

Denture Adhesives as an Adjunctive Measure for Improving the Fit, Retention, and Function of Complete Dentures: A Narrative Review

Dr. Althaaf Khan
BDS (SMU), AssocFCGDent (UK)
Private Practice, South Africa

Corresponding author

Abstract

Complete dentures remain a common and cost-effective treatment for edentulism, but progressive resorption of the denture-bearing tissues frequently compromises retention, stability, and masticatory efficiency over time, even when the prosthesis was well fabricated at insertion. Denture adhesives are widely used as an adjunctive, non-surgical means of improving the functional seal between the denture base and the oral mucosa. This narrative review synthesises the current evidence on the role of denture adhesives in improving the fit and performance of complete dentures. A structured search of the dental literature was conducted, focusing on systematic reviews, meta-analyses, randomised and controlled clinical trials, and case reports published in the last two decades. The available evidence, including several systematic reviews and meta-analyses, consistently demonstrates that denture adhesives significantly improve denture retention, maximum bite force, and masticatory performance compared with no-adhesive controls, with the greatest benefit observed in patients with resorbed ridges or ill-fitting prostheses. Adhesives also improve patient-reported outcomes, including comfort, confidence, and oral health-related quality of life. Cream and powder formulations appear broadly comparable in efficacy, while cushion and strip formats show more variable results. Safety concerns are largely confined to chronic overuse of zinc-containing adhesives, which has been associated with copper-deficiency myeloneuropathy in rare cases. Denture adhesives are best regarded as an adjunct that enhances a well-constructed prosthesis rather than a substitute for sound prosthodontic technique, and their prescription should be accompanied by clear instructions on quantity, frequency, and hygiene. Clinicians should reserve zinc-free formulations for long-term or heavy users and should periodically reassess the underlying fit of the denture rather than relying indefinitely on adhesive compensation.

Keywords

Denture Adhesives; Complete Denture; Denture Retention; Denture-Supporting Tissues; Edentulism; Oral Health-Related Quality of Life.

Introduction

Edentulism continues to affect a substantial proportion of the global adult population, and the complete removable denture remains the most widely used and economically accessible treatment for the fully edentulous patient. The long-term success of a complete denture depends on retention (resistance to vertical dislodging forces), stability (resistance to horizontal and rotational forces), and support (resistance to forces directed towards the underlying tissues). These properties depend

principally on the accuracy of the impression, the extension and adaptation of the denture base, and the health and morphology of the denture-bearing tissues.

Even a technically well-constructed denture is subject to a gradual and irreversible deterioration in fit, because the alveolar ridges continue to resorb throughout life following tooth loss. This remodeling increases the discrepancy between the denture-bearing surface and the fitting surface of the prosthesis, widening the interfacial space in which the physical forces of retention (interfacial surface tension, adhesion, cohesion, and atmospheric pressure) operate.^[1] The resulting loosening of the denture is compounded in patients with severely resorbed ridges, xerostomia, poor neuromuscular control, or unfavourable ridge relationships, all of which reduce the physiological retention that the prosthesis alone can achieve.

Denture adhesives, first introduced clinically in the early twentieth century and refined considerably since, are proprietary formulations applied to the fitting surface of a denture to increase retention and stability by occupying and sealing the space between the denture base and the mucosa.^[2] They are supplied as creams, powders, cushions, wafers, and strips, and are used, according to industry and professional-body estimates, by a substantial proportion of denture wearers worldwide. Despite this widespread use, denture adhesives have historically been viewed with some ambivalence by clinicians: some regard them as a legitimate adjunct to a well-fitting prosthesis, while others are concerned that they may be used by patients, or even prescribed by dentists, to mask an inadequately constructed or badly resorbed denture rather than to address the underlying problem.^[3,4]

The purpose of this narrative review is to synthesise the contemporary evidence on the clinical efficacy, mechanism of action, indications, and safety of denture adhesives when used as an adjunctive measure to improve the fit and function of complete dentures, and to translate this evidence into practical guidance for the general dental practitioner and prosthodontist. The specific objectives were (i) to summarise the physical and biological rationale for adhesive use, (ii) to evaluate the strength of evidence for improved retention, stability, and masticatory performance, (iii) to assess the impact of adhesives on patient-reported outcomes and quality of life, and (iv) to review the safety profile of adhesives, with particular reference to zinc-containing formulations.

Materials and Methods

This article was prepared as a narrative literature review rather than a primary clinical study; accordingly, no patient data were collected, no human or animal subjects were involved, and formal institutional ethical approval and informed consent were not required. All cited data are drawn from previously published, peer-reviewed sources.

