COMPARISON OF PERIODONTITIS DIAGNOSES ACCORDING TO 1999 AND 2017 CLASSIFICATIONS: AN ORIGINAL ARTICLE

ABSTRACT

Objectives: Classification systems of periodontitis have changed several times over the past 30 years as new information gathered about the pathophysiology of the disease rendered previous systems inadequate for classifying the diagnoses of all patients. Although the 1999 classification system was widely used in clinical practice and scientific studies, it had significant limitations leading to the reclassification introduced in 2017. In this context, the aim of this study is to evaluate how individuals diagnosed with periodontitis under the 1999 system were reclassified according to the 2017 system.

Materials and Methods: Participants diagnosed with periodontitis according to 1999 classification and who had not received periodontal treatment in the last six months were included in the study. The patient assessment procedure consisted of a comprehensive periodontal diagnosis through periodontal charting and full-mouth radiography.

Results: A total of 315 subjects (133 males and 182 females) were included in the study. According to the new classifications, 42 patients (17.94%) previously diagnosed with generalized chronic periodontitis according to 1999 classifications, were now classified as healthy with reduced periodontium, and 11 (4.7%) patients were classified as gingival inflammation with reduced periodontium. 63 (26.92%) patients were classified as SIII-GC and 33 patients (14.14%) as SIV-GC.

Conclusions: The new classification system is based on not only disease severity but also the dimensions of an individual's disease which include complexity and risk factors.

Keywords: Classification, diagnosis, disease, periodontitis.

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INTRODUCTION

Periodontitis is a microbially associated and host mediated multifactorial inflammatory disease characterized by loss of periodontal attachment.[1] Periodontitis classification has been modified several times in the last 30 years in accordance with emerging scientific findings.[2] The periodontitis classification system widely accepted in 1999 was used in both clinical practice and scientific research, despite its important deficiencies, such as the lack of pathobiology-based distinctions, diagnostic imprecision, and difficulties in practice.[3] The analysis of these important shortcomings prompted the reclassification of periodontitis in the 2017 workshop.[4]

The result of the 2017 workshop provides a current and future-oriented classification of the periodontal status of patients. Three types of periodontitis have been defined in the new classification: a) periodontitis, b) necrotizing periodontitis, and c) periodontitis as a manifestation of systemic disease. A staging and grading system was created to replace the term "aggressive periodontitis." Periodontitis was reclassified into four stages (I, II, III, and IV) according to severity of the disease, and three grades (A, B, and C) to differentiate disease susceptibility.[5] Importantly, the terms "clinical health" and "intact and reduced periodontium" were defined.[6]

The 2017 classification system addresses unresolved problems in the earlier system and provides a "future-proof" system for classifying periodontitis. This study evaluates how individuals diagnosed with periodontitis under the 1999 system are to be reclassified using the 2017 parameters.

MATERIALS AND METHODS

This study was conducted from February 2019 to August 2019 at the Faculty of Dentistry of Usak University. Participants were informed about the purpose of the investigation and informed consent forms were signed. The study was conducted according to the Helsinki Declaration's norms, and ethical approval was granted by the Local Ethical Committee of Usak University (Registration No: 226-04).

A comprehensive periodontal diagnosis was undertaken in the patient assessment procedure through periodontal charting and full-mouth radiography. Participants who had been diagnosed with periodontitis according to 1999 classifications and who had not received periodontal treatment in the previous six months were included in the study. The patients diagnosed under 1999 parameters as having chronic or aggressive periodontitis were reviewed by a calibrated periodontologist (AD). Patients' periodontitis was reported as localized if ≤ 30% of the sites were affected—otherwise, as generalized.[7,8]

