

## SCREENING INSTRUMENTS FOR PERIODONTAL DISEASES IN GENERAL DENTAL PRACTICE: A LITERATURE REVIEW

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### Abstract

**Introduction.** Periodontal diseases remain a major oral-health burden, and severe periodontitis continues to affect more than 1 billion people worldwide. In general dental practice, comprehensive periodontal diagnosis relies on clinical examination and radiographic assessment; however, full diagnostic protocols are time-consuming, technique-sensitive, and not always suitable for rapid chairside triage. This has driven interest in simple, reproducible, and minimally invasive screening instruments capable of facilitating early case identification.

**Aim.** To critically evaluate and synthesize current evidence regarding periodontal disease screening instruments applicable to general dental practice.

**Materials and methods.** A structured narrative literature review was conducted in PubMed, MEDLINE, and Google Scholar using combinations of the terms “gingivitis”, “periodontitis”, “screening”, and “mass screening”. English-language studies in adult human populations addressing clinical, imaging-based, or biomolecular/microbiological periodontal screening were considered. From 214 initially identified records, 20 studies published mainly between 2015 and March 2025 were retained for the final synthesis based on thematic relevance, recency, and clinical applicability.

**Results.** The reviewed literature converged on three principal directions of periodontal screening: rapid standardized clinical tools, imaging-based approaches, and chairside biomolecular/microbiological tests. BPE/PSR/PSI remain the most practical first-line instruments for routine triage, although they are screening rather than definitive diagnostic tools. Panoramic radiographic assessment of alveolar bone loss can add useful structural information, but only in conjunction with clinical findings. aMMP-8 and microbiological assays such as ADCHECK are promising adjunctive methods; however, the available evidence indicates moderate or context-dependent accuracy and supports a complementary rather than substitutive role.

**Conclusions.** Periodontal screening is feasible and clinically useful in general dental practice, particularly within a stepwise model. Standardized clinical tools should remain the entry point of triage, imaging should refine structural assessment, and biomarker-based or microbiological tests may enhance screening in selected cases. Current evidence therefore supports integration of these methods within a coherent clinical algorithm rather than reliance on any single modality.

**Keywords:** periodontitis; periodontal screening; periodontal triage; salivary biomarkers; chairside diagnostics; dental imaging

### Introduction

Periodontal diseases comprise a highly prevalent group of inflammatory conditions affecting the tooth-supporting tissues, with important consequences for oral function, tooth retention, and oral-health-related quality of life. Recent epidemiological estimates indicate that severe periodontitis affected more than 1.06 billion people in 2021, with a global age-standardized prevalence of approximately 12.50%, and that the absolute number of cases may continue to increase by 2050 [1]. This burden justifies the search for efficient early-identification and triage strategies in general dental practice.

Current periodontal diagnosis rests on the integration of clinical and radiographic data. Periodontal probing, bleeding on probing, clinical attachment loss, and radiographic assessment of alveolar bone support remain central both to case definition and to staging and grading within the current classification framework [2]. In everyday practice, however, a comprehensive periodontal examination is time-consuming, operator-sensitive, and not always suited to rapid screening within a busy general dental workflow.

Accordingly, periodontal screening should be regarded not as a surrogate for definitive diagnosis, but as a preliminary stratification step designed to identify patients who require full periodontal examination. Simplified clinical tools such as the Basic Periodontal Examination (BPE) and related systems are attractive because they are rapid, inexpensive, and easy to incorporate into routine consultations; nevertheless, they remain screening instruments and do not replace full periodontal charting or site-specific diagnostic assessment [3].

Recent clinical profiling studies using the 2018 periodontal classification have further emphasized that periodontal involvement in routine care is both frequent and heterogeneous, reinforcing the need for timely identification and individualized diagnostic pathways [15]. At the same time, the recent literature highlights two additional directions with practical screening potential: imaging-based approaches, especially those centered on alveolar bone loss, and chairside biomolecular or microbiological methods capable of capturing tissue-destructive activity or pathogen-associated signals [4–10]. Against this background, the present review synthesizes the applicability of these three major categories of periodontal screening instruments in general dental practice.

#### **Aim**

To critically evaluate and summarize the current evidence on periodontal disease screening instruments applicable to general dental practice.

