

Green Tea Consumption And Adjunctive Green Tea Products For Periodontal Disease Prevention And Management: A Narrative Review

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ABSTRACT

Intoduction: Periodontal disease is common among older adults and may contribute to tooth loss, oral discomfort, and compromised quality of life. This PubMed-based narrative review summarises evidence on green tea (*Camellia sinensis*) consumption and adjunctive green tea products for the prevention or management of periodontal disease, with emphasis on relevance to Indonesian older adults. **Method:** PubMed was searched up to 28 June 2026 using combinations of green tea, *Camellia sinensis*, catechin, epigallocatechin gallate, EGCG, matcha, periodontitis, periodontal disease, gingivitis, plaque, and scaling and root planing. PubMed-indexed clinical trials and systematic reviews relevant to periodontal outcomes were prioritised. Indonesian epidemiological and quality-of-life studies were included only when indexed in PubMed. **Result and Discussion:** No PubMed-indexed clinical trial was found that specifically evaluated green tea for periodontal disease in Indonesian older adults. Evidence from adult periodontal populations suggests that green tea catechins or EGCG, delivered as gels, strips, dentifrices, mouthwashes, ultrasonic scaler irrigants, or oral intake, may reduce gingival inflammation, bleeding, microbial burden, oxidative stress, inflammatory biomarkers, and, in some studies, probing depth or clinical attachment loss. **Conclusion:** Green tea may be a low-cost adjunct to plaque control and professional periodontal therapy, but it should not replace scaling and root planing, oral hygiene instruction, maintenance care, or management of systemic risk factors. Current evidence is heterogeneous and generally limited; therefore, recommendations for Indonesian older adults should be conservative and framed as supportive rather than curative.

INTRODUCTION

The oral cavity contains a complex microbial community with more than 700 recognised bacterial species. In health, the resident microbiota is largely compatible with host tissues, but dysbiosis of the subgingival biofilm can initiate and sustain gingival inflammation and periodontitis. Periodontitis is not simply an infection; it is a chronic inflammatory disease in which microbial challenge, host immune response, tissue-destructive mediators, and behavioural and systemic risk factors interact to destroy periodontal attachment and alveolar bone.

Older adults are particularly vulnerable to the consequences of periodontal disease because they have longer lifetime exposure to biofilm, restorations, tooth loss, medication-related xerostomia, systemic comorbidities, and barriers to dental attendance. Indonesian data support this concern. In a study of 369 older Indonesians, almost three quarters had generalised periodontitis and only a small minority were periodontally healthy. Edentulism also remains clinically important in Indonesia; analysis of national data reported an overall edentulism prevalence of 7.2%, rising markedly with age and reaching 29.8% in people aged 80 years and above. The impact of periodontal disease in Indonesian older adults is not limited to bleeding, tooth mobility, or tooth loss. Qualitative Indonesian evidence indicates that periodontal disease can affect comfort, mastication, social interaction, psychological well-being, and daily quality of life. These effects are important because periodontal treatment in older adults must be realistic, accessible, preventive, and compatible with general health, oral hygiene capacity, and economic limitations. Green tea, derived from *Camellia sinensis*, contains polyphenols, particularly catechins such as epigallocatechin-3-gallate (EGCG). These compounds have been investigated for antioxidant, anti-inflammatory, antibacterial, anti-biofilm, and host-modulatory effects relevant to oral health. Green tea mouthwashes and other topical preparations have also been studied as oral-care adjuncts because they may reduce plaque accumulation and gingival inflammation with fewer staining and taste-related adverse effects than chlorhexidine in some settings. However, the clinical claim must be precise. Most periodontal trials do not study simple daily tea drinking in Indonesian older adults. Instead, the strongest periodontal evidence concerns green tea catechins or EGCG used as adjuncts to scaling and root planing or as local oral-care products in adult populations. Therefore, this revised manuscript evaluates green tea as a supportive preventive or adjunctive strategy, not as an independent cure for periodontitis.