The same patients were re-evaluated according to the 2017 classification system by another calibrated investigator (FK) who was blind to their 1999 classifications. The patients were diagnosed as having periodontitis under these criteria: their interdental clinical attachment loss (CAL) was detectable at ≥ 2 non-adjacent teeth; their buccal or oral CAL was ≥ 3 mm with pocketing > 3 mm detectable at ≥ 2 teeth;[5] and the observed CAL could not be attributed to non-periodontitis causes. Periodontitis patients who do not have a probing pocket depth (PPD) of 4 mm or more, and with bleeding on probing (BoP) lower than 10%, were diagnosed with reduced periodontium; those with BoP higher than 10% were diagnosed as having reduced periodontium with gingival inflammation. If periodontitis patients had a PPD of 4 mm or more, periodontitis needs to be assessed as to stage and grade.[9,10]

The stages are based primarily on the worst-affected tooth's interdental CAL. The complexity score depends on the difficulty of treating the case, considering factors like deep probing depths, furcation involvement, and vertical defects. Subclassification of stages was reported as localized if < 30% of teeth were affected—otherwise, as generalized.[5,10]

Grade is based on the assessment of bone loss at the worst-affected tooth as a function of age. It is measured as radiographic bone loss in a

percentage of root length divided by the patient's age. Grades A and B can be modified if the patient smokes or is diabetic.[5,10]

Data analysis was performed by using the software Statistical Package version 17.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to evaluate the data in this study.

RESULTS

A total of 315 patients (133 males and 182 females) were included in the study. According to 1999 classifications, 234 (74.28%) of these patients suffered from generalized chronic periodontitis, 38 (12.06%) from generalized aggressive periodontitis, 21 (6.68%) from localized chronic periodontitis, and 22 (6.98%) from localized aggressive periodontitis.

Under the new classification system, 42 patients (17.94%) diagnosed with generalized chronic periodontitis in the 1999 system were reclassified as healthy and reduced periodontium, and 11 (4.7%) were reclassified as gingival inflammation with reduced periodontium. Sixty-three patients (26.92%) were classified as SIII-GC (stage III, grade C) and 33 (14.14%) as SIV-GC (Table 1).

Table 1. The new classification of patients with chronic periodontitis

1999 C n/ %	2017 C n/ %										Total n /%
	RP	RPG	N-RPG	SII -GB	SII-GC	SIII-GA	SIII-GB	SIII-GC	SIV-GB	SIV-GC	
GCP	42/ 17.94	11/ 4.7	-	19/ 8.11	22/ 9.4	6/ 2.56	31/ 13.24	63/ 26.92	7/ 2.99	33/ 14.14	234/ 100
LCP	5/ 23.80	-	2/ 9.53	-	-	-	8/ 38.09	6/ 28.58	-	-	21/ 100
Total	47/ 18.43	11/ 4.31	2/ 0.78	19/ 7.45	22/ 8.62	6/ 2.35	39/ 15.29	69 / 27.05	7/ 2.74	33 / 12.98	255 / 100

C: Classification
RP: Reduced periodontium
RPG: Reduced periodontium with gingival inflammation
N-RPG: Non periodontitis caused reduced periodontium with gingival inflammation
LCP: Localized chronic periodontitis
GCP: Generalized chronic Periodontitis

Five (23.80%) patients who were diagnosed with localized chronic periodontitis using 1999 parameters were reclassified as healthy and reduced periodontium. Two patients (9.53%) were classified as reduced periodontium and gingival inflammation from non-periodontitis causes (Table 1).

Of the patients diagnosed with generalized aggressive periodontitis according to 1999 classification, 21 (55.27%) were classified as SIV-GC, and 13 patients (59.09%) diagnosed with localized aggressive periodontitis according to 1999 classifications were classified as SIII-GC (Table 2).

Table 2. The new classification of patients with agressive periodontitis

1999 C n/ %	2017 C n/ %		Total n/ %
	SIII-GC	SIV-GC	
GAP	17 / 44.73	21/ 55.27	38/ 100
LAP	13/ 59.09	9/ 40.91	22/ 100
Total	30/ 50.0	30/ 50.0	60/ 100

C: Classification
GAP: Generalized aggressive periodontitis
LAP: Localized agressive periodontitis

According to 1999 classification, the mean age of generalized chronic periodontitis patients was 47.42 ± 10.67, and the mean age of localized aggressive periodontitis patients was 22.75 ± 3.40.

