

# The Evolution of Periodontal Disease Classification

Anas Abdul Khader

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Disease  
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## ABSTRACT

**Objective:** This study aims to trace the historical evolution of periodontal disease classification systems, analyse contemporary challenges and critiques, and explore future directions for refinement.

**Methods:** A narrative review was conducted, examining key milestones in the development of periodontal disease classification frameworks from the initial broad categorisations to the comprehensive, evidence-based systems introduced through international workshops in 1989, 1999, and 2017.

**Results:** Early classifications were based on clinical observations, while later systems incorporated pathological principles, disease etiology, and host response factors. The 1999 system provided a detailed framework accounting for gingival diseases, chronic/aggressive periodontitis, systemic disease associations, and other conditions. The 2017 workshop further refined the classification, introducing a staging and grading system for periodontitis. Contemporary challenges include the complexity of certain gingival conditions, debates surrounding specific categories, and the need for the integration of emerging technologies and research findings.

**Conclusion:** The evolution of periodontal disease classification reflects our advancing understanding of disease pathogenesis. Continued interdisciplinary efforts, incorporating genetic, microbiological, and host-response research, are crucial for refining the classification system to enable more precise disease stratification, personalised treatment strategies, and improved clinical outcomes.

**Key Words:** Evolution; Periodontal diseases; Classification

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## INTRODUCTION

Periodontal diseases, such as gingivitis and periodontitis, represent a spectrum of inflammatory conditions affecting the periodontium, arising primarily from a dysbiosis of the oral microbiota, with dental plaque as the main etiological factor. The interaction between this microbial biofilm and the body's immune response leads to inflammation and, if unmitigated, to tissue destruction and tooth loss. The clinical course is characterised by episodic activity and quiescence, influenced by a combination of modifiable factors like smoking and non-modifiable factors such as genetics. Genetic predispositions, particularly affecting the immune response, play a crucial role in the severity and progression of these diseases. Moreover, periodontal diseases have been linked to systemic health issues, highlighting the importance of oral health in overall systemic homeostasis.<sup>1</sup> In periodontology, classification systems establish a uniform framework for the diagnosis of conditions such as gingivitis and various

stages of periodontitis. The importance of these systems lies in their ability to provide consistent diagnostic criteria, ensuring accuracy and facilitating professional communication among dental practitioners. Furthermore, it enables dentists to customise treatment strategies based on the specific stage and severity of the disease, ranging from enhanced oral hygiene practices in gingivitis to surgical interventions in advanced periodontitis. In the realm of research, these systems are invaluable.<sup>2</sup> They allow for the comparative analysis of various studies and facilitate the identification of distinct subgroups within periodontal diseases. This is crucial in the context of personalized medicine and the development of innovative diagnostic approaches. In essence, periodontal classification systems play a pivotal role in both patient care and the advancement of periodontal research.

The present study conducts a historical analysis of these classification systems within periodontology. The study aims to track the evolution of these diagnostic frameworks, highlighting how the understanding of periodontal diseases has transitioned from an early bifurcation into inflammatory versus degenerative categories, to the current acknowledgement of a multifactorial etiology. By examining the progression of these classification systems, the study aims to reveal how advancements in scientific knowledge have fundamentally altered our comprehension of periodontal disease pathogenesis.

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## METHODS

To conduct a literature survey on “The Evolution of Periodontal Disease Classification”, a search was conducted in February 2024 across various electronic databases, including PubMed, SCOPUS, EMBASE, COCHRANE library, and Science Direct. The search utilized MeSH terms/keywords such as "Periodontal disease", "Classification", "History" and "Evolution". In addition to the electronic search, cross-references and textbooks were manually searched for relevant articles. The inclusion criteria included articles published in the English language from February 2010 to February 2024 that fulfilled the study objectives. The article selection process involved assessing the inclusion and exclusion criteria, as well as conducting a quality assessment. Out of the initial 775 articles identified, 67 were selected based on their titles and abstracts. After evaluating the full texts and applying the inclusion and exclusion criteria, 19 articles were chosen for the review, meeting the study's criteria (Figure 1).

