



DOI: <https://doi.org/10.56936/18290825-2026.20v.2-42>

## CYANOACRYLATE VS. DENTIN BONDING ON REDUCING DENTAL SENSITIVITY

SADATMANSOURI S.<sup>1</sup>, DADEHBEIGLOU P.<sup>2\*</sup>, NEMATI ANARAKI S.<sup>3</sup>, RAHMATPANAH K.<sup>4</sup>

<sup>1</sup> Department of Periodontics, TeMS.C., Islamic Azad University, Tehran, Iran

<sup>2</sup> Dentistry school of Islamic Azad university of Tehran Medical Sciences, Tehran, Iran

<sup>3</sup> Operative Department, Dental Branch of Tehran Azad University, Tehran, Iran

<sup>4</sup> Department of Dentistry, Kashan University of Medical Sciences, Kashan, Iran

Received 21.11.2025; Accepted for printing 14.05.2026

### ABSTRACT

**Introduction:** Hyper sensitivity is defined as a short-term sharp pain that occurs in dentin when exposed to the oral. The aim of this study was to compare the effect of cyanoacrylate with dentin bonding on the rate of changes in dental sensitivity.

**Material and Methods:** This study was a clinical trial. Written informed consent was obtained from the participants, then their initial sensitivity was measured and recorded with the visual analog scale index. Participants whose initial sensitivity value was greater than or equal to 5 were selected and divided into two groups: cyanoacrylate and dentin bonding. Patients were recalled after 24 hours and 1 week and the Visual analog scale assessment was evaluated.

**Results:** The results showed that in the dentin bonding group, the level of sensitivity before treatment was significantly different with 24 hours and 1 week after treatment ( $p < 0.05$ ). Also, according to the results of Wilcoxon Visual analog scale test, 24 hours and 1 week after treatment, there is no significant difference ( $p > 0.05$ ). In cyanoacrylate group, Wilcoxon test showed that the level of sensitivity before treatment was significantly different with 24 hours and 1 week after treatment ( $p < 0.05$ ), and level of sensitivity 24 hours and 1 week after treatment were not significantly different from each other. The level of sensitivity reduction 24 hours after treatment compared to before treatment was significantly different between the two groups ( $< 0.05$ ), also the level of sensitivity reduction 1 week after treatment compared to before treatment between the two groups There is no significant difference.

**Conclusion:** Both dentin bonding and cyanoacrylate reduce sensitivity within 24 hours after the intervention, with the effect of cyanoacrylate being greater and remaining equally stable up to 1 week after the intervention.

**KEYWORDS:** Hyper sensitivity, dentin sensitivity, dentin bonding agent, cyanoacrylate, VAS

### CITE THIS ARTICLE AS:

SADATMANSOURI S., DADEHBEIGLOU P., NEMATI ANARAKI S., RAHMATPANAH K. (2026). Cyanoacrylate vs. dentin bonding on reducing dental sensitivity; The New Armenian Medical Journal, vol.20 (2), 42-49; DOI: <https://doi.org/10.56936/18290825-2026.20v.2-42>

### ADDRESS FOR CORRESPONDENCE:

Parya Dadehbeiglou, Doctor of Dental Surgery  
Dentistry school of Islamic Azad university of  
Tehran medical sciences, Pasdaran Street, Tehran, PC  
1946853314, Iran  
Tel: +98 (914) 8248136  
E-mail: paryaadb@gmail.com

## INTRODUCTION

Tooth sensitivity is a sharp, temporary, and transient pain from exposed dentin that is caused by thermal, touch, osmotic, chemical, and drying stimuli and cannot be related to pathology or other dental defects [Holland G et al., 1997, Rees J. 2000, Cartwright R. 2014, Anithakumari R, Sureshbabu NM. 2022, Torres AdS et al., 2023]. This condition can be caused by gingivitis or following various periodontal treatments and is more common in canines (84%) and then premolars (75%) [Camps J, Pashley D., 2003, Hu D et al., 2004, Poulsen S et al., 2006, Shiau H. 2012].

The most important stimulus for dental sensitivity is cold (55%) and a smaller percentage is heat (18%) and touch (brushing) (13%) [Dababneh R et al., 1999]. The average age of people with sensitive teeth is around 30-50 years, and women are slightly more affected than men. Increased tooth sensitivity has many etiologies [Orchardson R, Gillam D. 2006] such as tooth decay, broken tooth or restoration, bleaching, occlusal trauma, new restorative treatments, gingival resorption, abrasion, erogenous, recent scaling, periodontal pocket removal surgery, and severe or incorrect brushing. [Walters PA. 2005].

The most commonly accepted theory about how pain occurs is the hydrodynamic hypothesis. According to this hypothesis, intratubular fluids are affected by thermal changes or physical osmotic changes and move, which stimulates baroreceptors and subsequently discharges or depolarizes nerves [Suge T et al., 2006, Anithakumari R, Sureshbabu NM., 2022, Torres AdS et al., 2023]. For tooth hypersensitivity to occur, dentin must be exposed to the oral environment, in which in 5-10% of cases enamel and cement do not overlap [Minoux M, Serfaty R. 2008, Davari A et al., 2013, Shiau H. 2014].

### EDITORIAL NOTE.

The Visual Analogue Scale (VAS) is a widely used psychometric instrument that offers a simple yet effective method for quantifying the intensity or magnitude of subjective experiences and attitudes [Koo M, Yang S, 2025].