A structured, though non-systematic, search of the electronic databases PubMed/MEDLINE, ScienceDirect, and Google Scholar was undertaken for English-language articles published up to 2025. Search terms, used singly and in combination, included “denture adhesive”, “denture adherent”, “denture fixative”, “complete denture retention”, “denture stability”, “masticatory performance”, “oral health-related quality of life”, and “zinc toxicity denture”. Priority was given to systematic reviews and meta-analyses, randomised and controlled clinical trials, and evidence-based clinical guidelines published by recognised professional bodies. Case reports and case series were included specifically to characterise the safety profile of zinc-containing adhesives. Reference lists of retrieved articles were hand-searched for additional relevant sources. Articles concerned exclusively with implant-retained overdentures, denture cleansers, or denture-base materials unrelated to adhesive use were excluded, as were non-peer-reviewed commercial sources. Because this is a narrative rather than a systematic review, no formal risk-of-bias assessment, PRISMA flow diagram, or meta-analytic pooling of data was performed; instead, findings from the identified systematic reviews and meta-analyses are reported descriptively and contextualised against the primary clinical trial literature.

Results and Discussion

Composition and mechanism of action

Contemporary denture adhesives are predominantly based on carboxymethylcellulose (CMC) and copolymers of polyvinyl methyl ether and maleic acid (PVM-MA), often combined with petrolatum or mineral-oil carriers in cream formulations, together with antimicrobial, flavouring, and colouring agents.^[2,4] On contact with saliva, these polymers hydrate and swell, forming a viscous, cohesive gel that occupies the void between the denture base and the mucosa, increases the interfacial surface

tension, and enhances adhesion and cohesion forces, the two principal physical mechanisms of denture retention. The resulting adhesive layer also acts as a functional cushion and food-particle seal, reducing the ingress of debris beneath the denture during mastication. An ideal adhesive should be effective in small quantities, easy to apply and remove, non-irritating to the mucosa, resistant to washout by saliva over a full day of function, and free of components that could pose a long-term systemic risk.^[1]

Effect on retention, stability, and masticatory performance

The most consistent and best-supported finding across the literature is that denture adhesives measurably improve objective retention. In a systematic review of thirty-two articles, Papadiochou et al. concluded that the majority of clinical studies supported an improvement in retention, stability, and masticatory performance with adhesive use, and reported general patient satisfaction where the adhesive met individual needs.^[1] This conclusion has since been reinforced by larger, more rigorous syntheses. A systematic review and meta-analysis by Shu et al., which pooled data from thirty-nine controlled trials (twenty-three randomised and sixteen non-randomised), found that adhesives produced a significantly higher standardised mean difference in retention (SMD 1.34; 95% CI 0.89–1.79), together with smaller but still significant improvements in maximum bite force (SMD 0.98; 95% CI 0.50–1.47) and masticatory performance (SMD 0.72; 95% CI 0.23–1.22) relative to no-adhesive controls.^[5] A subsequent systematic review of randomised controlled trials by Lemos et al., encompassing 516 participants across thirteen studies, reached a similar conclusion, reporting significant improvements in retention, stability, patient-reported outcomes, and masticatory performance with adhesive use, albeit with the certainty of evidence graded low to moderate.^[6] Comparable positive findings were reported in independent systematic reviews by Elabbasy et al.^[7] and by Florêncio Costa et al.,^[8] both of which similarly concluded that adhesives improve masticatory function in complete denture wearers.

Individual randomised trials support these pooled findings. de Oliveira Junior et al., in a crossover trial of forty edentulous participants, demonstrated a significant improvement in masticatory performance with two different adhesives compared with no adhesive.^[10] Torres-Sánchez et al. similarly showed, in a randomised, double-blind, crossover design, that masticatory efficacy in denture wearers using adhesive approached that of dentate individuals, whereas efficacy without adhesive remained significantly lower.^[11] Notably, the benefit of adhesives appears to be more pronounced in patients with old, ill-fitting, or resorbed prostheses than in those with newly constructed, well-adapted dentures, which supports the concept of adhesives as a compensatory adjunct for compromised denture-bearing tissues rather than a universal requirement for all denture wearers.

Influence of adhesive presentation (cream, powder, strip, cushion)

Denture adhesives are commercially available in several physical forms, and clinicians and patients frequently ask which presentation is superior. A systematic review and meta-analysis by Figueredo et al., which examined nine clinical studies comparing cream, powder, and strip presentations, found no statistically significant difference between cream and powder adhesives for masticatory performance (SMD 0.02; 95% CI –0.46 to 0.50) or between cream and strip adhesives for occlusal force.^[9] This suggests that, in terms of core functional outcomes, the choice between presentations may reasonably be guided by patient preference, ease of application, and tolerability rather than by an expectation of a clinically important difference in masticatory efficiency. Earlier work had suggested that cushion-type adhesives may offer somewhat lower retentive performance than paste or powder forms in some comparative studies, reinforcing that presentation-related differences, where they exist, are generally modest relative to the overall benefit of adhesive use itself.

