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Gabriela Barbieri Ortigara

VALIDADE DA ATUAL CLASSIFICAÇÃO DAS DOENÇAS PERIODONTAIS (EFP/AAP 2018) EM COMPARAÇÃO COM O CRITÉRIO CDC/AAP 2012 - UM ESTUDO TRANSVERSAL

Santa Maria, RS
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Dissertação apresentada ao Curso de Mestrado do Programa de Pós Graduação em Ciências Odontológicas da Universidade Federal de Santa Maria (UFSM), como requisito para obtenção do título de **Mestre em Ciências Odontológicas, com ênfase em Periodontia.**

Orientador: Profº. Drº. Carlos Heitor Cunha Moreira

Coorientadora: Profª. Drª. Camila Silveira Sfreddo

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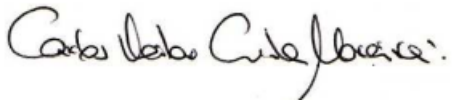

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RESUMO

VALIDADE DA ATUAL CLASSIFICAÇÃO DAS DOENÇAS PERIODONTAIS (EFP/AAP 2018) EM COMPARAÇÃO COM O CRITÉRIO CDC/AAP 2012 - UM ESTUDO TRANSVERSAL

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Diversos critérios têm sido utilizados para a definição dos casos de periodontite, dificultando inferências em relação a variação global dessa doença. O objetivo deste estudo foi analisar a validade da atual classificação periodontal na definição de caso de periodontite em uma população rural do Sul do Brasil. Uma amostra representativa de base populacional de 688 indivíduos, ≥15 anos de idade, residentes na zona rural em Rosário do Sul foi investigada. Foi realizado exame periodontal completo em seis sítios/dente, incluindo o Índice de Placa Visível (IPV), Índice de Sangramento Gengival (ISG), profundidade de sondagem (PS), sangramento à sondagem (SS) e nível de inserção clínica (NIC). Questionários foram aplicados para obter dados sociodemográficos e comportamentais e exame de hemoglobina glicada (HbA1c) foi realizado. A definição de caso de periodontite foi estimada e comparada de acordo com a classificação EFP/AAP 2018 (atual classificação periodontal) e pelo critério CDC/AAP 2012 (modalidade referência). Testes diagnósticos como sensibilidade, especificidade, valor preditivo positivo (VPP), valor preditivo negativo (VPN) e área sob a curva ROC (AUC) foram realizados. As análises dos dados foram conduzidas no Stata software (versão 14.1). Foram incluídos 588 indivíduos com 6 ou mais dentes. 71.1% dos indivíduos foram definidos em estádio III/ IV (EFP/AAP 2018), 47.6% foram considerados com periodontite moderada (CDC/AAP 2012) e obteve-se 100% de concordância entre as duas classificações utilizadas para a categoria grave. A classificação EFP/AAP 2018 apresentou sensibilidade de 99,8% e 100%, especificidade de 13,6% e 43,6%, VPP de 83,4% e 47,4% e VPN de 93,7% e 100% para periodontite moderada e grave, respectivamente. AUC de 0,9059 (IC95% = 0,879-0,933) e o ponto de corte ideal baseado na curva foi o estádio III. A classificação EFP/AAP 2018 demonstrou alta validade na avaliação de um caso de periodontite, contribuindo para a melhora do diagnóstico e do tratamento de pacientes com doença periodontal.

Palavras-chave: Periodontite. Doença periodontal. Testes diagnósticos. Classificação. Estudo observacional.

ABSTRACT

VALIDITY OF THE CURRENT CLASSIFICATION OF PERIODONTAL DISEASES (2018 EFP/AAP) COMPARED TO THE 2012 CDC/AAP CRITERIA - A CROSS-SECTIONAL STUDY

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Several criteria have been used to define cases of periodontitis hampering to infer the global variation of this disease. The aim of this study was to investigate the accuracy of 2018 EFP/AAP (currrent periodontal classification) in periodontitis case definition of individuals from a rural area in southern Brazil. A population-based sample of 688 individuals, ≥15 years old, living in Rosario do Sul was investigated. A complete periodontal examination was performed at six sites/tooth, including visible plaque indice (VPI), gingival bleeding index (GBI), probing depth (PD), bleeding on probing (BOP) and clinical attachment level (CAL). Questionnaires were applied to obtain demographic and behavioral data and glycated hemoglobin (HbA1c) test were performed. The periodontitis case definition was estimated and compared according to 2018 EFP/AAP and 2012 CDC/AAP (reference criteria). Diagnostic tests such as sensitivity (SN), specificity (SP), positive predictive value (PPV), negative predictive value (NPV) and area under ROC curve (AUC) were performed. Statistical analysis was performed using Stata software (version 14.1). 588 individuals with at least 6 teeth were included. Based on 2018 EFP/AAP-findings, 71.1% individuals were classified as stage III/IV and showed 100% of agreement with 2012 CDC/AAP for severe category. For periodontitis case definition, SN of 2018 EFP/AAP were 99,8% and 100%, SP were 13,6% and 43,6%, PPV were 83,4% and 47,4% and NPV were 93,7% and 100% for moderate and severe periodontitis, respectively. The AUC was 0.9059 (95% CI = 0.879–0.933) and the optimal cutoff based on the curve was stage III. The 2018 EFP/AAP classification demonstrated high validity in the evaluation of a case of periodontitis, contributing to the improvement of diagnosis and treatment of patients with periodontal disease.

Keywords: Periodontitis. Periodontal Diseases. Diagnostic tests. Classification. Observational study.