First introduced in the early 20th century and refined over subsequent decades, the VAS has become indispensable for assessing phenomena that lack objective measurement, such as pain intensity [Eusasobhon, 2022], emotional states [Dutheil, F. et al, 2024], quality of life [Åström et al. 2023], and patient satisfaction [Voutilainen, A. et al., 2016]

So far, two treatment methods are known to increase tooth sensitivity:

1) Complete or incomplete blockage of dentin tubules

2) Change in the sensitivity of pulpal nerves in the dentin-pulp region or close to it [Navyasri K. 2019, Schiff T et al., 2000, Anithakumari R, Sureshbabu N. 2022].

According to the type of operator, anti-allergic treatments are divided into two types of treatment by the patient or the dentist [Burt SM, Campbell SL. 2014]. Treatment by the dentist in the office, which is often a combination of several methods and can have better results, includes corticosteroids, oxalates, iontophoresis, varnishes, calcium hydroxide, hydroxyapatite, potassium salts and fluoride, bonding agents with dentin and the use of lasers. [Trushkowsky R, Oquendo A. 2011, Anithakumari R, Sureshbabu N. 2022]. The treatment by the patient himself is more common due to its economy and easy application, and it starts with careful plaque control and the use of gel, mouthwash, and hypoallergenic toothpaste (containing potassium nitrate and strontium chloride) [Duangthip D et al., 2017]. In general, the treatment should be appropriate to the diagnosed etiology.

If the tooth sensitivity test results show irreversible inflammation, endodontic treatments are needed. A fractured tooth probably needs an endodontic and periodontal evaluation to check the prognosis of the tooth. Tooth hypersensitivity associated with severe abrasion or erogenous needs restorative treatments along with teaching correct brushing techniques (cases with abrasion) or diet change (cases with erogenous) [Rauschenberger C. 1992]. In each condition, different treatment mechanisms are determined according to the cause or causes, but so far no specific treatment method is known for it [Torres Ad et al., 2023].

Cyanoacrylates are one of the most widely used substances in medical sciences, which are known to be effective due to the mechanism of blocking the tubules and preventing the flow of dentinal fluid. In addition to its biocompatibility, cheap price, accessibility, and easy application, this substance has been reported to be successful in reducing dental sensitivity with or without other methods [Flecha O et al., 2013, Lima TC et al., 2017, Torres Ad et al., 2023].

One of the methods of treating sensitivity is the use of ivory bonding, which has been reported to be effective [Perdigão J. 2013]. As mentioned before, one of the ways to reduce the hypersensitivity of the dentin is to block the dentin tubules with resin [Anithakumari R, Sureshababu NM. 2022]. Dentin bonding agents remove the smear layer and form deep dentin resin tags inside the dentin tubules. This substance effectively floods the dentinal tubules and prevents DH. However, most desensitizing agents are either ineffective or only effective for a short period [Agrawal P et al., 2017, Navyasri K et al., 2019, Anithakumari R, Sureshababu N. 2022].

Recently, various types of bonding are used to reduce dental sensitivity. Some studies have investigated the use of lasers to reduce dental sensitivity, which were not as effective and cost-effective as bonding. Cyanoacrylate is a available and inexpensive material that is used as a suture adhesive in periodontal surgeries. Cyanoacrylate is cost-effective, easier to use, and does not require isolation or curing. In the review of studies, no article was found that investigated the effectiveness of these two substances at the same time. Therefore, this study was conducted to simultaneously compare the effect of cyanoacrylate and dentin bonding on tooth sensitivity in patients referred to the Faculty of Dentistry of Tehran Islamic Azad University of Medical Sciences in 2018.

#### MATERIALS AND METHOD

This study was conducted by the clinical trial method and on the patients who were referred to the Faculty of Dentistry of Islamic Azad University of Tehran in 2018. The sampling method was sequential and random.

Previous studies have reported that cyanoacrylate reduced sensitivity in 80% of cases [Flecha O et al., 2013, Lima T et al., 2017]. According to this value and test power of 80% and confidence level of 90%, the number of samples in each group was 20 and a total of 40 people.

The participants were given sufficient information about the research objectives. The inclusion criteria included good general and oral health conditions, complaints of pain and sensitivity in the teeth or teeth in different areas of the mouth following response to air stimuli and Visual analog scale (VAS) analysis was greater than or equal to 5.

Patients with the mentioned conditions were excluded from the study: a history of treatment with anti-allergic substances, continuous and chronic use of anti-inflammatory analgesics, pregnancy and breastfeeding, patients with a history of allergy to the drugs used in this research, nutritional disorders and systemic conditions that can cause or predispose a person to dental sensitivity, such as acidification of the mouth (Gastroesophageal reflux disease), patients undergoing periodontal or orthodontic treatment in the last three months, dental or periodontal pathological conditions that cause tooth pain, teeth with a history of filling in the last three months. Last month, the final tooth with a large coating and filling, the tooth as an abutment base for a fixed or mobile prosthesis, patients with extensive caries or filling that has spread to the cervical region of the tooth.