#### **Materials and methods**

A structured narrative literature review was performed to identify studies on periodontal screening instruments applicable to general dental practice. The search was conducted in PubMed, MEDLINE, and Google Scholar using combinations of the terms “gingivitis”, “periodontitis”, “screening”, and “mass screening”, adapted as needed to the search syntax of each database.

Recent literature published primarily between 2015 and March 2025 was prioritized in order to capture both established clinical screening approaches and newer developments in dental imaging and chairside diagnostics. English-language studies involving adult human subjects and providing clinically relevant information on clinical, imaging-based, or biomolecular periodontal screening were considered eligible. A limited number of older foundational sources were retained only when necessary to contextualize specific microbiological assays or diagnostic concepts.

From an initial pool of 214 records, 20 studies were retained for the final narrative synthesis based on thematic relevance, recency, methodological contribution, and clinical applicability. The evidence was organized into three analytical domains (table 1): (1) standardized clinical screening tools; (2) imaging-based approaches; and (3) biomolecular or microbiological chairside tests. Because the objective was interpretive synthesis rather than quantitative pooling, the findings were analyzed qualitatively with emphasis on feasibility, diagnostic contribution, and limitations in general practice.

*Table 1. Main categories of periodontal screening instruments*

Category	Examples	Main advantages	Main limitations
Clinical	BPE, PSR, PSI	Rapid, low-cost, easy to integrate into routine care	Triage role only; may underestimate localized disease

Imaging	Panoramic radiography, R-PBL assessment	Adds objective structural information on alveolar bone	Require clinical correlation; 2D methods have inherent limitations
Biomolecular and microbiological	aMMP-8, ADCHECK, TLP assays	Minimally invasive, rapid, may capture biological activity	Moderate or context-dependent accuracy; complementary role

## Results

### 1. Standardized clinical tools

Rapid standardized clinical methods remain the most accessible periodontal screening instruments in routine dental care. Among them, BPE and the related PSR/PSI systems are the most widely used because they permit rapid sextant-based examination with a standardized probe and provide an overview score indicating whether more detailed assessment is required [3].

Their principal advantages are speed, low cost, ease of implementation, and compatibility with routine general-dental consultations. Their limitations derive from simplification: they do not independently define disease extent, staging complexity, or site-specific severity, and they may underestimate localized involvement. Their most appropriate role is therefore first-line triage, followed—when indicated—by full periodontal charting and radiographic confirmation [3].

### 2. Imaging-based approaches

The second major direction identified in the literature is imaging-based screening, particularly through assessment of alveolar bone loss on panoramic radiographs. Whereas clinical tools capture chairside inflammatory and probing-based information, imaging contributes structural corroboration by depicting the level of periodontal support. A clinical study involving 456 patients showed that radiographic periodontal bone loss (R-PBL) assessment on panoramic radiographs can serve as a reliable screening-oriented method for periodontitis, although it does not replace clinical evaluation [4].

Recent reviews of radiographic diagnosis in periodontal disease confirm the essential role of imaging in assessing bone levels, defect morphology, and treatment planning [5]. At the same time, the limitations of two-dimensional radiographs remain well recognized, while three-dimensional techniques such as CBCT are reserved for selected indications requiring more precise characterization of intrabony defects or furcation involvement. From a screening standpoint, imaging is therefore best understood as a complementary structural layer whose value depends on clinical correlation rather than as a stand-alone diagnostic strategy [5].