**Historical Perspective:** The chronicles of periodontal disease recognition and management stretch back millennia, with glimpses found in ancient Egyptian and Chinese texts. These accounts suggest an awareness of periodontal disease potentially as early as 5000 years ago. The dawn of modern periodontal literature emerged with Abu I Quasim (Abuccis) of 10th century Spain. Early attempts at classification, rooted in the 19th century, relied on observable clinical features. Terms like "pyorrhea alveolaris," literally translating to "pus oozing from the alveolus," reflected the prevailing notion of infected bone and influenced treatment approaches for many years. This era lacked a robust scientific foundation, with classifications such as "schmutz pyorrhea" and "paradontal pyorrhea" primarily based on observed characteristics. A paradigm shift occurred in the 1940s with Orban's classification scheme, which introduced pathological principles. This system categorized periodontal disease into "inflammatory," "dystrophic," and "traumatic" categories, gaining wider acceptance within the dental community. The 1960s witnessed a pivotal advancement - the recognition of a spectrum of related yet distinct periodontal diseases. Chronic marginal periodontitis became the primary recognized form, reflecting a move away from a singular disease entity.<sup>3</sup> By the 1970s and 1980s, the American Academy of Periodontology (AAP) classification acknowledged juvenile periodontitis and further sub-classified marginal periodontitis into "adult" and "rapidly progressive" forms. In 1976, a classification system was introduced that incorporated the concept of "host response" in addition to the presence of inflammation. In 1977, the American Academy of Periodontology (AAP) adopted Glickman's Classification, which

categorized periodontal diseases based on the age of onset and the rate of progression. In 1986, the World Health Organization (WHO) introduced the Community Periodontal Index of Treatment Needs (CPITN) for epidemiological studies.

In 1989, the World Workshop in Clinical Periodontics, organized by the AAP, introduced a new classification system that categorized periodontal diseases according to their etiology, clinical presentation, and disease progression. The main categories were: Adult Periodontitis (Chronic Periodontitis), Early-Onset Periodontitis (Aggressive Periodontitis), Periodontitis Associated with Systemic Diseases, Necrotizing Periodontal Diseases, Abscesses of the Periodontium, Periodontitis Associated with Endodontic Lesions, and Developmental or Acquired Deformities and Conditions.<sup>4</sup> In 1999, the International Workshop for a Classification of Periodontal Diseases and Conditions refined the 1989 classification system. It introduced new categories, such as Gingival Diseases and Periodontal Diseases of Children and Adolescents.

In 2017, the World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions introduced a new classification system that included peri-implant diseases and conditions and further refined the categories for periodontal diseases.

### **The 1999 International Workshop for a Classification of Periodontal Diseases and Conditions:**

The 1999 International Workshop for a Classification of Periodontal Diseases and Conditions introduced a new comprehensive classification system aimed to address the limitations of previous classifications and provide a more detailed framework for categorizing various periodontal conditions. The major categories in the 1999 classification included: Gingival Diseases, Chronic Periodontitis, Aggressive Periodontitis, Periodontitis as a Manifestation of Systemic Diseases, Necrotizing Periodontal Diseases, Abscesses of the Periodontium, Periodontitis Associated with Endodontic Lesions, and Developmental or Acquired Deformities and Conditions.<sup>5</sup> Within these major categories, numerous subcategories were introduced to provide a more detailed and specific classification based on factors such as etiology, clinical presentation, and disease progression.

The 1999 classification system was adopted globally in accredited graduate periodontal programs and board examinations, as it addressed the shortcomings of the previous classification and reflected the advancements in the understanding of periodontal diseases. The introduction of the 1999 classification system represented a significant milestone in the field of periodontics. These classification systems aimed to provide a standardized framework for diagnosing, understanding, and treating periodontal diseases,

reflecting the evolving knowledge and research in the field.<sup>6</sup>

Gingival diseases were categorized into dental plaque-induced and non-plaque-induced lesions. Chronic periodontitis was categorized based on the severity of clinical attachment loss (CAL) into slight, moderate, or severe forms, with each form further subdivided into localized or generalized presentations. Similarly, aggressive periodontitis was categorized based on CAL and localized or generalized patterns. The classification accounted for periodontitis as a manifestation of systemic diseases, including subcategories associated with haematological disorders, genetic disorders, and unspecified systemic conditions. Necrotising periodontal diseases were classified into necrotising ulcerative gingivitis and necrotizing ulcerative periodontitis. Abscesses of the periodontium were divided into a gingival abscess, periodontal abscess, and peri coronal abscess categories.<sup>7</sup> Periodontitis associated with endodontic lesions encompassed combined periodontic-endodontic lesions. The developmental or acquired deformities and conditions category included various local factors related to teeth and restorations, mucogingival deformities, and occlusal trauma. These comprehensive categories aimed to address the shortcomings of previous classification systems by providing a more detailed and clinically relevant framework for diagnosing and understanding the diverse range of periodontal diseases and conditions.

