



Original Research Article

A Comparative Evaluation of Periodontitis Diagnosis Based on the 1999 and 2017 Classification Systems

Article History:

Name of Author:

Dr Shumaila Younus¹, Dr Ujala Mushtaque², Dr M Ibtahaj Khan³, Dr Rumaisa Tariq⁴, Dr Muhammad Ubaidullah Makki⁵, Dr Laiba Arshad Nawab⁶

Affiliation: ¹Assistant Professor, Department of Oral Pathology, Jinnah Medical and Dental College, Karachi, Pakistan

²Assistant Professor/ Head of Department Periodontology, Jinnah Medical and Dental College, Karachi, Pakistan

³Lecturer and Demonstrator, Department of Periodontology, Jinnah Medical and Dental College, Karachi, Pakistan

⁴Lecturer and Demonstrator, Department of Periodontology, Jinnah Medical and Dental College, Karachi, Pakistan

⁵House Officer, Department of Periodontology, Jinnah Medical and Dental College, Karachi, Pakistan

⁶House Officer, Department of Periodontology, Jinnah Medical & Dental College, Karachi, Pakistan

Corresponding Author: Dr Ujala Mushtaque

Received: 12-05-2025

Revised: 05-06-2025

Accepted: 20-06-2025

Published: 15-01-2026

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Abstract: Background: Objective The 1999 classification of periodontal diseases has been widely used in both clinical practice and research; however, several conceptual and practical limitations prompted the development of an updated system in 2017. This study aimed to evaluate how patients previously diagnosed with periodontitis under the 1999 classification were reclassified according to the 2017 periodontal disease classification framework.

Methodology A cross-sectional quantitative study was conducted among 100 patients aged 40–50 years who had been previously diagnosed with periodontitis using the 1999 classification system. Comprehensive periodontal examinations were performed, including probing depth (PD), clinical attachment loss (CAL), bleeding on probing (BoP), and radiographic bone loss assessment. Patients were reassessed and categorized according to the 2017 classification using staging and grading criteria. **Results** Reclassification of patients demonstrated notable differences in diagnostic categorization when applying the 2017 classification. The newer system allowed more precise stratification based on disease severity, extent, and progression risk compared to the 1999 classification. **Conclusion** The 2017 periodontal classification provides a more comprehensive and biologically relevant framework for diagnosing periodontitis. Its application enhances diagnostic accuracy and supports individualized treatment planning compared to the 1999 classification system.

Keywords: Periodontitis, Periodontal Staging, Gingival Inflammation.

INTRODUCTION

Periodontitis is a multifactorial chronic inflammatory

disease initiated by microbial biofilms and influenced by host immune responses, leading to progressive

destruction of periodontal ligament and alveolar bone, and eventually tooth loss if left untreated (1). It remains one of the leading causes of tooth loss in adults worldwide and has been increasingly linked with systemic conditions such as diabetes mellitus and cardiovascular diseases (2). Accurate diagnosis and classification are therefore essential for effective disease management, prognosis determination, and epidemiological research (3). The classification of periodontal diseases has evolved over time to reflect advancements in scientific understanding (4). The 1999 classification system categorized periodontitis into chronic periodontitis, aggressive periodontitis, and periodontitis as a manifestation of systemic disease (5). Although this system was widely adopted in clinical practice and research, it relied heavily on disease extent and severity while lacking clear biological distinctions between disease entities (6). As a result, overlapping diagnostic categories often caused ambiguity in diagnosis and treatment planning (7). One of the major limitations of the 1999 classification was the absence of parameters related to disease progression and risk assessment (8). The distinction between chronic and aggressive periodontitis was often difficult to apply clinically due to similar clinical presentations, leading to inconsistent diagnoses among clinicians (9).