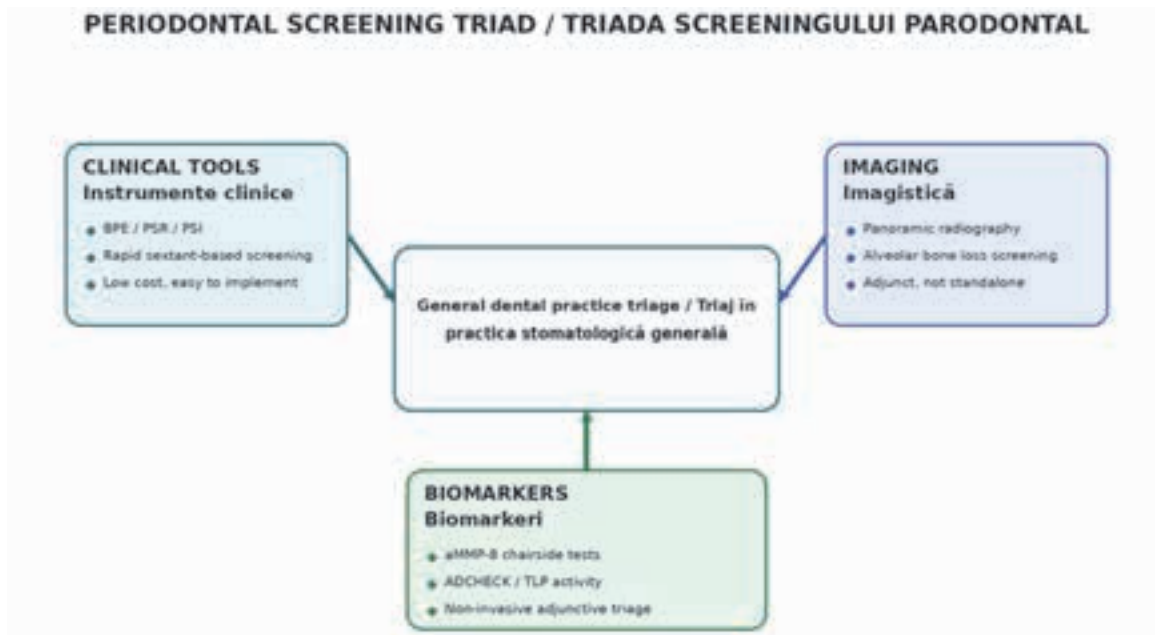
### 3. Biomolecular and microbiological chairside tests

The third and most dynamic screening direction is represented by salivary and microbiological point-of-care tests. Among the investigated biomarkers, aMMP-8 is one of the most extensively studied because it reflects active collagen degradation and ongoing periodontal tissue breakdown. Clinical evidence shows that the test tends to provide higher specificity than sensitivity, which supports its use as an adjunctive indicator rather than a solitary screening solution [6].

This interpretation is reinforced by higher-level evidence. A 2024 systematic review and meta-analysis reported pooled sensitivity of 0.63 and specificity of 0.84 for salivary aMMP-8 point-of-care testing, consistent with fair-to-moderate overall accuracy [8]. An updated 2025 validation and meta-analytic assessment reached a similar conclusion, namely that the test may enhance screening in selected contexts but cannot replace comprehensive periodontal examination [9].

In parallel, microbiological assays based on trypsin-like peptidase activity represent another promising pathway. ADCHECK, developed to detect proteolytic activity associated with red-complex pathogens, showed high specificity and very good concordance with real-time PCR in the 2022 study by Usui et al., suggesting potential value as a rapid adjunctive screening method [10]. Taken together, the biomarker and

microbiological literature supports integration into a layered screening model, especially when biological activity needs to be appraised alongside clinical and imaging findings, rather than substitution of conventional periodontal assessment.



**Figure 1. Stepwise periodontal screening pathway in general dental practice.**

Thus we propose a systematized stepwise periodontal screening pathway in general dental practice, that is based on current evidence regarding efficient methods in periodontal screening (figure 1).

## Conclusions

1. Currently available periodontal screening instruments can be grouped into three major domains—clinical, imaging-based, and biomolecular/microbiological—and none of them, when used in isolation, is sufficient to replace comprehensive periodontal examination.
2. Standardized clinical tools such as BPE/PSR/PSI remain the most pragmatic options for first-line triage in general dental practice because of their simplicity, speed, and low cost. Imaging-based methods add structural information on alveolar bone support, but their interpretive value depends on clinical correlation.
3. Biomolecular and microbiological chairside tests constitute the most innovative screening direction; however, the current evidence supports a complementary, context-dependent role rather than independent diagnostic replacement. Their greatest clinical value is likely to emerge within a stepwise screening algorithm adapted to patient risk profile and practice setting.

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### ACUPUNCTURA ÎN TRATAMENTUL NEURALGIEI DE TRIGEMEN DENTOGENE – MECANISME MOLECULARE ȘI STRATEGII DE TRATAMENT SIGURE

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