Then consent was obtained from the participants. They were also asked not to use products containing teeth allergens during the research. Patients were first examined to evaluate oral health and sensitivity. People with O'Leary index above 40% were excluded from the study [Lindhe J et al., 2008]. Their initial sensitivity was measured and recorded four times by VAS index following the application of air pressure and constant pressure from a distance of 3-4 mm from the cervical surface of the desired tooth [Flecha O et al., 2013, Lima T et al., 2017]. Its initial amount should be greater than or equal to 5.

The VAS scale is a ruler divided into 10 parts so that the beginning of the ruler (zero) represents no pain and the end of the ruler represents the maximum pain that a person can imagine [Flecha O et al., 2013, Jung G-H et al., 2018].

After isolating the tooth with a cotton roll, it was assigned to one of the two cyanoacrylates intervention groups (a combination of butyl and octyl cyanoacrylate manufactured by GluStitch, Canada) and the witness of dentin bonding clear fil liner bond F (SelfEtch with fluoride ion, two separate bottles (two-stage) made by KURARY company in Japan (pH=2)) was divided. Cyanoacrylate was placed in the desired tooth in the intervention group by an applicator (micro brush) on the sensitive surface. In the control group, dentin bonding was applied by an applicator (micro brush) on the sensitive tooth surface, and then waited for 20

seconds, dried with air and applied again, and was cured by a light cure device.

Again, the patients were called after 24 hours and 1 week, and the VAS index in the desired tooth was evaluated and recorded by the method mentioned above.

After extraction, the data were entered into SPSS-22 software, and the sensitivity changes were evaluated with Wilcoxon, Freedman and Mann-Whitney tests.

**RESULTS:**

The highest value of sensitivity was related to initial Visual analog scale (dentin bonding equal to  $7.5 \pm 0.61$  and cyanoacrylate equal to  $7.75 \pm 0.85$ ). After 24 hours, both substances reduced of the sensitivity, which was almost constant until one week, and the difference between the initial of sensitivity and 24 hours was similar to the difference between

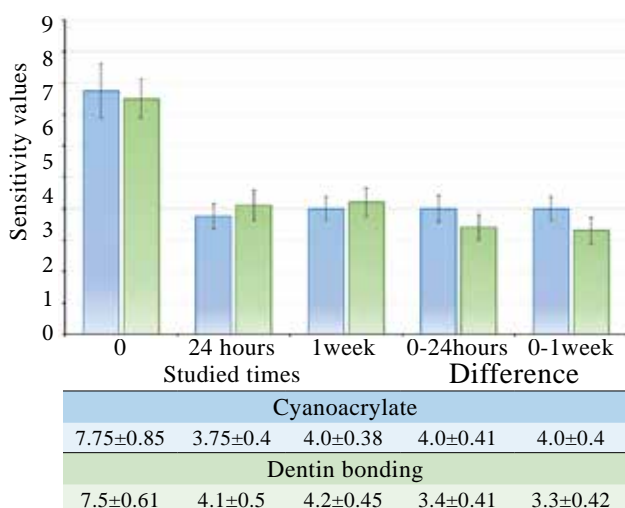


FIGURE 1. Sensitivity values in the studied times by Visual analog scale (VAS) and difference between imital and post-exposure tooth sensitivity values.

the initial of sensitivity and one week later. (Fig. 1)

According to the test results, it can be said that the VAS value in the dentin bonding group has decreased significantly 24 hours after the treatment ( $p < 0.05$ ) and one week after the treatment it is almost the same as compared to 24 hours after the treatment ( $p > 0.05$ ).

The results of comparing the effect of dentin bonding and cyanoacrylate on sensitivity showed that the value of sensitivity reduction 24 hours after treatment compared to before treatment has a significant difference between the two groups ( $p < 0.05$ ). Also, there is no significant difference

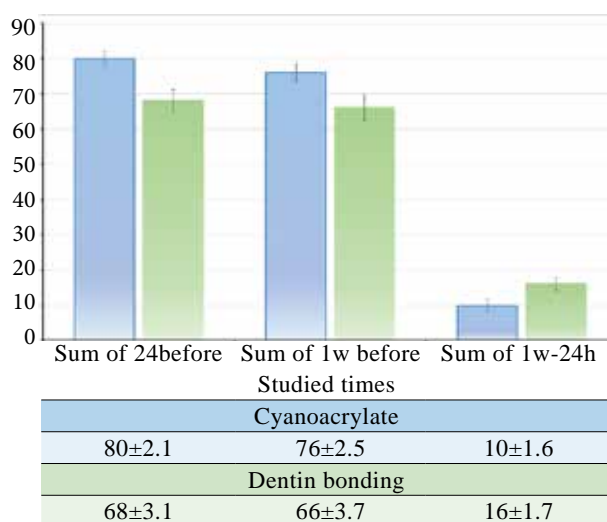


FIGURE 2. Comparison of visual analog scale values

between the two groups in the reduction of sensitivity 1 week after treatment compared to before treatment ( $p > 0.05$ ). According to the results of the test, it can be said that 24 hours after the treatment in the cyanoacrylate group, the level of sensitivity reduction is greater than that of the denting bonding group, and one week after the treatment, the level of sensitivity reduction is the same in both groups. (Fig. 2)

**DISCUSSION**

**Dentin hypersensitivity:** is defined as short and acute pain caused by the exposure of the open tubules of the dentin to the mouth. Dentin sensitivity is a common dental problem and can range from a minor discomfort for the patient to a disturbance in his quality of life. 5, 36). The canines and first premolars are the most affected teeth, which can be due to their prominent position in the mandible and maxilla [Addy M. 2000].