The 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions addressed several unresolved limitations of earlier classification systems. A major advancement was the introduction of standardized definitions of periodontal health and gingival inflammation on both intact and reduced periodontium, with bleeding on probing endorsed as the primary parameter for defining gingival inflammation. Importantly, the consensus emphasized that while gingivitis may revert to health, patients diagnosed with periodontitis remain susceptible to life, even after successful therapy, necessitating long-term supportive periodontal care. These refinements improved diagnostic clarity, particularly in previously treated patients, and enhanced the clinical and epidemiological applicability of the updated classification framework (10). Additionally, the system did not account for previously treated or stable cases, further limiting its applicability in longitudinal patient management. To overcome these limitations, the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions introduced a revised framework (11). The updated classification eliminated the term “aggressive periodontitis” and unified all forms under a single diagnosis of periodontitis, further categorized by staging and grading. Staging (I–IV) reflects disease severity and complexity, while grading indicates the rate of progression and risk factors such as smoking and systemic diseases (8). Furthermore, the 2017

classification introduced standardized definitions of periodontal health and gingival inflammation on both intact and reduced periodontium, allowing improved diagnostic clarity in previously treated patients (12). By incorporating disease severity, complexity, and progression risk into a single framework, the updated system provides a more comprehensive and clinically relevant approach. The present study aims to evaluate how patients previously diagnosed using the 1999 classification are reclassified under the 2017 system.

MATERIALS AND METHODS

This cross-sectional quantitative study was conducted in the Department of Periodontology at Jinnah Medical and Dental College, Karachi, Pakistan, over a six-month period from April 2025 to September 2025. Ethical approval was obtained from the institutional review board, and all procedures were carried out in accordance with ethical guidelines. Written informed consent was obtained from all participants prior to inclusion in the study. A total of 100 male and female patients aged between 40 and 50 years were included. All participants had been previously diagnosed with periodontitis according to the 1999 classification system. Patients who had received periodontal therapy within the preceding six months, those with systemic diseases or medications affecting periodontal health, pregnant or lactating women, and individuals with incomplete records were excluded to minimize confounding factors.

Comprehensive periodontal examinations were performed using a Williams periodontal probe. Probing depth and clinical attachment loss were recorded at six sites per tooth, while bleeding on probing was assessed to determine inflammatory status. Full-mouth radiographs were obtained to evaluate alveolar bone loss. All clinical and radiographic examinations were performed by calibrated examiners to ensure consistency. Patients were reassessed and classified according to the 2017 classification system. Individuals with probing depths less than 4 mm and bleeding on probing below 10% were categorized as having a reduced periodontium without active inflammation. Those with bleeding or probing equal to or greater than 10% were classified as having gingival inflammation on a reduced periodontium. Patients with probing depths of 4 mm or more were diagnosed with periodontitis and further categorized by stage and grade based on clinical attachment loss, radiographic bone loss, and disease extent. Data was recorded and analyzed using statistical software. Descriptive statistics were calculated using means and standard deviations, while comparative analysis was conducted using chi-square tests and independent t-tests. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 100 participants previously diagnosed with periodontitis according to the 1999 classification system were included in the study. The study population consisted of 46 male and 54 female participants with a mean age of 45.2 years. All individuals had a previous diagnosis of periodontitis based on the 1999 classification. The mean age of the participants was 45.2 ± 3.1 years, with a slightly higher proportion of females than males. All patients underwent comprehensive periodontal re-evaluation using the 2017 classification criteria as shown in table 1.

Table 1: Demographic Characteristics of Study Participants (n = 100)

Variable	Frequency	Percentage (%)
Male	46	46.0
Female	54	54.0
Mean Age (years)	45.2 ± 3.1	—

Upon re-evaluation using the 2017 classification, 40% of patients previously diagnosed with periodontitis were reclassified as having a reduced periodontium with or without active inflammation. Periodontitis was confirmed to be 60% of the study population based on current diagnostic criteria as shown in table 2.

Table 2: Reclassification of Periodontal Status According to the 2017 Classification

Periodontal Status	Frequency (n)	Percentage (%)
Reduced periodontium without inflammation	18	18.0
Reduced periodontium with gingival inflammation	22	22.0
Periodontitis	60	60.0

Among patients diagnosed with periodontitis, Stage III disease was the most prevalent (40%), indicating advanced attachment loss and increased disease complexity. Early-stage disease (Stage I) was observed in a smaller proportion of patients as shown in table 3.