SUMÁRIO

1 INTRODUÇÃO E JUSTIFICATIVA

A periodontite é uma doença inflamatória multifatorial crônica associada ao biofilme disbiótico, caracterizada pela destruição progressiva dos tecidos periodontais. É manifestada através de perda de inserção clínica e radiográfica, presença de bolsas periodontais e sangramento periodontal (PAPAPANOU et al., 2018). Estima-se que é a sexta condição mais prevalente (KASSEBAUM et al., 2014) e que 796 milhões de pessoas no mundo apresentam periodontite severa (GBD 2017 et al., 2020). Entretanto, comparações entre a prevalência da doença periodontal em diferentes populações são limitadas devido à heterogeneidade de métodos diagnósticos e dos critérios para definição de caso utilizados (EKE et al., 2010; KASSEBAUM et al., 2017; LOPEZ, BAELUM, 2003; SAVAGE et al., 2009).

A classificação de doenças periodontais é o agrupamento de características em comum, sinais e sintomas organizados de forma sistemática para identificação de doenças (CATON et al, 2018; SAVAGE et al., 2009). Os objetivos da classificação são definir estratégias uniformes de tratamento, internacionalizar nomenclaturas, permitir a comparabilidade das enfermidades a nível mundial e descrever e analisar a distribuição das doenças em uma população definida (TONETTI, CLAFFEY, 2005). Para a classificação de um indivíduo, utiliza-se o limite diagnóstico, ou seja, o ponto no qual a presença de uma condição de saúde ou doença pode ser identificada (HAJIJAN-TILAKI, 2018; LIU, 2012; LOPEZ-RATON et al., 2014; MAGDER, FIX, 2003).

Estudos prévios indicam uma ampla gama de metodologias que têm sido utilizadas para a definição dos casos de periodontite, dificultando inferências em relação a variação global dessa doença (EKE, BORGNAKKE, GENCO, 2020; GBD 2017 et al., 2020; PAGE, EKE, 2007; SAVAGE et al., 2009). Entre os fatores metodológicos distintos, há a heterogeneidade dos protocolos periodontais (exame parcial ou de boca toda) (KINGMAN, SUSIN, ALBANDAR, 2008), das unidades de análise (sítios, indivíduo), das definições de caso, dos modelos de sonda periodontal utilizados (DONOS, 2018; HOLTFRETER, SCHUTZHOLD, KOCHER, 2014), bem como, a variabilidade na prevalência de fatores ou indicadores de risco (HOLTFRETER et al., 2015). Portanto, diferentes limites de profundidade de sondagem (PS), sangramento à sondagem (SS) e nível de inserção clínica (NIC) fazem com que a definição de sítios saudáveis e sítios doentes seja inconsistente (BURT, 2005; BORRELL & PAPAPANOU, 2005).

Recentemente, em Chicago (EUA) ocorreu o Workshop Mundial para a Classificação das Doenças e Condições Periodontais e Peri-Implantares, no qual a Academia Americana de

Periodontia e a Federação Europeia de Periodontia propuseram uma nova classificação das doenças periodontais. Esta classificação atualizou as definições para as condições gengivais, doenças periodontais e peri-implantares, baseando-se na melhor evidência científica disponível atualmente (CATON et al, 2018). Entre as principais alterações, estão as categorias e os limites diagnósticos utilizados para classificar a doença periodontal (PAPAPANOU et al., 2018). Portanto, estudos específicos em diferentes populações e contextos clínicos que avaliem a sua acurácia diagnóstica e sua relação custo-benefício são necessários (TONETTI, SANZ, 2019).

Considerando a necessidade de estimativas de qualidade sobre a doença periodontal e a ausência da avaliação da acurácia da atual classificação em estudos latino-americanos (CARVAJAL et al., 2020), acreditamos que é o primeiro estudo em uma amostra rural com exame periodontal completo (6 sítios/ dente) que permitirá a avaliação da validade da atual classificação periodontal em uma população do Sul do Brasil.

2 REVISÃO DE LITERATURA

2.1 *Classificações periodontais*

Diversas classificações periodontais têm sido utilizadas no último século. Em 1951, um amplo sistema para classificação foi definido por Marshall-Day (MARSHAlL-DAY, 1951; MARSHALL-DAY, STEVENS, QUIGLEY, 1955), porém, esse sistema apresentou alguns pontos negativos, como a falta de referência fixa nos dentes para avaliação da profundidade de sondagem, dificultando a distinção entre edema gengival ou a real presença da atividade de doença periodontal, falta de clareza dos critérios e inadequação da técnica radiográfica sugerida (RAMJFORD, 1959). Durante esse período, outros autores também fizeram o uso da medida das bolsas periodontais sem ter como referência um ponto fixo no dente (MCINTOSH, 1954; MEHTA, GRAINGER, WILLIAMS, 1955), impossibilitando o uso significativo para a avaliação da progressão da doença periodontal. Em 1956, destaca-se o Índice Periodontal (IP) de Russell (RUSSELL, 1956), o qual apresenta facilidade do uso e possibilidade de comparação dos resultados, porém, como desvantagem, apresenta falta de clareza nos critérios utilizados, entre eles, a referência da junção cemento-esmalte. Nesse sistema, os escores estabelecidos foram:

Escore 0= Periodonto saudável;

Escore 1= Gengivite em parte da circunferência do dente;

Escore 2= Gengivite em toda circunferência do dente;

Escore 6= Gengivite com formação de bolsa;

Escore 8= Perda da função devido à mobilidade excessiva do dente.

Em 1959, uma importante classificação foi estabelecida: Índice de Doença Periodontal (IDP) de Ramjford, na qual seis dentes índice são selecionados para análise da condição periodontal (RAMJFORD, 1959). Uma modificação importante foi o estabelecimento da referência da junção cemento-esmalte para avaliação da profundidade da bolsa, possibilitando a avaliação da progressão da doença através da comparação dos exames periodontais. Alguns procedimentos para a avaliação da gengivite foram incrementados, como: análise da cor, forma, densidade e tendência dos tecidos gengivais para sangramento através da palpação e da sondagem. Outros fatores como cálculo, biofilme, mobilidade, atrição e falta de contato dos dentes também devem ser levados em consideração para a análise das condições dos tecidos periodontais. Conforme o autor, representa um método quantitativo de classificação para facilitar a indexação e análise dos dados, caracterizado por ser de fácil aprendizado, por permitir

a comparabilidade dos examinadores, ser de rápida aplicação e, também, por ser utilizável tanto em estudos epidemiológicos e clínicos, como na combinação de ambos (RAMJFORD, 1959).