The data of this study showed that in the dentin bonding group, the sensitivity level decreased after 24 hours and 1 week. In order to check the significance of this decrease due to the non-normality of the data, non-parametric tests were used; The results of this test showed that the sensitivity level of the dentin bonding group at 24 hours and 1 week after the intervention was significantly lower than before the intervention, which indicates the effect of dentin bonding in reducing the sensitivity at 24 hours and 1 week after the treatment. . The level of sensitivity in 24 hours and 1 week after the treatment did not have a significant difference, so it can be said

that Dentin Bonding had its effect 24 hours after the treatment and its value remained constant and did not decrease until 1 week after the treatment. Is.

In the study of Agrawal P et al., it was also shown that dentin bonding after treatment reduced the sensitivity, and this effect decreased with the passage of time [Agrawal P et al., 2017]. The study by B.fu et al., which was conducted in 2007 under the title of dentin bonding and anesthetic ability, also showed that dentin bonding reduces sensitivity after 24 hours [Fu B et al., 2007]. The results of Aqeel's study showed that copal varnish and dentin bonding agents are equally good in terms of effectiveness and reduction of postoperative sensitivity in Class I amalgam restorations (I damage limited to the outer third of the dentin) [Aqeel S et al., 2023].

The results of the this study also showed that in the cyanoacrylate group, the sensitivity level after 24 hours and 1 week after the intervention is significantly lower than its value before the intervention, which shows that cyanoacrylate also causes a decrease in the sensitivity in 24 hours and 1 week after the intervention. is treated The level of sensitivity in 24 hours and 1 week after the treatment did not have a significant difference, so the effect of cyanoacrylate is also in 24 hours after the treatment and until 1 week after the treatment, the amount of sensitivity reduction is constant and does not change.

A systematic review by Torres et al reported that all studies evaluated in this study showed positive results regarding the use of cyanoacrylate in the treatment of Dentin sensitivity. On the other hand, articles that provided level III evidence should be interpreted with caution, as these studies could have introduced methodological bias [Torres Ad et al., 2023].

A comparison of 30% potassium oxalate and cyanoacrylate in Naregal's study showed better results for oxalate after the seventh week of evaluating tactile stimuli and the absence of hypersensitivity until the end of the study. When the results of electrical stimulation were evaluated, this difference was statistically significant for up to 6 weeks for both groups (experimental and control). The cyanoacrylate group showed a 30% greater decrease in dentin hypersensitivity compared to potassium oxalate [Naregal G, Raju C. 2012].

The study by Lima et al., which was conducted in 2016, also showed that cyanoacrylate also causes

a decrease in sensitivity at first, and this effect decreases over time [Lima T et al., 2017]. The study by Olga D. Flecha et al. in 2013 also showed that cyanoacrylate reduced sensitivity within 24 hours after the intervention and remained stable for 90 days in response to the air-puff test and for 30 days in response to the cold test. [Flecha O et al., 2013]. The results of these studies are consistent with the present study.

Comparing the effect of two groups of dentin bonding and cyanoacrylate in reducing sensitivity, the findings of our study showed that in 24 hours after the intervention, cyanoacrylate significantly reduced the level of sensitivity compared to dentin bonding. However, 1 week after the intervention, there was no difference between the two groups in the reduction of sensitivity.

Lima's study also stated that the effect of laser and cyanoacrylate in reducing sensitivity is stable and the same over a longer period of time [Lima TC et al., 2017]. Flecha O. also concluded in her study that cyanoacrylate does not reduce sensitivity after 24 hours but remains constant [Flecha O et al., 2013], which is consistent with the results of the present study. However, Kisanlal, who has compared the effect of laser and dentin bonding in the treatment of increased tooth sensitivity, stated that the sensitivity decreased in both groups, but after 30 days, the reduction in sensitivity in the laser group was significantly higher than in the dentin bonding group, while In the present study, it was concluded that in a longer period of time, the groups have the same effect in reducing sensitivity [Agrawal P et al., 2017], the reason for this difference is the difference in the materials used because the laser was able to provide a better flood by depositing proteins in the dentinal tubules and the effect It is more stable. As it is known, fluid percolation in dentinal tubules is the cause of dentin sensitivity in teeth with bare root surfaces. Dentin bondings can lead to a decrease in sensitivity by blocking the dentin tubules or some of them by reducing the physiological sensitivity of the nerve terminals [Sellan P et al., 2020].

Although it is not possible to create a flood 100% and this issue is confirmed clinically, the cause of the positive pressure inside the tubules and the creation of small bubbles in the bonding layer, especially if these materials contain aqueous solvents.

In these cases, the scanning electron microscope images also show the presence of droplets trapped in the bonding layer and help to create the WATER-FREE layer. Cyanoacrylate creates a strong connection with dental hard tissue and this connection to dentin is stronger than enamel. The bonding agent is the anion polymerization of ethylene molecules of the main chain of cyanoacrylate, which creates a strong bond with substances containing -OH in water or alcohol and dentin [Torres AdS et al., 2023].