The age and gender distribution of patients diagnosed according to 1999 classification is shown in Table 3.

Table 3. The age and gender distribution of patients who diagnosed according to 1999 classification

1999 C n/ %	Gender			Age
	Male n/ %	**Female** n/ %	**Total** n/ %	**Mean± sd.**
GAP	14 /10.52	24/ 13.18	38/ 12.06	36.33±6.86
GCP	99/ 74.43	135/ 74.17	234/ 74.28	47.42±10.67
LAP	12/ 9.02	10/ 5.49	22/ 6.98	22,75±3.40
LCP	8/ 6.03	13/ 7.16	21/ 6.68	42,00±6.08
Total	133/ 100	182/ 100	315/ 100	43.99±9.39

C: Classification
GAP: Generalized aggressive periodontitis
GCP: Generalized chronic periodontitis
LAP: Localized agressive periodontitis
LCP: Generalized chronic periodontitis

According to 2017 classification, the mean age of reduced periodontitis patients was 42.05 ± 7.57, and the mean age of SIV-GB patients was 52.0 ± 6.34. The age and gender distribution of patients diagnosed according to 2017 classification is shown in Table 4.

Table 4. The age and gender distribution of patients who diagnosed according to 2017 classification

2017 C	Gender			Age
	Male n /%	**Female** n /%	**Total** n /%	**Mean± sd.**
RPG	4 /3.01	7 /3.84	11 /3.49	53.00±8.49
N-RPG	1 /0.75	1 /0.54	2 /0.63	52.19±5.32
RP	20 /15.03	27 /14.83	47 /14.92	42.05±7.57
SII-GB	11 /8.27	8 /4.39	19 /6.03	51.00±14.00
SII-GC	10 /7.51	12 /6.59	22 /6.98	53.50±5.97
SIII-GA	2 /1.50	4 /2.19	6 /1.90	37.00±4.69
SIII-GB	16 /12.03	23 /12.63	39 /12.38	46.17±9.58
SIII-GC	46 /34.62	53 /29.12	99 /31.42	40.13±10.60
SIV-GB	2 /1.50	5 /2.74	7 /2.22	52.00±6.34
SIV-GC	21 /15.78	42 /23.13	63 /20.03	42.70±18.02
Total	133 /100	182 /100	315 /100	43.99±9.39

C: Classification
RPG: Reduced periodontium with gingival inflammation
N-RPG: Non periodontitis caused reduced periodontium with gingival inflammation
RP: Reduced periodontium

According to 1999 classification, 55.0% of smokers were diagnosed as generalized chronic periodontitis, and 35.41% of diabetics were diagnosed as localized chronic periodontitis. Distribution of smokers and diabetic patients is shown in Table 5.

Table 5. Distribution of smoker and diabetic patients who diagnosed according to 1999 classification

1999 C	Smoker patients n /%	Diabetic patients n /%
GCP	33 /55.0	31 /64.59
LCP	-	17 /35.41
GAP	19 /31.66	-
LAP	8 /13.34	-
Total	60 /100	48 /100

C: Classification
GAP: Generalized aggressive periodontitis
GCP: Generalized chronic periodontitis
LAP: Localized agressive periodontitis
LCP: Generalized chronic periodontitis

According to 2017 classification, 31.66% of smokers were diagnosed as SIII-GC and 37.5% of diabetics were diagnosed as SII-GC. Distribution of smokers and diabetic patients is shown in Table 6.