Posteriormente, uma nova metodologia para mensuração da doença periodontal foi proposta a partir do Índice de Necessidade de Tratamento Periodontal Comunitário (ICNTP) (AINAMO, 1982). Esse índice foi preconizado pela Organização Mundial da Saúde (OMS) para estudos das condições periodontais em nível coletivo. O ICNTP possibilita a análise da necessidade de intervenção em determinada população e a avaliação de resultados alcançados através de ações na área, incluindo exames para o sangramento gengival, presença de cálculo supra/subgengival e presença de bolsas periodontais. Uma sonda específica (com esfera na extremidade de 0,5mm) é utilizada para a realização do exame e a boca é dividida em sextantes. Os códigos utilizados são:

0= sextante hígido;

1= sextante com sangramento (observado diretamente ou com espelho, após sondagem);

2= cálculo (qualquer quantidade detectada no exame);

3= bolsa de 4 a 5 mm (margem gengival na área preta da sonda);

4= bolsa de 6 mm ou mais (área preta da sonda não visível) (AINAMO, 1982).

Em relação às classificações mundiais, no ano de 1977, no Workshop Mundial realizado pela Academia Americana de Periodontia apenas duas categorias de periodontite foram estabelecidas: Periodontite juvenil e Periodontite Marginal Crônica (WAERHAUG, 1977). Na classificação de 1986, quatro categorias: Periodontite Juvenil, Periodontite Adulta, Periodontite Gengivo Ulcerativa Necrosante e Periodontite Refratária. Em 1989, a Academia Americana de Periodontia (AAP) no World Workshop em Periodontia Clínica apresentou uma melhora significativa das classificações anteriores. As quatro condições até então estabelecidas sofreram alteração, resultando em cinco categorias: Periodontite de Início Precoce, Periodontite Adulta, Periodontite Ulcerativa Necrotizante, Periodontite Refratária e Periodontite Associada à Doença Sistêmica (CATON, 1989). Entretanto, esse sistema ainda apresentava deficiências, como, por exemplo, critérios inadequados para avaliação, terminologias idade-dependentes e falta de informações em relação às doenças gengivais. Posteriormente, uma classificação mais simples e completa foi estabelecida no 1º Workshop Europeu em Periodontia, em 1993 (ATTSTROM, VAN DER VELDEN, 1994), a qual foi composta por três categorias de periodontite: Periodontite do Adulto, Periodontite de Estabelecimento Precoce e Periodontite Ulcerativa Necrosante.

No ano de 1996, ocorreu o World Workshop em Periodontia, no qual verificou-se a necessidade da revisão da classificação proposta anteriormente (1989) (ARMITAGE, 1996). Assim, em 1999, no Workshop Internacional das Doenças e Condições Periodontais houve uma importante atualização da classificação das doenças periodontais (ARMITAGE, 1999). Entre as principais mudanças, estão a inclusão do item “Doenças gengivais”, substituição de "Periodontite Adulta" por “Periodontite Crônica”, substituição de “Periodontite de Início Precoce” por “Periodontite Agressiva”, eliminação da categoria de “Periodontite Refratária”, esclarecimento da designação “Periodontite como manifestação de doenças sistêmicas”, substituição de “Periodontite Ulcerativa Necrotizante” por “Doenças Periodontais Necrotizantes”, adição da categoria “Abscesso periodontal”, adição de categoria sobre “Lesões Periodontais-Endodônticas” e sobre “Deformidades e Condições de Desenvolvimento ou Adquiridas”. De acordo com essa classificação, a periodontite pode ser considerada:

Leve= Quando apresentar perda de inserção de 1 ou 2mm;

Moderada= Perda de inserção de 3 ou 4mm;

Severa= Perda de inserção ≥5mm.

No ano de 2005, ocorreu o 5º Workshop Europeu em Periodontia, o qual revisou as classificações dos 10 anos anteriores (TONETTI, CLAFFEY, 2005). Inicialmente, foi desenvolvida uma classificação para avaliar fatores de risco para a doença em estudos epidemiológicos, definindo periodontite em dois níveis:

1= Perda de inserção proximal ≥3 mm em ≥2 dentes não adjacentes: definição de caso sensível (inclusive de casos incipientes).

2= ≥30% dos dentes com NIC ≥ 5 mm: definição de caso mais específica (para identificar apenas casos com extensão e gravidade significativos).

Através desse critério, seis sítios por dente são avaliados, sendo que, sítios interproximais possuem maior confiabilidade para avaliação da doença (sítios vestibulares ou linguais/palatais podem superestimar a prevalência devido a presença de abrasão ou recessão gengival). Contudo, essa classificação apresenta limitações uma vez que a avaliação de periodontite incipiente e severa faz o uso apenas do índice de perda de inserção, sem associar com outros índices, como PS e SS (EKE et al., 2012).

Na classificação de Page e Eke (2007), o Centro de Controle e Prevenção de doenças (CDC) dos EUA em conjunto com a Associação Americana de Periodontia (AAP) definiram um caso cujo foco principal foi a avaliação de periodontite moderada e grave (PAGE, EKE, 2007). Posteriormente, essa classificação foi atualizada e incluiu a definição de periodontite

leve (EKE et al., 2012). A inclusão de casos incipientes ou iniciais de periodontite evita a subestimação da doença, principalmente em jovens. Além disso, detectar periodontite leve é importante, pois essa categoria é a mais responsiva à prevenção clínica e às práticas de higiene oral e há possibilidade de predizer populações em risco para o desenvolvimento dos estágios mais avançados da doença (EKE et al., 2012).