Therefore, it is chemically connected to the tooth tissue, as a result, it creates a good bond from the very beginning, which justifies the results of the present study, and on the other hand, it justifies the stronger connection of cyanoacrylates with dentin than enamel because only 3% of enamel is water and non-mineral, while in dentin This ratio is 31%. But in any case, polar water molecules simply penetrate between the bonding or cyanoacrylate layers and cause the depolymerization of cyanoacrylate

by hydrolysis, and for this reason, after a week, the results of both groups are the same. On the other hand, the bonding used in this study contains large amounts of fluoride. Raid, which can help reduce tooth sensitivity and tubule deposits, made the results of the two groups similar in the first 24 hours. The source of the manufacturer claims that the nanoparticles in these bondings can easily enter the tubules and reduce Sensitivity.

### CONCLUSION

Finally, according to the limitations of the present study, the following results were obtained:

1-Dentin bonding and cyanoacrylate reduce the sensitivity in 24 hours after the intervention, which remains stable for 1 week after the intervention.

2- Reduction of sensitivity in the cyanoacrylate group in the first 24 hours is more than dentin bonding.

3- In 1 week after the intervention, the effect of two substances in reducing sensitivity is the same.

### REFERENCES

1. Addy M. (2000). Dentine hypersensitivity: definition, prevalence, distribution and aetiology. 2000:239-48. Tooth wear and sensitivity: In Book: Clinical advances in restorative dentistry London: 1st Edition by Martin Addy, Graham Embery, Michael Edgar, Robin Orchardson, 378 pages, Martin Dunitz Publishers, London
2. Agrawal PK, Jibhkate N, Warhadpande MM. (2017). Comparative evaluation of diode laser and dentin bonding agent in the treatment of dentin hypersensitivity—An in vivo study. Indian Journal of Conservative and Endodontics. 2017;2(2):50-4.
3. Anithakumari R, Sureshbabu NM. (2022). The effect of desensitizing agents on the bond strength of dentin bonding agents: A systematic review. Journal of Conservative Dentistry and Endodontics. 2022;25(6):580-7. DOI: 10.4103/jcd.jcd\_248\_21
4. Aqeel S, Lodhi SK, Ehsan S, Rafique A, Mirza KS, Qureshi HN. (2023). Comparison of Post-operative Sensitivity in Class I Amalgam Restorations using Copal Varnish Versus Dentin Bonding Agent: A Randomized Control Trial. Pakistan Journal of Medical & Health Sciences. 2023;17(03):558-561. DOI:10.53350/pjmhs2023173558
5. Åström, M.; Thet Lwin, Z.M.; Teni, F.S.; Burström, K.; Berg, J. (2023). Use of the visual analogue scale for health state valuation: A scoping review. Qual. Life Res. 2023, 32, 2719–2729, <https://doi.org/10.1007/s11136-023-03411-3>
6. Burt SM, Campbell SL. (2014). An innovative way to relieve dentinal hypersensitivity. RDH Magazine. 2014;2. doi.org/10.1371/journal.pone.0316159
7. Camps J, Pashley DJ. (2003). In vivo sensitivity of human root dentin to air blast and scratching. Journal of periodontology 2003;74(11):1589-1594. <https://doi.org/10.1902/jop.2003.74.11.1589>
8. Cartwright RB (2014). Dentinal hypersensitivity: a narrative review. Community Dental Health 2014; 31(1):15-20. doi:10.1922/CDH\_3287Cartwright
9. Dababneh R, Khouri A, Addy M. (1999). Dentine hypersensitivity - An enigma? A review of terminology, mechanisms, aetiology and management. British dental jour-