Table 6. Distribution of smoker and diabetic patients who diagnosed according to 2017 classification

2017 C	Smoker n /%	Diabetic n /%
SII-GC	5 /8.34	18 /37.5
SII-GB	6 /10.0	-
SIII-GB	11 /18.34	7 /14.58
SIII-GC	19 /31.66	9 /18.75
SIV-GB	-	-
SIV-GC	12 /20.0	9 /18.75
RP	7 /11.66	5 /10.41
Total	60 /100	48 /100

C: Classification
RP: Reduced periodontium

DISCUSSION

The 2017 classification system was developed in order to accommodate advances in knowledge derived from both biological and clinical research. The new classification characterizes periodontitis using a staging and grading system.[11] Periodontal health, gingival health, and gingival diseases on an intact and reduced periodontium are clearly defined for the first time.[12]

Of patients diagnosed with generalized chronic periodontitis or with localized chronic periodontitis according to 1999 classification, 17.94% and 23.80%, respectively, were re-diagnosed as having periodontitis-caused reduced periodontium with clinical gingival health under the 2017 classification system. Determining the current disease status of a patient who received periodontal therapy in the past is important in the new classification system.[13] A successfully-treated periodontitis patient may appear to be healthy, but a periodontitis patient remains a periodontitis patient for life. Clinical gingival health may be found in a patient with a history of periodontitis who was successfully treated and is currently stable.[14] Although patients are clinically healthy, periodontal stability requires careful maintenance and continued risk-factor control, because the disease may progress at any time.[12,15]

Of the patients diagnosed with generalized chronic periodontitis according to 1999 classification, 4.7% were re-diagnosed as having reduced periodontium with gingival inflammation. Dental plaque-induced gingivitis may arise on a reduced periodontium in a currently stable periodontitis patient in whom clinical inflammation has been eliminated. Therefore, patients should be closely monitored during periodontal maintenance for any reactivation of periodontitis.[4,16]

Of the patients diagnosed with localized chronic periodontitis according to 1999 classification, 9.53% were re-diagnosed as having reduced periodontium with gingival inflammation from non-periodontitis causes, due to attachment loss caused by orthodontic treatment. Alveolar bone loss or attachment loss due to causes other than periodontitis was classified as reduced periodontium in a non-periodontitis patient, according to the new classification.[17]

Chronic periodontitis patients were classified into different stages according to the new classification system. Patients can be diagnosed in a more detailed and precise way in the new classification, because the old classification is based solely on severity, while staging is now taken into account using complexity factors that affect treatment success, in addition to the standard dimensions of severity and extent.[3] Although chronic periodontitis patients were diagnosed as to different stages, there were no patients diagnosed as SI. This may be due to the absence of SI patients in this sample group, or because patients who would have been designated as SI were not diagnosed as having periodontitis in the 1999 classifications, because the worst-affected teeth guided the 2017 classifications, whereas diagnosis of periodontitis was based on

the mean CAL of the entire dentition in the 1999 classification.[3,13]

Chronic periodontitis patients were classified into different grades; 2.35% of chronic periodontitis patients were diagnosed as Grade A, which assumes a slow rate of progression, while 48.65% were diagnosed as Grade C, which indicates a high rate of disease progression. This means that almost half of chronic periodontitis patients are at risk for further progression of the disease and possibly poor outcomes of treatment. The reason for the high number of Grade C patients, despite slow to moderate rates of disease progression in patients with chronic periodontitis, can be explained as follows: if the patient has risk factors associated with greater disease progression or is less responsive to bacterial reduction therapies, the grade score was raised. The high rate of patients with chronic periodontitis being diagnosed as Grade C affects the intensity of therapy, secondary prevention after therapy, and careful maintenance therapy.[18,19]

Although chronic periodontitis patients were classified into different grade levels, all patients with aggressive periodontitis were diagnosed as Grade C, which is a predictor of adverse future disease progression in the absence of intervention for risk-factor control and treatment. While the severity of disease varies from slight to severe in individuals with chronic periodontitis, all individuals with aggressive periodontitis exhibit severe CAL.[20] According to the new classification, individuals with aggressive periodontitis will experience more rapid and severe destruction than individuals with chronic periodontitis. This is also consistent with the definition of the clinical features of aggressive periodontitis in the 1999 classification.[3,21]

Recognized risk factors for severe destruction at an earlier age and that negatively affect treatment response have not been included in previous periodontitis classification systems, but have been used to classify a patient who is a smoker or a patient with diabetes mellitus.[22,23] Improved knowledge of how risk factors affect periodontitis indicate that risk factors should be considered in the classification of periodontitis.[24,25]

Since including risk factors in the classification system predicts future disease susceptibility, the new classification can be seen as a future-oriented system.