De acordo com a classificação CDC/AAP 2012, no mínimo dois dentes devem estar presentes em boca e são avaliados quatro sítios interproximais (EKE et al., 2012). Periodontite pode ser classificada em 3 grupos de acordo com a PS e NIC:

Leve= ≥2 sítios interproximais com perda de inserção ≥3mm e ≥2 sítios interproximais com PS≥4mm (não no mesmo dente) ou um sítio com PS≥5mm.

Moderada= ≥2 sítios interproximais com perda de inserção ≥4mm (não no mesmo dente) ou ≥2 sítios interproximais com PS≥5mm.

Severa= ≥2 sítios interproximais com perda de inserção ≥6 mm (não no mesmo dente) e ≥1 sítio interproximal com PS≥5 mm.

A classificação europeia (TONETTI, CLAFFEY, 2005) possui maior sensibilidade (capacidade do teste diagnóstico de detectar os indivíduos verdadeiramente positivos, ou seja, de diagnosticar corretamente os doentes) e a americana (EKE et al., 2012) maior especificidade (capacidade do teste diagnóstico de detectar os verdadeiros negativos, isto é, de diagnosticar corretamente os indivíduos sadios), porém, a classificação CDC/AAP 2012 possui maior sensibilidade para casos verdadeiros por avaliar não apenas perda de inserção, mas também, profundidade de sondagem (EKE et al., 2012).

No ano de 2017, a Academia Americana de Periodontia (AAP) e a Federação Europeia de Periodontia (EFP) propuseram a nova classificação periodontal (CATON et al, 2018). Assim, foi possível atualizar conceitos e definições de caso para as condições gengivais, doenças periodontais e peri-implantares de acordo com o conhecimento adquirido nos últimos anos (CATON et al, 2018).

A nova classificação (CATON et al, 2018) representou uma grande mudança em relação ao sistema de classificação anterior (ARMITAGE, 1999), como o reconhecimento de que não há conhecimento suficiente de fisiopatologia específica das doenças periodontais que permita considerar periodontite crônica e agressiva como doenças distintas (TONETTI, GREENWELL, KORNMAN, 2018). Portanto, baseado na fisiopatologia, três formas diferentes de periodontite foram identificadas: periodontite necrosante, periodontite como manifestação direta de doenças sistêmicas e periodontite.

O primeiro passo para o sistema de classificação proposto é a identificação do paciente como um caso periodontal, assim, no contexto de atendimento clínico será considerado um caso de periodontite, se:

1. Houver perda de inserção detectável em dois ou mais sítios interproximais não adjacentes; ou

2. Perda de inserção e profundidade de sondagem maior que 3 mm na vestibular ou lingual/palatina em pelo menos 2 dentes, sem ter a causa: 1) recessão gengival de origem traumática; 2) cárie dental estendendo até a área cervical do dente; 3) presença da perda de inserção na face distal de um segundo molar e associado ao mau posicionamento ou à extração de terceiro molar; 4) lesão endoperiodontal drenando por meio do periodonto marginal; ou 5) ocorrência de fratura radicular vertical.

O segundo passo é a identificação da forma específica de periodontite e o terceiro é a descrição da apresentação clínica e outros elementos que podem afetar tanto a saúde bucal como sistêmica. De acordo com a atual classificação, a periodontite será classificada de acordo com o ESTÁDIO e GRAU. Sendo que o estádio poderá ser do I ao IV e remete à gravidade e complexidade da doença. Primeiro será definido pelo "índice determinante": perda clínica de inserção, na qual o NIC de 1-2 mm definirá o estádio I (leve), NIC 3-4 mm estádio II (moderada), NIC ≥ 5 mm estádio III (grave com potencial perda dentária) e IV (grave com potencial perda da dentição). Em sua ausência, utiliza-se perda óssea radiográfica. Para definir a complexidade, serão levados em consideração profundidade de sondagem, lesões de furca, mobilidades avançadas e a necessidade de reabilitação. Como descritor de estádio, deve-se classificar ainda quanto à extensão e distribuição: localizada (até 30% dos dentes afetados), generalizada (>30% dos dentes envolvidos) ou padrão molar/incisivo.

O grau está relacionado com a evidência ou risco de progressão da doença, antecipam possíveis respostas à terapia periodontal e o efeito da periodontite na saúde sistêmica do paciente. O indivíduo será classificado em grau A, B ou C e poderá alterar de acordo com: 1) evidências diretas de progressão (quando observações longitudinais estão disponíveis); ou 2) evidências indiretas (baseada no exame de perda óssea em função da idade no dente mais afetado da dentição). Após a determinação da graduação pela evidência de progressão (critério primário), o grau pode ser modificado pela presença de fatores de risco (tabagismo e diabetes mellitus), deve ser aumentado independentemente dos critérios primários de taxa de progressão. Os graus são classificados assumindo uma moderada taxa de progressão (grau B),

posteriormente deve-se avaliar medidas diretas ou indiretas de uma maior progressão que justifique a aplicação do grau C. Caso a doença estiver controlada, aplica-se o grau A.

Entre as principais mudanças, está a definição/classificação de um caso de periodontite. Portanto, estudos específicos em diferentes populações e contextos clínicos que avaliem a sua acurácia diagnóstica e sua relação custo-benefício são necessários (TONETTI, SANZ, 2019).

As definições de caso e os conceitos em relação às condições de saúde e doença periodontal vêm sofrendo grandes alterações, principalmente, devido à evolução das pesquisas científicas. Portanto, novos aprendizados e conhecimentos são gerados, possibilitando a atualização/substituição dos critérios previamente utilizados, assim como, novas descobertas e avanços na área (NOVAK, 2002).