- nal. 1999;187(11):606-611. DOI <https://doi.org/10.1038/sj.bdj.4800345>
10. Davari A, Ataei E, Assarzadeh H. (2013). Dentin hypersensitivity: etiology, diagnosis and treatment; a literature review. *Journal of Dentistry*. 2013;14(3):136.
  11. Duangthip D, Man A, Poon PH, Lo ECM, Chu C-H. (2017). Occlusal stress is involved in the formation of non-cariou cervical lesions. A systematic review of abfraction. *Am J Dent*. 2017;30(4):212-20.
  12. Dutheil, F.; Palgen, C.; Brousse, G.; Coste, A.; Saurin, J.; Lambert, C.; Péliissier, C. (2024). Validation of visual analog scales of mood and anxiety at the workplace. *PLoS ONE* 2024, 19, e0316159, . <https://doi.org/10.1371/journal.pone.0316159>
  13. Euasobhon, P.; Atisook, R.; Bumrunghatodom, K.; Zinboonyahgoon, N.; Saisavoey, N.; Jensen, M.P. (2022). Reliability and responsiveness of pain intensity scales in individuals with chronic pain. *Pain* 2022, 163, e1184–e1191. DOI: 10.1097/j.pain.0000000000002692
  14. Flecha OD, Azevedo CG, Matos FR, Vieira-Barbosa NM, Ramos-Jorge ML, Gonçalves PF, et al. (2013). Cyanoacrylate versus laser in the treatment of dentin hypersensitivity: a controlled, randomized, double-masked and non-inferiority clinical trial. *Journal of Periodontology*. 2013;84(3):287-94. DOI:10.1902/jop.2012.120165
  15. Fu B, Shen Y, Wang H, Hannig M. (2007). Sealing ability of dentin adhesives/desensitizer. *Operative dentistry*. 2007;32(5):496-503. Sealing ability of dentin adhesives/desensitizer.
  16. Holland G, Narhi M, Addy M, Gangarosa L, Orchardson RJJocp. (1997). Guidelines for the design and conduct of clinical trials on dentine hypersensitivity. 1997;24(11):808-13. DOI: <https://doi.org/10.1111/j.1600-051X.1997.tb01194.x>
  17. Hu D, Zhang YP, Chaknis P, Petrone ME, Volpe AR, DeVizio WJTJocd. (2004). Comparative investigation of the desensitizing efficacy of a new dentifrice containing 5.5% potassium citrate: an eight-week clinical study. 2004;15(1):6-10.
  18. Jung G-H, Jung S, Park H-J, Oh H-K, Kook M-SJJoCS. (2018). Factors Influencing Perception of Facial Attractiveness :Gender and Dental Education .2018;29(2:(e170-e5. DOI:10.1097/SCS.0000000000004241
  19. Koo M, Yang S-W. (2025). Visual Analogue Scale. *Encyclopedia*. 2025; 5(4):190. <https://doi.org/10.3390/encyclopedia5040190>, <https://doi.org/10.3390/encyclopedia5040190>
  20. Lata S ,Varghese N ,Varughese JM) .2010.( Remineralization potential of fluoride and amorphous calcium phosphate-casein phosphopeptide on enamel lesions :An in vitro comparative evaluation .*Journal of conservative dentistry :JCD* .2010 ;13(1 :(p .42-46.
  21. Lima TC ,Vieira-Barbosa NM ,Grasielle de Sá Azevedo C ,de Matos FR ,Douglas de Oliveira DW ,de Oliveira ES ,et al) .2017 .(Oral health-related quality of life before and after treatment of dentin hypersensitivity with cyanoacrylate and laser. *Journal of periodontology*. 2017;88(2):166-72. <https://doi.org/10.1902/jop.2016.160216>
  22. Lindhe J, Lang NP, Karring T. (2008). *Clinical Periodontology and Implant Dentistry, An edition of Clinical periodontology and implant dentistry (2008), 5 edition, Publisher Wiley-Blackwell, 1448P. Oxford*
  23. Minoux M, Serfaty R. (2008). Vital tooth bleaching: Biologic adverse effects - A review. *Quintessence international*. 2008;39(8).
  24. Naregal, G., & Raju, C. (2012). Comparative assessment of efficacy of a single application of Potassium Oxalate and N-Butyl 2-Cyanoacrylate in treatment of hypersensitive teeth-A clinical study. *Indian Journal of Public Health Research and Development*, 3, 20-24.
  25. Navyasri K, Alla RK, Vineeth G, Suresh Sajjan M. (2019). An overview of dentin bonding agents. *Int J Dent Mater* .2019;1(2:(60-67. DOI :10.37983/IJDM.2019.1204
  26. Orchardson R ,Gillam DG) .2006 .(Managing dentin hypersensitivity. *The Journal of the American Dental Association*. 2006;137(7):990-998. <https://doi.org/10.14219/jada.archive.2006.0321>
  27. Perdigão J, Geraldeli S, Hodges J. (2013). Total-etch versus self-etch adhesive: Effect

- on postoperative sensitivity. *Journal of Esthetic and Restorative Dentistry*. 2013; 25(4): 284-285. <https://doi.org/10.14219/jada.archive.2003.0109>
28. Poulsen S, Errboe M, Lescay Mevil Y, Glennly AM. (2026). Potassium containing toothpastes for dentine hypersensitivity. *Cochrane Database of Systematic Reviews* 2006, Issue 3. Art. No.: CD001476. DOI: 10.1002/14651858.CD001476.pub2.
  29. Rees JJJocp. (2000). The prevalence of dentine hypersensitivity in general dental practice in the UK. 2000;27(11):860-5. <https://doi.org/10.1034/j.1600-051x.2000.027011860.x>
  30. Rauschenberger CR. (1992). Dentin permeability: the clinical ramifications. *Dental Clinics of North America*. 1992;36(2):527-42. [https://doi.org/10.1016/S0011-8532\(22\)02511-3](https://doi.org/10.1016/S0011-8532(22)02511-3)
  31. Schiff T, Zhang Y, DeVizio W, Stewart B, Chaknis P, Petrone M, et al. (2000). A randomized clinical trial of the desensitizing efficacy of three dentifrices. 2000(27):4-10; quiz 28.
  32. Sellan PLB, Zanatta RF, Torres CRG, Tian F-c, Bergeron BE, Niu L-n, et al. (2020). Effects of calcium-phosphate, laser and adhesive on dentin permeability and bond strength. *Heliyon*. 2020;6(5). DOI: 10.1016/j.heliyon.2020.e03925
  33. Shiau HJ) .2012 .(Dentin hypersensitivity. *Journal of evidence based dental practice*. 2012;12(3):220-8. DOI: 10.1016/S1532-3382(12)70043-X
  34. Suge T ,Kawasaki A ,Ishikawa K ,Matsuo T, Ebisu S) .2006 .(Effects of plaque control on the patency of dentinal tubules :an in vivo study in beagle dogs .*Journal of periodontology* .2006;77(3):(454-9 .<https://doi.org/10.1902/jop.2006.050159>
  35. Torres AdS ,Martins OBL ,Otoni RP ,Henrique Soares K ,Torres MG ,Firoozi P ,et al) .2023.( Effectiveness of Cyanoacrylate in the Treatment of Dentin Hypersensitivity: A Systematic Review. *International journal of dentistry*. 2023;2023. DOI: 10.1155/2023/1465957
  36. Trushkowsky RD, Oquendo A. (2011). Treatment of dentin hypersensitivity. *Dental Clinics*. 2011;55(3):599-608.
  37. Voutilainen A.; Pitkäaho T.; Kvist T.; Vehviläinen-Julkunen K. (2016). How to ask about patient satisfaction? The visual analogue scale is less vulnerable to confounding factors and ceiling effect than a symmetric Likert scale. *J. Adv. Nurs*. 2016, 72, 946–957, <https://doi.org/10.1111/jan.12875>
  38. Walters PA. (2005). Dentinal hypersensitivity: a review. *J Contemp Dent Pract*. 2005;6(2):107-117.