Patient-reported outcomes and quality of life

Beyond objectively measured retention and masticatory function, denture adhesives have a consistent positive effect on patient-reported outcomes. In a randomised, crossover, double-blind trial, Torres-Sánchez et al. found significantly higher satisfaction scores for retention, stability, and reduced food accumulation with two different adhesives compared with no adhesive, with no meaningful difference between the two adhesive brands tested.^[12] Surveys of practising dentists corroborate this clinical

impression: in a questionnaire-based study conducted in Greece, most respondents reported recommending adhesives to improve retention and patient confidence, particularly in patients with compromised denture-bearing tissues.^[13] Pilot data assessing oral health-related quality of life over a six-month period in new complete denture wearers using an adhesive reported improvements in the function, pain, discomfort, and psychosocial domains of the Geriatric Oral Health Assessment Index, even though objective masticatory parameters did not always change significantly over the same interval, suggesting that the psychosocial and comfort-related benefits of adhesive use may, in some patients, be as clinically meaningful as the measurable functional gains.^[14] Collectively, these findings are consistent with the broader literature on oral health-related quality of life in edentulous patients, in which denture retention and stability are repeatedly identified as key determinants of psychosocial wellbeing, confidence in social situations, and satisfaction with prosthodontic treatment.

Denture adhesives as an adjunct, not a substitute, for sound prosthodontic technique

A recurring theme across the clinical guidelines and narrative literature is that denture adhesives should be positioned explicitly as an adjunct to, rather than a replacement for, a well-fitting, properly extended, and correctly occluded denture. The American College of Prosthodontists' evidence-based guidelines for the care and maintenance of complete dentures state that adhesives can improve retention and stability and may benefit patients with dry mouth, thin or displaceable tissues, or difficulty adapting to new dentures, while cautioning that they should not be used to compensate for a poorly fitting prosthesis that requires relining, rebasing, or remaking.^[3] Duqum et al. similarly frame adhesive use as a legitimate clinical recommendation for appropriately selected patients, provided that the underlying denture is periodically reassessed rather than treated as permanently acceptable simply because an adhesive renders it wearable.^[4] The American Dental Association's patient guidance reiterates this adjunctive framing, recommending that adhesive be applied only in the quantity needed — typically three to four pea-sized dollops per denture — to provide additional retention and stability rather than to correct a grossly ill-fitting prosthesis.^[15] From a clinical-governance perspective, this distinction matters: the evidence reviewed above supports adhesives as an effective adjunct across a spectrum of denture fits, but it does not support their use as an indefinite substitute for corrective prosthodontic treatment when a denture has become clinically unacceptable.

Safety considerations: zinc-containing adhesives and copper deficiency

The principal safety concern associated with denture adhesives relates to chronic, excessive use of zinc-containing formulations. Because zinc and copper are absorbed competitively in the gastrointestinal tract, sustained high zinc intake can induce intestinal metallothionein, which preferentially binds copper and promotes its faecal excretion, leading over time to acquired copper deficiency. Nations et al. first drew wide clinical attention to this association by reporting four patients with hyperzincaemia and hypocupraemia, each of whom had used substantially more than the recommended amount of zinc-containing denture cream over a prolonged period, and who presented with sensorimotor polyneuropathy, myelopathy, or haematological abnormalities including anaemia and cytopenias.^[16] Tezvergil-Mutluay et al. subsequently reviewed the broader literature on this phenomenon, concluding that patients should be explicitly counselled about the risks of prolonged, excessive adhesive use.^[17] More severe outcomes have also been documented: Afrin reported a fatal case of ascending sensorimotor polyneuropathy attributed to copper deficiency secondary to chronic zinc-based adhesive overuse, in which neurological abnormalities failed to reverse despite copper supplementation,^[18] and Crown and May described a case of bone-marrow failure diagnosed initially as myelodysplastic syndrome that resolved substantially, together with the associated neuropathy, following cessation of the adhesive and copper repletion.^[19] More recent case reports continue to add to this body of evidence, including a case in which zinc-induced copper deficiency from chronic denture-adhesive use mimicked myelodysplastic syndrome on bone-marrow examination, underscoring that this remains a live diagnostic consideration even in the current era of predominantly zinc-free commercial reformulations.^[20]