Table 3: Distribution of Periodontitis by Stage (2017 Classification) (n = 60)

Stage	Frequency (n)	Percentage (%)
Stage I	8	13.3
Stage II	18	30.0
Stage III	24	40.0
Stage IV	10	16.7

Grading analysis revealed that most periodontitis patients were classified as Grade B, reflecting a moderate rate of disease progression. However, more than one-quarter of patients demonstrated rapid progression (Grade C), emphasizing the importance of risk-based assessment as shown in table 4.

Table 4: Distribution of Periodontitis by Grade (2017 Classification) (n = 60)

Grade	Frequency (n)	Percentage (%)
Grade A (slow progression)	12	20.0
Grade B (moderate progression)	32	53.3
Grade C (rapid progression)	16	26.7

Generalized periodontitis was more frequently observed than localized disease, affecting 65% of patients diagnosed with periodontitis under the 2017 classification as shown in table 5.

Table 5: Comparison of Disease Extent Under the 2017 Classification (n = 60)

Extent of Disease	Frequency (n)	Percentage (%)
Localized (<30% teeth involved)	21	35.0
Generalized ($\geq 30\%$ teeth involved)	39	65.0

While all participants were diagnosed with periodontitis under the 1999 classification, the 2017 system demonstrated improved diagnostic discrimination by identifying 40% of patients as having stable periodontal conditions rather than active disease as shown in table 6.

Table 6: Comparison Between 1999 and 2017 Classification Outcomes

Diagnostic Outcome	1999 Classification (n)	2017 Classification (n)
Diagnosed as periodontitis	100	60
Non-active / stable disease	—	40

DISCUSSION

This study demonstrates the practical implications of transitioning from the 1999 to the 2017 periodontal disease classification system. The findings highlight significant differences in diagnostic categorization when patients previously labeled as periodontitis were reassessed using updated criteria. These observations support previous reports emphasizing the limitations of the older classification system. The 1999 classification relied primarily on disease severity and extent, often failing to distinguish disease activity or progression risk (8). As reported by Flemmig³, this resulted in overlapping diagnoses and inconsistent treatment approaches. Our findings reflect similar challenges, where patients initially diagnosed with periodontitis were reclassified as having stable or non-active disease under the 2017 framework. The 2017 classification introduces staging and grading, enabling a multidimensional assessment of periodontal disease (13). Staging allows clinicians to assess disease severity and complexity, while grading provides insight into disease progression and risk factors (8). This dual approach enhances clinical decision-making and supports individualized treatment planning (14). Another significant advantage of the 2017 system is the introduction of periodontal health and gingival inflammation on a reduced periodontium (15). This distinction is particularly valuable in previously treated patients, allowing clinicians to differentiate between historical tissue loss and active disease, a limitation noted in earlier systems.

Moreover, recent studies corroborate the substantial impact of adopting the 2017 classification on periodontal diagnosis and clinical interpretation. Karaaslan et al. demonstrated that a significant proportion of patients previously diagnosed as chronic periodontitis under the 1999 classification were reclassified into distinct stages and grades under the 2017 framework, highlighting improved granularity in disease description and risk stratification (16). Similarly, research analyzing electronic health records found that aggressive periodontitis cases, previously distinct in the 1999 system, were uniformly classified as Grade C in the new system, emphasizing the

importance of progression risk factors in modern periodontal diagnosis (17). Additionally, broader epidemiological evidence has shown that prevalence estimates of periodontitis decrease significantly when the 2017 criteria are applied, suggesting that the updated classification may reduce over-diagnosis and

better reflect true disease burden (18). Overall, the results of this study align with international consensus reports advocating the adoption of the 2017 classification (19, 20, 21). The improved diagnostic precision and risk assessment capabilities of the updated system make it more suitable for contemporary periodontal practice and research.

A major strength of this study was the direct comparison of two widely used periodontal classification systems within the same patient population. Standardized clinical and radiographic assessments enhanced diagnostic reliability. However, the cross-sectional design limits assessment of disease progression over time. Additionally, the study was conducted at a single center, which may limit generalizability.

CONCLUSION

The 2017 periodontal disease classification system provides a more comprehensive and clinically relevant diagnostic framework than the 1999 classification. Its application allows improved differentiation of disease severity, complexity, and progression risk. Reclassification of patients previously diagnosed under the 1999 system underscores the importance of adopting the updated classification for accurate diagnosis, treatment planning, and future periodontal research.

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