**CONTENTS**

4. **DAS A.C., SAMIR P.V., KHAN S.H., FERNANDES B., ARYA A., MUSTAFA M.**  
ARTIFICIAL INTELLIGENCE IN THERAPEUTIC DECISION-MAKING FOR COMPLEX DENTAL DISEASES: A REVIEW
11. **ALAM M.K. ALMOHAMMED Y.E.M., HAJEER M.Y., ALANAZI A.W.N., ALANAZI F.S.A., ALNAWMASI Y.M.F.**  
LABORATORY ASSESSMENT OF CRISPR-MEDIATED MODULATION OF OSTEOBLASTIC AND OSTEOCLASTIC GENE EXPRESSION UNDER SIMULATED ORTHODONTIC FORCE
17. **GEORGE A.L., PANICKER P., FRANCIS F., RAGHUNANDANAN S., MOHIDEEN K., ALMUTAIRY M.F.**  
CAR-T-INSPIRED IMMUNOMODULATORY NANOVESICLES FOR TARGETED ELIMINATION OF ORAL SQUAMOUS CELL CARCINOMA CELLS
23. **ALFAWZAN A.A., ALAM M.K., HAJEER M.Y.**  
IN-VITRO EVALUATION OF NANOPARTICLE-REINFORCED ORTHODONTIC ADHESIVES FOR ENHANCED SHEAR BOND STRENGTH AND ANTIMICROBIAL ACTIVITY
30. **JADHAV S., PATRI G., BEHERA S.S.P., BANIK A., ARYA A., MUSTAFA M.**  
STEM-CELL-DERIVED BIOENGINEERED DENTAL PULP CONSTRUCTS FOR VITAL PULP THERAPY: A RANDOMIZED LABORATORY TRIAL
36. **TUENKAR Y.A., SHANKARGOUDA S., SEHDEV B., SINGH R.B., RAMAMURTHY J., MAHAPATRA N.**  
AI-GUIDED PERSONALIZED DRUG-DELIVERY NANOPARTICLES FOR PRECISION TREATMENT OF PERI-IMPLANTITIS: A MULTICENTER EVALUATION
42. **SADAT MANSOURI S., DADEHBEIGLOU P., NEMATI ANARAKI S., RAHMATPANAH K.**  
CYANOACRYLATE VS. DENTIN BONDING ON REDUCING DENTAL SENSITIVITY
50. **JALALUDDIN M., CALIAPEROMAL S.K., JAYANTI I., PATIL M., RAMAMURTHY J., MUSTAFA M.**  
MRNA-BASED REGENERATION OF PERIODONTAL LIGAMENT FIBROBLASTS: A TRANSLATIONAL PILOT STUDY
56. **AZATYAN V.YU., YESSAYAN L.K., SHMAVONYAN M.V., MURADYAN A.A.**  
EVALUATING THE EFFECTS OF CIGARETTE SMOKING AND HEATED TOBACCO PRODUCTS ON THE ORAL MUCOSA AND PERIODONTIUM IN PATIENTS WITH HEPATIT C VIRUS IN ARMENIA: A PILOT STUDY
65. **MOHAMMADI E., NAZARBAGHI S., HAJIESMAELLO M.**  
COMPARATIVE EFFICACY OF LOW-LEVEL LASER THERAPY AND TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION IN THE MANAGEMENT OF DIABETIC PERIPHERAL NEUROPATHY: A RANDOMIZED CONTROLLED TRIAL
73. **HOSSEINIAZAR M.M., KABOUDMEHRI M., ROOSTA Y.**  
PREDICTIVE VALUE OF SERUM TRACE ELEMENTS FOR CHEMOTHERAPEUTIC EFFICACY IN GASTRIC AND COLON CANCER: A CROSS-SECTIONAL STUDY
82. **ESMAELIZADEH M., ASHT'A'RI MEHRJARDI A., MOHAMMADINIA O., MOHAMMADPOUR S., HOKMABADI M.E., AMINI F., AZIZI T., VAKILI AHRARI RODI M.**  
NEW HORIZONS IN SUBSTANCE ABUSE DISORDER: A SYSTEMATIC REVIEW OF EPIGENETIC MECHANISMS AND MULTIDIMENSIONAL PERSPECTIVES (2023–2025)
90. **SHAHROKHI-FARD P., SAGHEBI A., TALAEI A.**  
EFFECTIVENESS OF ACCEPTANCE AND COMMITMENT THERAPY ON COVID-19 PROTECTION INDICATORS, PHYSICAL DISORDER SYMPTOMS, AND PERCEIVED STRESS IN HEALTHCARE PERSONNEL IN MASHHAD HOSPITALS
98. **SURKUNDA T.S., STANLEY W., ELENJICKAL V., BALLAL A., NAGARAJU S., BOPPE S., KAMATH N., SHASTRY B.**  
CLINICAL FEATURES, OUTCOMES AND COMPARATIVE EVALUATION OF DIAGNOSTIC CRITERIA OF INVASIVE ASPERGILLOSIS AT A TERTIARY CARE CENTRE: A RETROSPECTIVE OBSERVATIONAL STUDY
- 108 **SABERI M.K., MOKHTARI H., HOSEINI AHANGARI S.A., OUCHI A., SHOURCHEH B.**  
THE ONLINE ATTENTION TO SPIRITUAL HEALTH RESEARCH: AN ALTMETRIC ANALYSIS
- 118 **LETTER TO THE EDITOR**  
A GENERALIZED ANALYTICAL REVIEW OF ARTICLES IN A ISSUE 2 ON ADVANCED TECHNOLOGIES IN MODERN STOMATOLOGY



