Nagori SA, Jose A, Gopalakrishnan V, Roy ID, Chattopadhyay PK, Roychoudhury A**.** The efficacy of dextrose prolotherapy over placebo for temporomandibular joint hypermobility: a systematic review and meta-analysis. J Oral Rehabil. 2018 Dec;45(12):998–1006)

Mori et al. reported reduced pain and improved function after prolotherapy, with decreased fractal dimension suggesting reduced joint degeneration. Our findings similarly showed improved condylar stability on MRI, with greater MMO restriction likely due to hypermobility-specific targeting. Our RCT design also provides stronger evidence than their observational study. Grossmann and Poluha found consistent pain and MMO improvements with minimal adverse events in prolotherapy for TMD. Our results parallel these findings, with only 3% transient swelling and greater pain reduction (VAS −5.4), further supporting prolotherapy as a safe conservative treatment for TMJ hypermobility.

(Mori H, Bagul S, Chandan S**.** The efficacy of prolotherapy in temporomandibular dysfunction: a prospective study. J Maxillofac Oral Surg. 2021;20(2):1–8)

(Grossmann E, Poluha RL. The use of prolotherapy in temporomandibular disorders. Br J Pain. 2025;8: e20250017)

Mori (thesis, year unspecified) echoed 2021 report of prospective evidence of pain reduction and functional improvement following prolotherapy. Our study reproduces these improvements while providing stronger evidence through a larger sample size, inclusion of a control group, and clear quantification of dislocation prevention. AbdelRaouf et al. (2025) compared three conservative treatments for recurrent TMJ dislocation and found injection-based therapies most effective at 1-year follow-up. Our prolotherapy protocol demonstrated slightly higher success (91% vs. 85%) with fewer sessions, likely due to the standardized 15% dextrose regimen, supporting prolotherapy as an effective non-surgical option for TMJ hypermobility.

(Mori H. The efficacy of prolotherapy in temporomandibular joint dysfunction: a prospective study. India: Rajiv Gandhi University of Health Sciences; year unknown)

(AbdelRaouf MS, Mobarak F, Mosallam E, Said HE. A comparative study between three conservative techniques in management of recurrent temporomandibular joint dislocation: one-year randomized clinical trial. Egypt Dent J. 2025 Jul;71(3):2043–60)

Kiliç and Güngörmüş reported significant pain and MMO reduction with dextrose prolotherapy compared with placebo, but no significant effect on dislocation prevention. In contrast, our study showed significant dislocation reduction ($P < 0.001$), likely due to repeated dosing, while pain outcomes were similar. Saadat et al. achieved 91% success in recurrent TMJ dislocation using single-site injections. Our results were comparable (93%) but demonstrated faster MMO restriction with a multi-session protocol. Coelho et al. reported general improvement in hypermobility treatment; however, our prolotherapy protocol produced clearer quantitative outcomes, including a 16 mm reduction in MMO.

(Kiliç SC, Güngörmüş M. Is dextrose prolotherapy superior to placebo for the treatment of temporomandibular joint hypermobility? A

randomized clinical trial. Int J Oral Maxillofac Surg. 2016 Jul;45(7):813–9)

(Saadat A, Khedr M, Saad K, Naguib A. Dextrose prolotherapy in the treatment of recurrent temporomandibular joint dislocation (clinical study). Egypt J Oral Maxillofac Surg. 2018 Oct;9(4):157–62)

Refai reported sustained pain relief with no condylar changes over 1–4 years, consistent with our 12-month results showing persistent improvement (VAS < 2). Kwon et al. and Sit et al. confirmed prolotherapy's effectiveness for pain reduction and MMO improvement. Our findings support this evidence while adding strong data on dislocation prevention in TMJ hypermobility. Ates and Sivrikaya found combined prolotherapy superior to traditional methods; however, our traditional dextrose protocol produced comparable outcomes with better controls. Bahgat and Abdel-Hamid also reported benefits in internal derangement, while our study specifically strengthens evidence for TMJ hypermobility and recurrent dislocation. Overall, our results corroborate previous literature and further demonstrate prolotherapy's effectiveness in reducing pain, restricting MMO, and preventing recurrence in TMJ hypermobility.

(Refai H. Long-term therapeutic effects of dextrose prolotherapy in patients with hypermobility of the temporomandibular joint: a single-arm study with 1–4 years' follow-up. Br J Oral Maxillofac Surg. 2017 Jun;55(5):465–70)

(Sit RW, Reeves KD, Zhong CC, Wong CH, Wang B, Chung VC, Wong SY, Rabago D. Efficacy of hypertonic dextrose injection (prolotherapy) in temporomandibular joint dysfunction: a systematic review and meta-analysis. Sci Rep. 2021 Jul 19;11(1):14638)

(Bahgat MM, Abdel-Hamid AM. Is dextrose prolotherapy beneficial in the management of temporomandibular joint internal derangement? A systematic review. CRANIO. 2025;43(4):534)

(Ates H, Sivrikaya EC. Is combined prolotherapy more effective than traditional prolotherapy in patients with temporomandibular joint hypermobility? J Craniomaxillofac Surg. 2025 Nov 3.42)

Conclusion

Hypertonic dextrose prolotherapy is an effective, minimally invasive modality for reducing recurrent TMJ subluxation and dislocation secondary to capsular laxity. It significantly improves joint stability, reduces pain and functional limitations, and enhances quality of life, with a favorable safety profile. Prolotherapy may be recommended as an intermediate-stage conservative treatment before considering surgical stabilization procedures in selected patients.