The 1999 classification system had a significant positive impact on both clinical practice and research in the field of periodontics. In clinical settings, it became the official terminology adopted by the American Academy of Periodontology (AAP). While it did not change insurance coding for billing periodontal treatments, the new detailed categories allowed for better communication and a more continuous understanding of the range of periodontal conditions. The inclusion of an expanded section on gingival diseases was also an important development.<sup>8</sup> For research, the comprehensive framework provided by the 1999 classification enabled more organized and comparable study of periodontal disease data across different regions. Researchers could categorise and analyse findings in a more standardized manner, improving research quality and collaboration.

**The 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions:** In 2017, the field of periodontology witnessed a landmark advancement with the introduction of a revised classification system by the American Academy of Periodontology (AAP) and the European Federation of Periodontology (EFP). This novel framework addressed the inherent limitations of the 1999 classification system, offering a more robust and comprehensive approach to diagnosing and

managing periodontal diseases. This new approach sought to create a more encompassing nosology for periodontal pathologies. The scope of the classification was expanded to encompass not only established periodontal diseases but also peri-implant diseases and conditions. This broader perspective reflects the evolving understanding of oral health and the challenges associated with Osseo-integrated implants.<sup>9</sup> The 2017 system incorporates detailed information on established risk factors such as cigarette smoking, a well-documented contributor to periodontal disease progression. Additionally, it considers a patient's specific response to periodontal therapy, paving the way for the development of individualized treatment plans. Furthermore, the revised classification emphasizes understanding the etiologic factors of periodontal diseases. This deeper understanding of the disease pathogenesis empowers periodontists and general dentists for more effective management strategies and to develop optimal treatment plans for individual patients. This shift towards a more personalized, evidence-based approach has the potential to significantly improve clinical outcomes and patient well-being.

This revised framework incorporates several key changes and additions; Stage and Grade Refinement where all three previously recognized forms of periodontal disease (chronic, aggressive, and periodontitis as a manifestation of systemic diseases) have been recategorized into a more nuanced system incorporating stages and grades. This allows for a more precise assessment of disease severity and progression. Reflecting the growing use of dental implants, the 2017 classification now encompasses peri-implant diseases and conditions. This inclusion equips clinicians with the necessary tools for diagnosing and managing these implant-related complications.<sup>10</sup> Recognizing the wider spectrum of potential pathogens, the classification incorporates specific categories for fungal and viral infections. This allows for a more targeted approach to treating these less common infectious etiologies. The 2017 system eliminates redundant categories like "Erythema Multiforme" and "Drug-induced" gingivitis. Additionally, it simplifies the terminology for necrotizing ulcerative gingivitis/periodontitis by removing the "ulcerative" descriptor and replacing it with just "necrotizing gingivitis" and "necrotizing periodontitis". The new classification introduces the term "necrotizing stomatitis," acknowledging this distinct inflammatory condition affecting the oral mucosa. The previous distinction between "chronic" and "aggressive" periodontitis has been replaced with a new grouping under the broader category of "periodontitis." This reflects a more nuanced understanding of the disease process, where factors like disease course and host response play a crucial role in classification.<sup>11</sup>

Table No.1: Comparison of Periodontal Disease Classification Systems

Classification System	Period	Scope	Defining Criteria
Orban's Classification	1940s	Periodontal diseases	Categorized periodontal diseases into "inflammatory," "dystrophic," and "traumatic" based on pathological principles.
Glickman's Classification	1977	Periodontal diseases	Based on the age of onset and rate of progression, sub-dividing periodontitis into "adult" and "rapidly progressive" forms.
WHO CPITN	1986	Epidemiological studies	Community Periodontal Index of Treatment Needs (CPITN) to assess periodontal health on a community level.
AAP 1989 Workshop	1989	Clinical presentation of periodontal diseases	Introduced a new classification system categorizing periodontal diseases by etiology, clinical presentation, and disease progression. Major categories included Adult Periodontitis (Chronic), Early-Onset Periodontitis (Aggressive), Periodontitis Associated with Systemic Diseases, and others.
AAP 1999 Workshop	1999	Refinement of periodontal disease classification	Refined the 1989 system and introduced new categories such as Gingival Diseases, Chronic Periodontitis, Aggressive Periodontitis, Periodontitis as a Manifestation of Systemic Diseases, and others.
AAP/EFP 2017 Workshop	2017	Periodontal and peri-implant diseases and conditions	Introduced staging and grading for periodontitis, covering all forms of periodontal disease. Included peri-implant diseases and conditions. Emphasized risk factors, etiology, and host response. Introduced stages and grades to determine severity and risk of progression.