METHODS

This manuscript was revised as a PubMed-based narrative review. Because the aim was to correct and update a short review article rather than conduct a full systematic review with duplicate screening, protocol registration, risk-of-bias assessment, and certainty grading, the previous PRISMA-style flow diagram was removed. A PRISMA claim would be inappropriate without a reproducible systematic-review protocol and complete reporting of screening decisions.

PubMed was searched up to 28 June 2026 using the following concepts: (green tea OR *Camellia sinensis* OR catechin OR EGCG OR epigallocatechin gallate OR matcha) AND (periodontitis OR periodontal disease OR gingivitis OR dental plaque OR scaling and root planing). Clinical trials, randomised controlled trials, systematic reviews, meta-analyses, and clinically relevant narrative reviews indexed in PubMed were prioritised. Additional PubMed-indexed studies on periodontal disease, edentulism, and oral health-related quality of life in Indonesian older adults were included to support the local public-health rationale.

The review focused on periodontal clinical outcomes, including plaque index, gingival index, bleeding on probing, probing pocket depth, clinical attachment level, microbial outcomes, oxidative stress markers, and inflammatory biomarkers. Studies focused only on dental caries, oral cancer, halitosis, or non-periodontal outcomes were not used as primary evidence. Because few studies enrolled older adults and none specifically tested Indonesian older adults, the applicability of the evidence was judged narratively and cautiously.

RESULTS

The PubMed-indexed periodontal literature supports a biologically plausible role for green tea as an adjunct, but the evidence is heterogeneous. The included studies used different green tea preparations, doses, vehicles, delivery routes, comparators, and follow-up periods. Most trials were small and short-term. Importantly, the clinical evidence should be separated into two categories: (1) adjunctive treatment studies in periodontitis, usually combined with scaling and root planing; and (2) plaque or gingivitis studies in prevention-oriented oral care.

Tabel 1. PubMed-indexed clinical evidence on green tea as an adjunct in periodontitis

Study	Design and population	Green tea intervention	Key findings and interpretation
Kudva et al., 2011 ⁷	Split-mouth clinicomicrobiological study; 14 chronic periodontitis patients with contralateral pockets of 5-8 mm.	Scaling and root planing plus local green tea catechin strips versus scaling and root planing alone.	Short-term improvement in probing pocket depth and microbial counts was reported in adjunct sites. Plaque and gingival index changes were not consistently superior. Interpretation: promising local-delivery pilot evidence, but small sample and short follow-up.
Chava and Vedula, 2013 ⁸	Randomised clinical trial; 30 chronic periodontitis patients with contralateral sites of at least 4 mm.	Thermo-reversible green tea catechin gel placed locally after scaling and root planing.	Adjunctive gel reduced gingival inflammation, probing depth, and relative clinical attachment level over 4 weeks. Interpretation: positive short-term local adjunct evidence.

Study	Design and population	Green tea intervention	Key findings and interpretation
Hattarki et al., 2013 ⁹	Split-mouth clinical and microbiological study; 20 chronic periodontitis subjects.	Local green tea catechin delivery after scaling and root planing versus scaling and root planing alone.	Both groups improved clinically; between-group clinical differences were not significant. Greater reductions in selected periodontal pathogens were reported with green tea. Interpretation: microbiological benefit may exceed measurable short-term clinical superiority.
Rattanasuwan et al., 2016 ¹⁰	Randomised placebo-controlled trial; 48 subjects with pockets of 5-10 mm.	Subgingival green tea extract gel delivered at baseline, 1 week, and 2 weeks after scaling and root planing.	All groups improved. Test sites showed greater reduction in bleeding on probing at 3 months and lower gingival index at 1 and 3 months. Interpretation: anti-inflammatory benefit; probing depth and attachment outcomes require cautious interpretation.
Hrishi et al., 2016 ¹¹	Randomised controlled pilot study; 30 patients with mild-to-moderate chronic periodontitis after scaling and root planing.	Green tea dentifrice compared with fluoride-triclosan dentifrice.	Green tea dentifrice produced greater improvements in gingival index, bleeding, clinical attachment, and antioxidant markers over 4 weeks. Interpretation: possible supportive home-care adjunct, but pilot sample and short follow-up.