2.2. *Testes diagnósticos*

São instrumentos utilizados no diagnóstico clínico, na triagem e na pesquisa para identificar os indivíduos doentes e estão relacionados às informações clínicas obtidas da anamnese, do exame físico e de exames complementares (por exemplo, procedimentos de imagem) (GORDIS, 2017). Objetivam estimar a probabilidade de um desfecho, a probabilidade de ter a doença e a probabilidade de não ter a doença, assim, são passíveis de falhas (NAAKTGEBOREN, et al., 2016).

A acurácia de um teste diagnóstico é definida como a proporção de todos os resultados do teste (positivos e negativos) que estão corretos, portanto, é capaz de sintetizar o valor geral de um teste (BOSSUYT et al., 2003). Também pode ser definida como a probabilidade de o teste estar de acordo com o padrão ouro (melhor critério diagnóstico possível), para todos os pacientes estudados (NAAKTGEBOREN, et al., 2016). Caracteriza-se por possuir dois componentes: a sensibilidade e a especificidade.

2.2.1. Sensibilidade

Sensibilidade é definida como a capacidade de o teste identificar a doença entre os indivíduos realmente doentes ou a percentagem de pessoas com a doença de interesse que têm um teste positivo. Testes altamente sensíveis (quando negativos) são úteis clinicamente para excluir a presença de uma doença, são indicados em situações em que as consequências de deixar passar determinada enfermidade são consideráveis (doenças graves e tratáveis) e, também, nos procedimentos de rastreamento, voltados para a detecção de uma doença nos seus

estádios iniciais (GREINER, PFEIFFER, SMITH, 2000; HANLEY, 1989; HAJIAN-TILAKI, 2013; KUMAR, INDRAYAN, 2011).

Um teste altamente sensível possui baixa porcentagem de falso-negativos (proporção de doentes com resultados negativos). Em contrapartida, aumenta o número de falso-positivos (proporção de indivíduos não-doentes com resultados positivos), ocasionando problemas como: custos financeiros, devido a necessidade de testes mais caros e sofisticados; sobrecarga no sistema de saúde, causada pelo aumento do número de doentes e; efeito psicológico do indivíduo ser taxado como doente, como, ansiedade e preocupação (GORDIS, 2017; KRAMER, 1988).

2.2.2. Especificidade

Especificidade é definida como a habilidade de o teste descartar a existência da doença entre os indivíduos não doentes ou a percentagem de pessoas sem a doença de interesse que têm um teste negativo. Testes altamente específicos (quando positivos) são úteis clinicamente para sugerir a presença de uma doença, são especialmente necessários quando os resultados falso-positivos podem ser física, emocional ou financeiramente nocivos, por exemplo, pacientes diagnosticados erroneamente com câncer e indicados a tratamentos como a quimioterapia (GREINER, PFEIFFER, SMITH, 2000; HANLEY, 1989; HAJIAN-TILAKI, 2013; KUMAR, INDRAYAN, 2011).

Um teste altamente específico possui baixa porcentagem de falso-positivos. Porém, aumenta o número de falso-negativos, menos doença será diagnosticada, influenciando negativamente em doenças que necessitam de intervenção precoce. Testes altamente específicos também possuem baixa efetividade em intervenção na história natural da doença (GORDIS, 2017; KRAMER, 1988).

2.2.3. Sensibilidade x especificidade

O ideal seriam testes altamente sensíveis e específicos, porém, há um contrabalanço entre esses dois componentes. Para solucionar esse desafio, é necessário o estabelecimento de um ponto de corte (ponto no qual o resultado do teste mudará de negativo para positivo, discriminando os indivíduos doentes daqueles não-doentes) (HAJIJAN-TILAKI, 2018; LIU, 2012; LOPEZ-RATON et al., 2014; MAGDER, FIX, 2003). Conforme aumenta-se a sensibilidade (menos falso-negativos), pela diminuição do ponto de corte, há uma diminuição

da especificidade, em contrapartida, aumentando a especificidade (menos falso-positivos), pelo aumento do ponto de corte, há uma diminuição da sensibilidade. (HAJIAN-TILAKI et al., 1997; LINNET, 1987; LIU, 2012). Portanto, a escolha do nível do ponto de corte depende da importância dada aos falso-negativos e falso-positivos.

2.2.4. Curva de Característica de Operação do Receptor (Curva ROC)

Uma análise para expressar a relação entre sensibilidade e especificidade de um teste e decidir onde deve ficar o melhor ponto de corte é definida como curva ROC (HANLEY, MCNEIL, 1982). É constituída assinalando-se, para cada ponto de corte, os valores correspondentes da sensibilidade (S) e da proporção de resultados falso-positivos (1-E) nos eixos das ordenadas e das abscissas, respectivamente. Sendo que, para todas as medidas, os valores possíveis variam de 0 a 1, ou 0% a 100%. A análise da curva ROC compara a área sob a curva de mais de um teste para uma mesma doença: a medida da área sob a curva sintetiza o desempenho dos diferentes procedimentos. Assim, a acurácia geral de um teste poderá ser descrita como a área sob a curva: quanto maior a área e quanto maior a concentração do teste no canto superior esquerdo, melhor desempenho do teste (HANLEY, MCNEIL, 1982; OBUCHOWSKI, BULLEN, 2018; SWETS, 1988).

2.2.5. Valores preditivos (VP)

O valor preditivo é expresso em porcentagem e é considerado uma das medidas diagnósticas mais úteis clinicamente, visto que, visa analisar qual a probabilidade de o paciente ter ou não a doença após o resultado do teste ter sido positivo ou negativo (GORDIS, 2017). Também é conhecido como probabilidade posterior ou probabilidade pós teste e é influenciado tanto pela sensibilidade e especificidade, como pela prevalência da doença (KRAMMER, 1988; KUMAR, INDRAYAN, 2011; RASLICH, MARKERT, STUTES, 2007).