The Journal is founded by  
Yerevan State Medical  
University after M. Heratsi.

## Rector of YSMU

Armen A. *MURADYAN*

## Address for correspondence:

Yerevan State Medical University  
2 Koryun Street, Yerevan 0025,  
Republic of Armenia

## Phones:

(+37410) 582532 YSMU

(+37493) 588697 Editor-in-Chief

Fax: (+37410) 582532

E-mail: [namj.ysmu@gmail.com](mailto:namj.ysmu@gmail.com), [ysmiu@mail.ru](mailto:ysmiu@mail.ru)

URL: <http://www.ysmu.am>

Our journal is registered in the databases of Scopus, EBSCO and Thomson Reuters (in the registration process)



SCOPUS



EBSCO



THE GUFO

Print in "Monoprint" LLC  
Director: Armen Armenakyan  
Andraniks St., 96/8 Bulding  
Yerevan, 0064, Armenia  
Phone: (+37491) 40 25 86  
E-mail: [monoprint1@mail.ru](mailto:monoprint1@mail.ru)

*TheGufo is an online database platform designed to help researchers publish and share their scientific work on a global scale. Our company was founded to address the need for affordable and user-friendly platform that removes many of the barriers traditionally imposed by the publishing industry. All scientific work published through TheGufo complies with Creative Commons 4.0 and other recognized standards to ensure authenticity, proper referencing, and academic integrity. Each submission undergoes a detailed peer-review process prior to publication.*

*Our mission is to provide researchers worldwide with a professional, accessible, and cost-effective platform to share both new and existing work with their peers. To further encourage participation, we also offer special promotional programs for academic institutions.*

*Dear reader, to access our website, please follow the link below*  
<https://thegufo.com/> <https://>

## Editor-in-Chief

Arto V. *ZILFYAN* (Yerevan, Armenia)

## Deputy Editors

Hovhannes M. *MANVELYAN* (Yerevan, Armenia)

Hamayak S. *SISAKYAN* (Yerevan, Armenia)

## Executive Secretary

Stepan A. *AVAGYAN* (Yerevan, Armenia)

## Editorial Board

Armen A. *MURADYAN* (Yerevan, Armenia)

Drastamat N. *KHUDAVERDYAN* (Yerevan, Armenia)

Suren A. *STEPANYAN* (Yerevan, Armenia)

## Foregin Members of the Editorial Board

Waleed *GHANIMA* (Oslo, Norway)

Carsten N. *Gutt* (Memmingen, GERMAY)

Ming-Hua *ZHENG* (Wenzhou, China)

## Coordinating Editor (for this number)

Farzad *KARIMPOUR* (Yasuj, IR Iran)

## Editorial Advisory Council

Vahe Yu. *AZATYAN* (Yerevan, Armenia)

Ara S. *BABLOYAN* (Yerevan, Armenia)

Ines *BANJARI* (Osijek, Croatia)

Azat A. *ENGIBARYAN* (Yerevan, Armenia)

Mahdi *ESMAEILZADEH* (Mashhad, IR Iran)

Ruben V. *FANARJYAN* (Yerevan, Armenia)

Gabriele *FRAGASSO* (Milano, Italy)

Samvel G. *GALSTYAN* (Yerevan, Armenia)

Armen Dz. *HAMBARDZUMYAN* (Yerevan, Armenia)

Airazat M. *KAZARYAN* (Oslo, Norway)

Seyran P. *KOCHARYAN* (Yerevan, Armenia)

Levon M. *MKRTCHYAN* (Yerevan, Armenia)

Ashot M. *MKRTUMYAN* (MoscowRussia)

Mariam R *MOVSIYAN* (Gumri, Armenia)

Mikhail Z. *NARIMANYAN* (Yerevan, Armenia)

Sevak *SHAHBAZYAN* (Yerevan, Armenia)

Arthur K. *SHUKURYAN* (Yerevan, Armenia)

Gevorg N. *TAMAMYAN* (Yerevan, Armenia)

Marine M. *TANASHYAN* (Moscow, Russia)

Hakob V. *TOPCHYAN* (Yerevan, Armenia)

Alexander *WOODMAN* (London, England)

Konstantin B. *YENKOYAN* (Yerevan, Armenia)

Yumei *NIU* (Harbin, China)

Peijun *WANG* (Harbin, Chine)