Study	Design and population	Green tea intervention	Key findings and interpretation
Chopra et al., 2016 ¹²	Randomised controlled clinical trial; 120 subjects with mild-to-moderate chronic periodontitis.	Green tea intake as an adjunct to mechanical periodontal therapy compared with placebo.	Clinical periodontal measures and gingival crevicular fluid antioxidant capacity improved, with marked antioxidant improvement in the green tea group. Interpretation: one of the most relevant studies for consumption, but it still used green tea as an adjunct to mechanical therapy.
Wang et al., 2021 ¹³	Split-mouth randomised trial; chronic periodontitis sites treated during scaling and root planing.	EGCG solution delivered through a modified ultrasonic scaler tip versus distilled water coolant.	Additional probing depth reduction and clinical attachment gain were modest; Tannerella forsythia was reduced. Interpretation: mechanistically interesting EGCG delivery method with small clinical effect size.
Zeng et al., 2022 ¹⁴	Randomised clinical trial in moderate-to-severe chronic periodontitis.	EGCG solution used as the ultrasonic-scaler irrigant during non-surgical periodontal therapy.	Reported as an adjunctive non-surgical periodontal treatment trial. Interpretation: supports continued investigation of EGCG irrigation, but direct geriatric and Indonesian applicability is not established.
Rezvani et al., 2022 ¹⁵	Randomised clinical trial; 30 chronic periodontitis patients.	Daily green tea intake for 6 weeks combined with scaling and root planing versus scaling and root planing alone.	Salivary interleukin-1 beta decreased significantly in the green tea group. Interpretation: supports an anti-inflammatory effect of green tea consumption as an adjunct, but sample size was small.

Study	Design and population	Green tea intervention	Key findings and interpretation
Nakao et al., 2024 ¹⁶	Clinical component with chronic periodontitis patients during supportive periodontal therapy, supported by in vitro analyses.	Matcha mouthwash compared with control mouthwashes.	Matcha reduced salivary Porphyromonas gingivalis compared with baseline. Interpretation: emerging evidence for matcha as a supportive antimicrobial mouthwash; clinical periodontal endpoints remain preliminary.
Rengaraj et al., 2025 ¹⁷	Clinical trial in patients with periodontitis pockets of 4-7 mm.	Green tea extract gel as local drug delivery after scaling and root planing compared with ornidazole gel.	Green tea gel showed favourable probing depth results at 1 month. Interpretation: recent positive local-delivery evidence, but longer follow-up and independent replication are needed.
Goncalves et al., 2026 ¹⁸	Randomised double-blinded noninferiority trial after periodontal surgery in stage 3 periodontitis.	Gel containing green tea and hyaluronic acid compared with chlorhexidine gel after open-flap debridement.	Clinical and microbiological outcomes were reported as noninferior with better tolerability signals. Interpretation: relevant to postoperative adjunctive care, but not evidence for tea drinking alone.

Overall, local green tea preparations appear most consistently associated with reductions in gingival inflammation, bleeding, and selected microbial markers. Improvements in probing pocket depth and clinical attachment were reported in several trials, but these outcomes were not uniformly superior across all studies. Evidence for daily green tea consumption is more limited than evidence for topical or local delivery, yet the randomised trials by Chopra et al. and Rezvani et al. suggest that intake may support antioxidant or anti-inflammatory periodontal responses when combined with mechanical periodontal therapy.^{12,15}

DISCUSSION

Biological plausibility

Green tea catechins, especially EGCG, have plausible periodontal actions. They may reduce oxidative stress, modulate inflammatory mediators, inhibit growth or virulence of periodontal pathogens, and interfere with biofilm activity. These mechanisms are relevant because periodontal tissue destruction is driven not only by bacteria but also by the host inflammatory response.⁵ The biological rationale therefore supports green tea as an adjunct, particularly when applied locally where periodontal pockets and gingival tissues are exposed to higher concentrations of active compounds.