According to 1999 classification, the mean age of generalized chronic periodontitis was highest, and the mean age of localized aggressive periodontitis was the lowest. This result is consisted with the literature that reports chronic periodontitis as being most prevalent in adults, while aggressive periodontitis usually affects people under 30 years of age.[20,26] According to the new classification, systemic conditions, risk factors, and treatment requirements modified the stage and grade of periodontitis rather than age. Thus, making an age-dependent generalization would be inaccurate with the new classification.

In the 1999 classification, the patient who requires initial periodontal treatment and the patient who requires advanced periodontal treatment were diagnosed with periodontitis and this situation was changed with 2017 classification. In the 2017 classification, the stage of the periodontitis increases as the patient's need for periodontal treatment increases. Another difference was that in 1999 classification all individuals with periodontitis were under the same maintenance treatment protocol. In 2017 classification, the necessity of more careful maintenance treatment was demonstrated for individuals with high disease progression rate as well as grade of periodontitis.

Although our study aims to compare the previous and the new classification systems, there are certain limitations. Firstly, individuals were classified as healthy or diseased considering their clinical status, and only HbA1c levels were requested from diabetic individuals. Secondly, different results may be obtained in other selected sample groups due to the nature of periodontitis.

In sum, the new classification is based on not only disease severity but also includes dimensions of an individual's disease, including complexity and risk factors. Thus, factors that influence approaches to therapy and disease outcomes are included in the classification.

Periodontitis Teşhisi Konulan Bireylerin 1999 Ve 2017 Sınıflamalarına Göre Karşılaştırılması

ÖZ

Amaç: Periodontitisin patofizyolojisi hakkında toplanan yeni bilgiler, önceki sınıflandırmaların tüm hastaların tanılarını koymada yetersiz kaldığı için, periodontitisin sınıflandırma sistemleri son 30 yılda birkaç kez değişti. 1999 sınıflandırma sistemi klinik uygulamada ve bilimsel çalışmalarda yaygın olarak kullanılmasına rağmen, 2017'deki yeniden sınıflandırmaya yol açan önemli sınırlamalara sahipti. Bu bağlamda, bu çalışmanın amacı, 1999 sistemi altında periodontitis tanısı konan bireylerin 2017 sistemine göre nasıl sınıflandırıldığını değerlendirmektir. Gereç ve Yöntemler: 1999 sınıflamasına göre periodontitis tanısı alan ve son altı ayda periodontal tedavi görmeyen katılımcılar çalışmaya dahil edildi. Hasta değerlendirme prosedürü, periodontal indekslerin alınması ve tam ağız radyografisi ile kapsamlı bir periodontal tanıdan oluşmaktaydı. Bulgular: Çalışmaya toplam 315 birey (133 erkek ve 182 kadın) dahil edildi. Yeni sınıflandırmaya göre, daha önce 1999 sınıflandırmasına göre generalize kronik periodontitis tanısı konan 42 hasta (%17,94), azalmış periodonsiyum ile sağlıklı, 11 (%4,7) hasta ise azalmış periodonsiyum ile dişeti iltihabı olarak sınıflandırıldı. 63 (%26,92) hasta SIII-GC ve 33 hasta (%14,14) SV-GC olarak sınıflandırıldı. Sonuçlar: Yeni sınıflandırma sistemi sadece hastalık şiddetini değil, aynı zamanda bireye özgü komplekslik ve risk faktörlerini de içermektedir. Anahtar Kelimeler: Sınıflandırma, tanı, hastalık, periodontitis.

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