O valor preditivo positivo (VPP) é definido como a proporção dos indivíduos cujo teste resultou positivo, que realmente têm a doença. Quanto mais específico for um teste, maior seu VPP (mais confiante o pesquisador pode ficar que um teste positivo confirme o diagnóstico) (GORDIS, 2017). Também é associado à prevalência, ou seja, quanto maior a prevalência da doença, maior será o VPP (KRAMMER, 1988). Um elevado VPP é desejado antes de se iniciar um tratamento com efeitos colaterais importantes e/ou custo elevado, evitando sua aplicação de forma desnecessária (KUMAR, INDRAYAN, 2011; RASLICH, MARKERT, STUTES, 2007).

O valor preditivo negativo (VPN) é definido como a proporção dos indivíduos cujo teste resultou negativo, que realmente não têm a doença. Quanto mais sensível for um teste, maior seu VPN (mais confiante o pesquisador pode ficar que um teste negativo descarte o diagnóstico) (GORDIS, 2017). Também é associado à prevalência, ou seja, quanto maior a prevalência da doença, menor será o VPN (KRAMMER, 1988). Espera-se um alto VPN em um exame inicial, a partir do qual somente os pacientes com resultados positivos serão investigados com mais detalhe (KUMAR, INDRAYAN, 2011; RASLICH, MARKERT, STUTES, 2007).

A utilização dos testes diagnósticos deve levar em consideração as situações clínicas e os objetivos a serem alcançados de acordo com a característica de cada doença. Assim, através da análise e comparação de testes, será possível escolher qual deles terá o melhor desempenho.

3 OBJETIVOS

3.1 Objetivo geral

Analisar a validade da atual classificação periodontal (EFP/AAP 2018) na definição de caso de periodontite em uma população rural do Sul do Brasil.

3.2 Objetivos específicos

Comparar a ocorrência das definições de casos de periodontite em indivíduos residentes em Rosário do Sul de acordo com a Classificação CDC/AAP 2012 (estudos epidemiológicos) e a atual classificação periodontal – EFP/AAP 2018 (diagnóstico individual).

Avaliar a sensibilidade, especificidade, valor preditivo positivo, valor preditivo negativo e área sob a curva ROC (acurácia geral) da atual classificação periodontal na definição de caso de periodontite comparada ao critério CDC/AAP 2012.

4 ARTIGO

Este artigo será submetido ao periódico *Journal of Clinical Periodontology*, Online ISSN:1600-051X. Fator de impacto: 5.241, Qualis CAPES A1. As normas para publicação estão descritas no Anexo A.

A ficha do exame supragengival, subgengival e a aprovação pelo Comitê de Ética em Pesquisa da Universidade Federal de Santa Maria (CAAE: 37862414.5.0000.5346) do projeto de pesquisa: Levantamento Epidemiológico na Área Rural de Rosário do Sul (RS) estão disponíveis no apêndice A, B e C, respectivamente.

The 2018 EFP/AAP Classification Demonstrates High Accuracy in Evaluating a Periodontitis Case Compared to 2012 CDC/AAP

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Running title: Accuracy of the current classification of periodontal diseases

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ABSTRACT

Aim: To investigate the accuracy of the 2018 EFP/AAP classification in comparison with 2012 CDC/AAP criteria in periodontitis case definition.

Materials and Methods: This cross-sectional study assessed a population-based sample from a rural area in southern Brazil. A complete periodontal examination was performed at six sites/tooth. The periodontitis case definition was estimated and compared according to 2018 EFP/AAP and 2012 CDC/AAP (reference criteria). The following diagnostic tests were performed: sensitivity (SN), specificity (SP), positive predictive value (PPV), negative predictive value (NPV), and area under ROC curve (AUC).

Results: 588 subjects with at least 6 teeth were included. Based on 2018 EFP/AAP-findings, 71.1% of the subjects were classified as stage III/IV and showed 100% of agreement with 2012 CDC/AAP for severe category. For moderate and severe periodontitis definition, SN of 2018 EFP/AAP were 99.8% and 100%, SP were 13.6% and 43.6%, PPV were 83.4% and 47.4% and NPV were 93.7% and 100%, respectively. The AUC was 0.9059 (95% CI = 0.879–0.933) and the optimal cutoff based on the curve was stage III.

Conclusions: The 2018 EFP/AAP classification showed high levels of accuracy compared to 2012 CDC/AAP in a rural sample with high periodontitis occurrence.

KEY WORDS: Periodontitis. Periodontal Diseases. Diagnostic tests. Classification. Observational study.

Clinical Relevance

Scientific rationale for study: The need of based-population studies assessing clinical and epidemiological implications of the use of the current case definition (2018 EFP/AAP) of periodontitis.

Principal findings: This assessment revealed high levels of accuracy between the two criteria, 2018 EFP/AAP and 2012 CDC/AAP (reference modality).

Practical implications: The use of the 2018 EFP/AAP classification promises an accurate assessment of periodontitis. Thus, the 2018 EFP/AAP criteria may help to improve diagnosis and personalize treatment in subjects with periodontal disease.

INTRODUCTION

Periodontitis is a chronic multifactorial inflammatory disease caused by a dysbiotic dental biofilm (Papapanou et al., 2018). Its diagnostic is simple, performed in routine dental practice it does not require sophisticated technology. Early diagnosis, capturing mild and moderate stages, allows effective treatment with limited irreversible consequences to regain periodontal health (Kassebaum et al., 2014; Thomson, Shearer, Broadbent, Foster Page, & Poulton, 2013; Thorbert-Mros, Cassel, & Berglundh, 2017). Periodontitis is the sixth most prevalent chronic disease worldwide (Kassebaum et al., 2014), 796 million subjects displaying severe case conditions (Bernabe et al., 2020). However, comparisons of the prevalence of periodontal diseases among different populations are hampered by heterogeneity in diagnostic methods and case definition criteria (Kassebaum et al., 2017; Lopez & Baelum, 2003; Savage, Eaton, Moles, & Needleman, 2009). Thus, a universal classification appears essential to advance the assessment of periodontal diseases.