Clinical meaning of the evidence

The most clinically defensible statement is that green tea may support conventional periodontal care. It should not be presented as a replacement for toothbrushing, interdental cleaning, scaling and root planing, periodontal maintenance, smoking cessation, diabetes control, or professional diagnosis. Even when positive effects are reported, most trials combine green tea with mechanical therapy. Therefore, the benefit cannot be attributed to green tea alone in a way that would justify stand-alone treatment recommendations.

The systematic review evidence is mixed. Gartenmann et al. found a statistically greater probing pocket depth reduction when green tea was used adjunctively, but cautioned that included studies were heterogeneous and had risk-of-bias concerns.¹³ Melo et al. later concluded that the certainty of evidence was very low and found no consistent probing-depth difference, although some effects were seen for bleeding, gingival index, and plaque index depending on application form.¹⁴ This difference between reviews is important: the manuscript should present green tea as promising but not definitively proven.

Relevance for Indonesian older adults

For Indonesian older adults, the public-health rationale is strong because periodontal disease and tooth loss are common and can affect chewing, comfort, social interaction, and quality of life.^{2,4} Green tea is also relatively accessible, familiar, and culturally acceptable. Nevertheless, the direct clinical evidence is indirect because the identified green tea trials were not performed specifically in Indonesian geriatric populations. Many studies excluded smokers, pregnant or lactating women, recent antibiotic users, and patients with systemic disease; therefore, real-world older adults with diabetes, polypharmacy, xerostomia, frailty, or limited manual dexterity may respond differently.

A conservative Indonesian recommendation would be to encourage moderate unsweetened green tea consumption as part of a healthy diet and to consider green tea-containing mouthwash or dentifrice as a supportive oral-hygiene adjunct when appropriate. However, established periodontal disease still requires periodontal examination, diagnosis, mechanical debridement, and maintenance care. In public-health programmes, green tea should be framed as an adjunct to plaque control and health education, not as a substitute for dental services.

Safety and practical considerations

Green tea is generally considered safe when consumed moderately as a beverage. However, excessive intake or concentrated supplements may cause sleep disturbance due to caffeine, gastrointestinal discomfort, reduced iron absorption, or drug interactions in susceptible individuals. Older adults taking anticoagulants, antiplatelet drugs, multiple medications, or iron supplementation should be advised not to use concentrated green tea extracts without medical consultation. For dental use, green tea mouthwashes may have fewer staining effects than chlorhexidine in some studies, but they also have less established long-term evidence and should not be assumed to have the same antiseptic potency.

Strengths and limitations of the present review

A strength of this revised review is that the reference base has been restricted to PubMed-indexed studies and the periodontal evidence has been separated by route of administration and outcome type. This reduces overclaiming and improves traceability of the data. The main limitation is that this remains a narrative review. It does not include duplicate screening, protocol registration, formal risk-of-bias assessment, or certainty-of-evidence grading. The conclusions should therefore be interpreted as a clinically informed synthesis rather than a systematic-review recommendation.

Future research

Future studies should evaluate green tea interventions specifically in older adults, including populations with common systemic conditions such as diabetes and cardiovascular disease. In Indonesia, pragmatic community-based trials could compare oral-hygiene education alone with oral-hygiene education plus unsweetened green tea intake or green tea oral-care products. Outcomes should include periodontal pocket depth, clinical attachment level, bleeding on probing, plaque control, tooth loss, adverse effects, patient-reported outcomes, adherence, cost, and acceptability. Longer follow-up is required to determine whether short-term anti-inflammatory or antimicrobial changes translate into meaningful prevention of attachment loss or tooth loss.

CONCLUSION

Periodontal disease is a relevant health problem for Indonesian older adults because it is common, contributes to tooth loss, and can affect daily comfort and quality of life. Green tea has plausible antioxidant, anti-inflammatory, and antimicrobial properties, and PubMed-indexed trials suggest potential benefits when green tea catechins, EGCG, or green tea products are used as adjuncts to mechanical periodontal therapy. However, the evidence is heterogeneous, mostly short-term, and not specific to Indonesian older adults. Green tea should therefore be recommended only as a supportive adjunct to conventional prevention and periodontal treatment, not as a stand-alone therapy. More robust clinical research in Indonesian older adults is needed before definitive public-health or clinical protocols can be established.

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