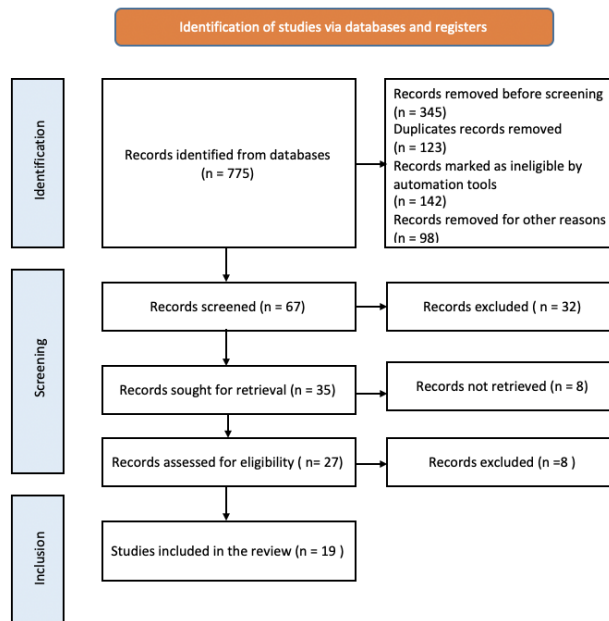


Figure No.1: Flowchart showing the step-by-step identification of the studies via databases

The staging and grading system for periodontitis in the new 2017 classification framework for periodontal diseases, incorporates a multi-dimensional staging and grading system for periodontitis. The staging component primarily assesses the severity and extent of the current periodontal destruction and complexity of disease management. It is determined by factors such as clinical attachment loss (CAL), radiographic bone loss (RBL), probing depth (PD), and presence of vertical and horizontal osseous defects, furcation involvement, tooth hypermobility, and ridge defects. The distribution of these lesions across the dentition is also considered. Stages range from the initial Stage I to the most severe Stage IV periodontitis.

Grading, on the other hand, evaluates the potential future progression of the disease based on the evidence of progression rate in the past, anticipated response to

standard periodontal therapy, and the influence of risk factors. It incorporates direct evidence of progression rate from longitudinal records, as well as indirect evidence from clinical and radiographic findings and risk factor assessment. The three grades - A (slow progression), B (moderate progression), and C (rapid progression) - provide insights into the likely aggressiveness and treatment responses.<sup>12</sup> The grading process accounts for the modulating effects of risk factors, with a specific emphasis on smoking and diabetes as potential contributors to accelerated progression and impaired healing responses. These risk factors can influence the final grade assigned and may necessitate more intensive treatment and monitoring protocols.

By integrating both the current severity (staging) and future risk dimensions (grading), this multifaceted

system facilitates a comprehensive assessment of individual periodontitis cases, enabling more personalized treatment planning, prognostic evaluations, and targeted preventive strategies. The expanded scope, including peri-implant conditions, equips practitioners with tools for diagnosing and managing implant-related complications, reflecting the increasing use of dental implants.<sup>13</sup>

For research, the updated classification offers a standardized and globally accepted terminology, facilitating consistent data reporting and cross-study comparisons. The emphasis on etiologic factors and host response paves the way for investigations into disease mechanisms, biomarkers, and targeted therapies. Collaborative research efforts across disciplines can leverage the classification system to advance our understanding of periodontal and peri-implant disease pathogenesis, ultimately informing evidence-based clinical decision-making and improving patient outcomes.

In the 2017 classification of periodontal and peri-implant diseases and conditions, a significant addition was the category of "clinical health." This category was introduced to address the limitations of the previous system, which often led to the misdiagnosis of cases as either gingivitis or periodontitis. By recognizing clinical health, the revised classification provides a framework for identifying and managing cases where the periodontal tissues are healthy, thereby preventing unnecessary treatment for conditions that do not exist.

The 2017 classification acknowledges that clinical health can exist in both the periodontium (the structures that support the teeth) and peri-implant tissues (the tissues surrounding dental implants). This differentiation helps clinicians accurately diagnose the health status of these tissues and apply appropriate preventive and maintenance strategies. The inclusion of clinical health as a distinct category underscores the importance of recognizing and preserving healthy periodontal and peri-implant conditions, which is essential for overall oral health and effective long-term management of periodontal diseases.