It is important to place these findings in proportion. The reported cases uniformly involve use far in excess of manufacturers' instructions, typically more than one large tube per week over months to years, rather than the intermittent, appropriately dosed use recommended in clinical guidelines. Following the publicity generated by these reports, several major manufacturers reformulated their

products to remove zinc entirely, and clinicians can now generally select zinc-free adhesives for patients anticipated to be long-term or heavy users, or for those with pre-existing neurological or haematological conditions. Nonetheless, the case-report literature underscores the importance of explicit patient instruction on the correct quantity and frequency of application, periodic clinical review of denture-adhesive-dependent patients, and a low index of suspicion for zinc-related copper deficiency in any denture wearer presenting with unexplained peripheral neuropathy, myelopathy, or cytopenia.

Clinical recommendations

Drawing together the evidence reviewed above, several practical recommendations can be made for the general dental practitioner. First, denture adhesives should be considered as a reasonable adjunctive option for patients with reduced physiological retention due to resorbed ridges, xerostomia, thin or displaceable mucosa, neuromuscular impairment, or difficulty adapting to a new denture, and can be expected to improve retention, bite force, masticatory performance, and patient-reported comfort and confidence in most such patients.^[1,5,6] Second, the choice between cream, powder, and strip presentations can reasonably be guided by patient preference rather than by an expectation of superior function from any single form.^[9] Third, adhesives should not be prescribed, nor should patients be permitted to self-manage, as a long-term substitute for correcting a denture that has become clinically unacceptable; persistent reliance on adhesive to control an unstable denture should prompt clinical reassessment and consideration of reline, rebase, or remake.^[3,4] Fourth, patients should be given explicit verbal and, where possible, written instructions on the correct quantity (a small number of pea-sized dollops per denture), frequency, and removal technique, and zinc-free formulations should be preferred for patients likely to be long-term or high-volume users.^[15,16,17]

Limitations of the current evidence

Several limitations of the existing evidence base warrant acknowledgement. Most of the controlled trials included in the available systematic reviews were conducted over short observation periods (days to a few weeks), predominantly in patients with newly constructed and reasonably well-fitting complete dentures, which limits generalisability to the population of long-term, ill-fitting denture wearers who might be expected to derive the greatest benefit.^[5,6] Many included studies were small, non-randomised, or at unclear or moderate risk of bias, and the certainty of evidence for several outcomes has been graded as low to moderate rather than high.^[6] Comparative data on adhesives in removable partial denture wearers, as opposed to complete denture wearers, remain scarce. Finally, because this review was conducted as a narrative rather than a systematic synthesis, it is subject to the inherent limitations of non-systematic literature selection, including the potential for selective emphasis on more readily identified or higher-profile publications.

Conclusion

The weight of current evidence, including several independent systematic reviews and meta-analyses, supports denture adhesives as an effective adjunctive measure for improving the retention, stability, masticatory performance, and patient-reported comfort of complete dentures, with the greatest benefit typically observed in patients with compromised denture-bearing tissues or ageing, ill-fitting prostheses. Cream and powder formulations appear broadly comparable in efficacy, and the safety profile of adhesives is favourable when used as directed, with serious adverse effects, principally copper-deficiency myeloneuropathy, confined almost exclusively to chronic, substantial overuse of zinc-containing products. Denture adhesives should nevertheless be prescribed and used as a genuine adjunct to a well-constructed, correctly extended, and periodically reviewed prosthesis, and never as a permanent substitute for corrective prosthodontic treatment. Appropriately selected patients, clearly instructed in correct use, and periodically reassessed by their dentist, stand to gain a meaningful and reproducible improvement in denture function and quality of life from adjunctive adhesive use.

Acknowledgements

The author wishes to thank colleagues in private practice who provided informal clinical discussion during the preparation of this review. No individual outside the named author met the criteria for authorship.

Funding Statement

This review received no external funding, grants, or other financial support from any funding agency in the public, commercial, or not-for-profit sectors.

Conflict of Interest

The author declares no financial, professional, institutional, or personal conflicts of interest relevant to the content of this review. The author has no commercial affiliation with, and has received no compensation from, any manufacturer of denture adhesives or related dental products.