The classification of periodontal diseases is the systematic grouping of common characteristics, signs and symptoms, to identify variant disease forms and stages (Caton et al., 2018; Savage et al., 2009). The objectives of the classification are to standardize nomenclature, establish treatment strategies, and compare the prevalence of disease in different populations (Tonetti & Claffey, 2005). For the classification of the periodontal status in an individual patient, a cutoff value for clinical attachment level (CAL) and probing pocket depth (PPD) is generally used to establish criteria for a case of periodontitis (Hajian-Tilaki, 2018; Liu, 2012; López-Ratón, Rodríguez-Álvarez, Suárez, & Sampedro, 2014; Magder & Fix, 2003; Savage et al., 2009). Based on these criteria, previous studies used a range of methods to define cases of periodontitis, hampering inferences regarding global variation (Bernabe et al., 2020; Eke, Borgnakke, & Genco, 2020; Holtfreter et al., 2015; Page & Eke, 2007; Savage et al., 2009). Among distinct methodological aspects, there is a heterogeneity in protocol (Holtfreter, Schützhold, & Kocher, 2014; Kingman, Susin, & Albandar, 2008), units of analysis, periodontal probe models (Donos, 2018; Holtfreter et al., 2014), and assessment of risk factors (Holtfreter et al., 2015), different CAL and PPD cutoff values preventing the standardization of periodontitis cases (Paper, 2005).

The 2017 World Workshop on the Classification of Periodontal and Peri-implant Diseases and Conditions proposed current classification of periodontitis. The classification, based on the strongest available scientific evidence, updates definitions for gingival conditions, periodontal and peri-implant diseases, and introduces a periodontal health concept (Caton et al.,

2018). Among the main features are the categories and diagnostic limits proposed for periodontal conditions (Papapanou et al., 2018). Specific studies in different populations that assess its diagnostic accuracy and cost-effectiveness are necessary (Papapanou et al., 2018; Tonetti & Sanz, 2019). Therefore, the aims of this study were to evaluate the accuracy of the 2018 EFP/AAP classification in comparison with 2012 CDC/AAP criteria (Eke et al., 2012) in periodontitis case definition. In addition, to investigate the rearrangement of the periodontitis cases according to categories considering the transition from an epidemiological perspective to an individual diagnosis.

MATERIALS AND METHODS

Study design and sample selection

This cross-sectional study was carried out in subjects age 15 years or older living in a rural area of Rosário do Sul in southern Brazil with an estimated population of 40,000 including 4,776 subjects located in rural areas (IBGE, 2010). Participants were recruited between March 2015 and May 2016. Full description of the epidemiological survey is published elsewhere (Ferreira et al., 2019). The sample size for the whole survey was estimated in 580 subjects considering the worst-case scenario (50% prevalence) for the main outcome (periodontal disease) and was adjusted for finite populations. For this study, the sample size calculation was estimated considering the worst-case scenario of periodontal disease (prevalence of 50%) and the minimum sample for sensitivity and specificity analysis (Bujang & Adnan, 2016). Thus, the minimum required sample size was 462 subjects. As this study was nested in an epidemiological survey that investigated other oral health outcomes, a sample larger than necessary was included.

Data collection

Two trained dentists (SD, TGMF) performed face-face interviews to collect demographic, behavioral and medical data. Eighteen-year-old and older subjects had blood samples collected according to WHO guidelines (2010). For this study, glycated hemoglobin (HbA1c) was analyzed. Full-mouth periodontal clinical examination was carried out at six sites per tooth (mesiobuccal, mid-buccal, distobuccal, distolingual, mid-lingual and mesiolingual), excluding third molars. Two trained calibrated dentists (JB, MC) conducted examinations in a mobile unit equipped with a complete dental unit (dental chair, artificial light, and others basic amenities). The following parameters were collected: Visible Plaque Index (VPI) (Ainamo & Bay, 1975),

Gingival Bleeding Index (GBI) (Ainamo & Bay, 1975), PPD, bleeding on probing (BoP) and CAL. PPD was measured from the free gingival margin to the bottom of the pocket/sulcus. CAL was defined as the distance from cemento-enamel junction to the bottom of the pocket/sulcus. Measurements were performed using a manual periodontal probe (UNC-15, Neumar®, São Paulo, Brazil) coded in mm rounded to the nearest whole mm.

Intra- and inter-examiner reproducibility for PPD and CAL were assessed twice by repeated measurements, using ≥ 1,000 sites in seven subjects, once before the data collection procedures as well as during the study using the intra-class correlation coefficient (ICC). ICC values for intra-examiner and inter-examiner reproducibility ranged from 0.89 to 0.93 and 0.89 to 0.96, respectively.

Ethical considerations

The study protocol was approved by the Ethics Committee in Research of Federal University of Santa Maria (CAAE: 37862414.5.0000.5346), guided according the Helsinki Declaration. All participants signed a written informed consent document.