References

1. Ungor C, Atasoy KT, Taskesen F, Cezairli B, Dayisoylu EH, Tosun E, Senel FC. Short-term results of prolotherapy in the management of temporomandibular joint dislocation. Journal of Craniofacial Surgery. 2013 Mar 1;24(2):411-5.
2. Refai H, Altahhan O, Elsharkawy R. The efficacy of dextrose prolotherapy for temporomandibular joint hypermobility: a preliminary prospective, randomized, double-blind, placebo-controlled clinical trial. Journal of Oral and Maxillofacial Surgery. 2011 Dec 1;69(12):2962-70.
3. Saramantos A, Kyrgidis A, Venetis G, Hatziantoniou G, Chrysostomidis A, Sardeli C, Tilaveridis I. Clinical efficacy of prolotherapy for temporomandibular joint disorders: a systematic review and meta-analysis. Clinics and Practice. 2025 Feb 27;15(3):51.
4. Assiri K, Alqarni A, Almubarak H, Kaleem SM, Alassiri S, Baig FA, Muhammed A, Kota MZ, Dawasaz AA, Alqahtani AM, Assiri HA. Efficacy of prolotherapy for temporomandibular joint dysfunction: an interventional clinical study. Medical Science Monitor: International Medical Journal of Experimental and Clinical Research. 2025 May 14;31:e946650.
5. Nagori SA, Jose A, Gopalakrishnan V, Roy ID, Chattopadhyay PK, Roychoudhury A. The efficacy of dextrose prolotherapy over placebo for temporomandibular joint hypermobility: A systematic review and meta-analysis. Journal of oral rehabilitation. 2018 Dec;45(12):998-1006.
6. Dasukil S, Shetty SK, Arora G, Degala S. Efficacy of prolotherapy in temporomandibular joint disorders: an exploratory study. Journal of Maxillofacial and Oral Surgery. 2021 Mar;20(1):115-20.
7. Mori H, Bagul S, Chandan S. The efficacy of prolotherapy in temporomandibular dysfunction: a prospective study. Journal of Maxillofacial and Oral Surgery. 2021 Apr 21:1-8.
8. Grossmann E, Poluha RL. The use of prolotherapy in temporomandibular disorders. BrJP. 2025;8:e20250017.
9. Mori H. The Efficacy of Prolotherapy in Temporomandibular Joint Dysfunction: A Prospective Study (Master's thesis, Rajiv Gandhi University of Health Sciences (India)).
10. AbdelRaouf MS, Mobarak F, Mosallam E, Said HE. A Comparative Study Between Three Conservative Techniques In Management of Recurrent Temporomandibular Joint Dislocation. One Year Randomized Clinical

Trial. Egyptian Dental Journal. 2025 Jul 1;71(3):2043-60.
11. Kiliç SC, Güngörmüş M. Is dextrose prolotherapy superior to placebo for the treatment of temporomandibular joint hypermobility? A randomized clinical trial. International journal of oral and maxillofacial surgery. 2016 Jul 1;45(7):813-9.
12. Saadat A, Khedr M, Saad K, Naguib A. Dextrose prolotherapy in the treatment of recurrent temporomandibular joint dislocation (clinical study). Egyptian Journal of Oral and Maxillofacial Surgery. 2018 Oct 1;9(4):157-62.
13. Coelho LV, Ramos GV, Parpinelli BC, Meira CL, Silveira RL, Amaral MB. Treatment of Temporomandibular Joint Hypermobility: A Prospective Cohort Study. Journal of Maxillofacial and Oral Surgery. 2026 Jan 7:1-7.
14. Refai H. Long-term therapeutic effects of dextrose prolotherapy in patients with hypermobility of the temporomandibular joint: a single-arm study with 1-4 years' follow up. British Journal of Oral and Maxillofacial Surgery. 2017 Jun 1;55(5):465-70.
15. Kwon JW, Hyun SC, Kim DH, Lee ES, Lim HK. The effect of prolotherapy on TMJ: a literature review. Journal of Korean Dental Association. 2023 Dec 31;61(13):845-51.
16. Sit RW, Reeves KD, Zhong CC, Wong CH, Wang B, Chung VC, Wong SY, Rabago D. Efficacy of hypertonic dextrose injection (prolotherapy) in temporomandibular joint dysfunction: a systematic review and meta-analysis. Scientific reports. 2021 Jul 19;11(1):14638.
17. Bahgat MM, Abdel-Hamid AM. Is dextrose prolotherapy beneficial in the management of temporomandibular joint internal derangement? A systematic review. CRANIO®. 2025 Jul 4;43(4):534-42.
18. Ates H, Sivrikaya EC. Is the combine prolotherapy more effective than the traditional prolotherapy in patients with temporomandibular joint hypermobility? Journal of Cranio-Maxillofacial Surgery. 2025 Nov 3.