References

1. Papadiochou S, Emmanouil I, Papadiochos I. Denture adhesives: a systematic review. *J Prosthet Dent.* 2015;113(5):391-397.
2. Grasso JE. Denture adhesives. *Dent Clin North Am.* 2004;48(3):721-733.
3. Felton D, Cooper L, Duqum I, Minsley G, Guckes A, Haug S, et al. Evidence-based guidelines for the care and maintenance of complete dentures: a publication of the American College of Prosthodontists. *J Prosthodont.* 2011;20(Suppl 1):S1-S12.
4. Duqum I, Powers KA, Cooper L, Felton D. Denture adhesive use in complete dentures: clinical recommendations and review of the literature. *Gen Dent.* 2012;60(6):467-477.
5. Shu X, Fan Y, Lo ECM, Leung KCM. A systematic review and meta-analysis to evaluate the efficacy of denture adhesives. *J Dent.* 2021;108:103638.
6. Lemos CAA, da Fonte Porto Carreiro A, Rosa CDDRD, Luna Gomes JM, de Oliveira Limirio JPJ, Mendonça G, et al. Does the use of an adhesive improve conventional complete dentures? A systematic review of randomized controlled trials. *J Prosthet Dent.* 2022;128(2):150-157.
7. Elabbasy N, Ahn TJ, Morton P, Han PP, Enciso R, Mulligan R. Efficacy of denture adhesives in complete denture wearers compared to denture wearers not using denture adhesives. A systematic review. *Spec Care Dentist.* 2021;41(2):251-270.
8. Flôrencio Costa RT, Leite Vila-Nova TE, Barbosa de França AJ, Gustavo da Silva Casado B, de Souza Leão R, Dantas de Moraes SL. Masticatory performance of denture wearers with the use of denture adhesives: a systematic review. *J Prosthet Dent.* 2020 Dec 2. doi:10.1016/j.prosdent.2020.10.011. Epub ahead of print.
9. Figueredo OMC, Gama LT, Câmara-Souza MB, Marañón-Vásquez GA, Magno MB, Maia LC, et al. Influence of different presentations of denture adhesives on masticatory function of complete denture wearers: a systematic review and meta-analysis. *J Prosthet Dent.* 2021 Nov 9. doi:10.1016/j.prosdent.2021.09.026. Epub ahead of print.
10. de Oliveira Junior NM, Rodriguez LS, Mendoza Marin DO, Paleari AG, Pero AC, Compagnoni MA. Masticatory performance of complete denture wearers after using two adhesives: a crossover randomized clinical trial. *J Prosthet Dent.* 2014;112(5):1182-1187.
11. Torres-Sánchez C, Montoya-Salazar V, Torres-Lagares D, Gutiérrez-Pérez JL, Jiménez-Castellanos E. Comparison of masticatory efficacy among complete denture wearers with two adhesives and dentate individuals: a randomized, crossover, double-blind clinical trial. *J Prosthet Dent.* 2017;117(5):614-620.
12. Torres-Sánchez C, Montoya-Salazar V, Torres-Lagares D, Gutiérrez Pérez JL, Jiménez-Castellanos Ballesteros E. Satisfaction in complete denture wearers with and without adhesives: a randomized, crossover, double-blind clinical trial. *J Clin Exp Dent.* 2018;10(6):585-590.
13. Polyzois G, Lagouvardos P, Omar R, et al. Attitudes of dentists toward denture adhesives: questionnaire survey in Greece. *J Prosthet Dent.* 2017;118(5):643-649.
14. Nicolas E, Veyrune JL, Lassauzay C. A six-month assessment of oral health-related quality of life of complete denture wearers using denture adhesive: a pilot study. *J Prosthodont.* 2010;19(6). doi:10.1111/j.1532-849X.2010.00601.x.
15. American Dental Association. Denture care and maintenance [Internet]. Chicago: American Dental Association; [cited 2026 Sep 15]. Available from: <https://www.ada.org/resources/ada-library/oral-health-topics/dentures>
16. Nations SP, Boyer PJ, Love LA, Burritt MF, Butz JA, Wolfe GI, et al. Denture cream: an unusual source of excess zinc, leading to hypocupremia and neurologic disease. *Neurology.* 2008;71(9):639-643.

17. Tezvergil-Mutluay A, Carvalho RM, Pashley DH. Hyperzincemia from ingestion of denture adhesives. *J Prosthet Dent*. 2010;103(6):380-383.
18. Afrin LB. Fatal copper deficiency from excessive use of zinc-based denture adhesive. *Am J Med Sci*. 2010;340(2):164-168.
19. Crown LA, May JA. Zinc toxicity: denture adhesives, bone marrow failure and polyneuropathy. *Tenn Med*. 2012;105(1):39-42.
20. Mims MH, Reid ES, Hash MG, Maddux A. A hematologic twist: zinc-induced copper deficiency mimicking myelodysplastic syndrome. *Cureus*. 2025;17(7):e87624.