**Contemporary Challenges and Critiques:** The 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions provided an updated framework for classifying gingival diseases. While this classification system represents a significant advancement, there are ongoing challenges in its application in clinical settings, as well as critiques and debates surrounding specific categories or criteria. Moreover, emerging technologies and scientific discoveries play a crucial role in addressing these challenges and refining the classification system.

One of the primary challenges in applying the current classification is the inherent complexity and overlap of certain gingival conditions. For instance, differentiating between plaque-induced and non-plaque-induced gingival lesions can be complicated in cases where multiple etiological factors are involved. Additionally, the clinical manifestations of some gingival diseases

may exhibit similarities, making definitive diagnosis based solely on clinical presentation a challenge. There have been critiques and debates surrounding specific categories within the gingival disease classification.<sup>14</sup> For example, the categorisation of certain lesions as "non-plaque-induced" has been questioned, as the role of the biofilm in the pathogenesis of these conditions may have been underestimated. Furthermore, the criteria for distinguishing between different subcategories, such as the various forms of desquamative gingival lesions, have been subject to ongoing discussions and refinements.

Emerging technologies and scientific discoveries have the potential to address these challenges and refine the classification system. Advances in molecular diagnostics, including the application of genomics, transcriptomics, and proteomics, can provide valuable insights into the underlying pathogenic mechanisms of gingival diseases. These technologies may facilitate the identification of specific biomarkers or molecular signatures that can aid in more accurate diagnosis and classification. Furthermore, the integration of novel imaging modalities, such as advanced optical coherence tomography (OCT) or multiphoton microscopy, may enable enhanced visualisation and characterisation of gingival lesions, potentially revealing subtle differences that could inform classification refinements.<sup>15</sup>

Longitudinal studies and large-scale epidemiological data analyses, facilitated by electronic health records and data-sharing initiatives, can shed light on the natural history, risk factors, and clinical outcomes of various gingival diseases. This information can be instrumental in validating or refining the existing classification criteria. Collaborative efforts among clinicians, researchers, and professional organizations are crucial in addressing these challenges.<sup>16</sup> Regular reassessments of the classification system, incorporating the latest scientific evidence and clinical experiences, will be essential to ensure its continued relevance and applicability in diverse clinical settings. By embracing emerging technologies, fostering interdisciplinary research, and encouraging open scientific discourse, the dental community can work towards a more comprehensive and accurate classification of gingival diseases, ultimately enhancing our ability to provide targeted prevention, diagnosis, and management strategies for these prevalent oral health conditions.

## FUTURE DIRECTIONS

Potential areas for refinement in the classification of periodontal diseases include re-evaluating the sub-classification of chronic and aggressive periodontitis based on disease progression patterns and risk factors. Additionally, the classification of periodontitis associated with systemic diseases may require updates as new systemic links are established through research. Furthermore, incorporating genetic risk stratification, microbial profiles, and host-response biomarkers into the classification criteria could enhance disease characterization and personalized treatment approaches. Regular reassessments and interdisciplinary

collaborations are crucial to ensure the classification system remains clinically relevant and aligned with the latest scientific advancements in the field.<sup>17</sup>

Genetic studies could lead to classifying periodontal diseases based on specific genetic profiles associated with disease susceptibility or progression patterns. High-throughput microbiological techniques may uncover new microbial communities implicated in distinct clinical presentations, necessitating new categories or subcategories. Research on host-response mechanisms, including immune regulation, inflammation, and tissue repair, could identify biomarkers or molecular signatures characteristic of different periodontal disease phenotypes. Integrating such genetic, microbiological, and host-response data into classification criteria may enable more precise disease stratification and personalized treatment strategies. Continued research in these areas is crucial for refining future periodontal disease classifications to reflect our evolving understanding of disease pathogenesis.<sup>18</sup>

Refining the classification of periodontal diseases requires interdisciplinary collaboration among clinicians, researchers from genetics, microbiology, immunology, and epidemiology.<sup>19</sup> Achieving international consensus through collaborative efforts between professional organizations, academic institutions, and global stakeholders is crucial for widespread acceptance and adoption of an updated, universally applicable classification system.

## CONCLUSION

The classification of periodontal diseases has significantly evolved, transitioning from broad clinical observations to evidence-based frameworks, notably through milestones like the 1989 and 1999 international workshops. These advancements enhance diagnosis, research, and management by providing standardized terminology, aiding communication, facilitating comparative studies, identifying risk factors, and guiding tailored interventions. Without refined classification schemes, addressing these prevalent oral health issues would be hindered. Yet, achieving an optimal system is an ongoing process, necessitating adaptation to emerging scientific insights on disease mechanisms, biomarkers, and treatments.

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