Periodontitis case definition

The case definition of periodontitis was carried out using two classification systems: 2012 CDC/AAP (Eke et al., 2012) and 2018 EFP/AAP (Tonetti, Greenwell, & Kornman, 2018). According to the consensus of experts from Europe and the USA, it is suggested to use the case definitions developed by the CDC/AAP in epidemiological studies (Holtfreter et al., 2015) and according to a recent epidemiologic trend in the USA this classification has been used worldwide (Eke et al., 2020). This classification was established from the clinical measurements of PPD and CAL in at least two interproximal sites of different teeth. According to this classification, the subject was considered healthy, with mild, moderate or severe periodontitis: (a) mild periodontitis was defined as having at least two interproximal sites with CAL ≥ 3 mm and at least two interproximal sites with PD ≥ 4 mm (not on the same tooth) or one site with PPD ≥ 5 mm; (b) moderate periodontitis was considered two or more interproximal sites with CAL ≥ 4 mm (not on the same tooth), or two or more interproximal sites with PPD ≥ 5 mm (not on the same tooth); and (c) severe periodontitis was defined as having two or more interproximal sites with CAL ≥ 6 mm (not on the same tooth), and at least one interproximal site with PPD ≥ 5 mm.

In the current classification (2018 EFP/AAP), the subject was classified with periodontitis when interdental CAL on two non-adjacent teeth was present, or if buccal or oral CAL was ≥3 mm, with pocketing >3 mm, due to the periodontal condition (Tonetti et al., 2018). This classification system is based on the stages and grades of periodontitis. In our study, only stages were considered and the severity of disease was defined according to the interproximal CAL at site of greatest loss: (a) stage I (mild periodontitis) was defined as CAL 1 to 2 mm; (b) stage II (moderate periodontitis) was defined as CAL 3 to 4 mm, and (c) stage III and IV (severe periodontitis) was defined as CAL ≥ 5 mm. Stage I is the borderline between gingivitis and periodontitis and represents the early stages of attachment loss, subjects at this stage were analyzed regarding the sites of greatest loss and the extension of disease. Localized form of periodontitis was defined if < 30% of teeth showed the most severe class, otherwise as generalized.

Data management and statistical analysis

Data analysis was performed using Stata (StataCorp. 2014. Stata Statistical Software: Release 14.1. College Station, TX: StataCorp LP). Descriptive analysis included means (standard deviations) for continuous variables and frequency distributions for categorical variables. Demographic variables considered were age, gender (male/female), and self-reported skin color (white/non-white). Diabetes mellitus was categorized as absent (Hb1Ac < 6.5%) or present (Hb1Ac ≥ 6.5%) (Of & Mellitus, 2014). Self-report of smoking habits was categorized in no smokers and smokers. Clinical variables (VPI, GBI, BoP, PPD, and CAL) were considered continuous variables. Tooth count was considered excluding third molars and tooth loss was categorized as 0 tooth loss, 1-4 teeth lost, and ≥5 teeth lost. All clinical data were presented by age categories and total sample, and it followed the standards for reporting periodontitis in epidemiologic studies proposed by Holtfreter et al. (Holtfreter et al., 2015).

Diagnostic tests such as sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and area under the ROC curve (AUC) were performed to assess the accuracy of the current periodontal classification. The number of periodontitis cases was estimated and compared according to the 2018 EFP/AAP classification and 2012 CDC/AAP classification (reference modality). For diagnosis tests, stage I of 2018 EFP/AAP and healthy and mild categories of 2012 CDC/AAP were considered as a non-periodontal case. To allow the AUC analysis, data of 2012 CDC/AAP criteria was dichotomized as periodontitis (mild, moderate and severe categories) and no periodontitis.

RESULTS

The whole sample, 688 subjects, received complete clinical examinations. In this study, 70 edentulous and 30 subjects with less than six teeth were not included, leading to a sample of 588 subjects age 15-93 years. The sampling process is described in Figure 1.

Demographic, behavior, medical, and clinical characteristics are shown in Table 1. Mean age was 45.4 (16.0), most subjects self-reporting as white (68.5%). 14.8% of the subjects were smokers, 54% smoked ≥10 cigarettes/day. 6.5% of the subjects had diabetes mellitus, 53.1% with HbA1c≥7.0%. Mean number of teeth was 20.3 (6.9), 56% of subjects had lost ≥5 teeth, tooth loss increasing in older subjects. At least 50% of the sites presented with visible biofilm, approximately, 25% presented with gingival bleeding. Mean PPD and CAL was 2.3 (0.7) and 3.0 (1.7), respectively, BoP occurred in 44.3 (25.5) of the sites. For more information on the proportion of affected sites and teeth per individual by degree of PPD, see the figure in the supplementary material (Supplementary figure 1). A few proportion of the sites and teeth had PPD ≥5mm was observed.

Table 2 presents overall and age stratified distribution of participants according to the CDC/AAP and the EFP/AAP case definition. According to the 2012 CDC/AAP classification, 80 (13.6%), 280 (47.6%), and 198 (33.8%) of the subjects exhibited no periodontitis, moderate, and severe periodontitis, respectively. According to the 2018 EFP/AAP classification using CAL as criterion, all subjects were considered a periodontitis case. A minority was classified stage I (2.7%), while 418 (71.1%) were classified stage III and IV (severe periodontitis). Analysis of 16 subjects, mean age 20.4 (5.4) years, classified Stage I showed 2 mm interdental CAL at the site of greatest loss. Considering a CAL of 2 mm, 11 (68.7%) would be with localized periodontitis, 5 (31.3%) generalized periodontitis and if CAL of 1 mm was considered, 100% of subjects would feature generalized periodontitis.

Comparison between cases using the CDC/AAP and the EFP/AAP case definition are shown in Figure 2. Assessing how patients classified according to the 2012 CDC/AAP classification were re-classified in the 2018 EFP/AAP classification (2012 CDC/AAP definition as reference criteria), 100% agreement was found between classifications analyzed for the severe category. On the other hand, in early stages, 62 (77.5%) subjects classified in the healthy category (2012 CDC/AAP classification) are considered stage II (moderate periodontitis) in the current classification. Similarly, most subjects (93.3%) with mild periodontitis are now considered stage II (moderate periodontitis- 2018 EFP/AAP).

Table 3 shows the diagnosis tests for EFP/AAP 2018 periodontitis system. For moderate periodontitis (stage II) and severe periodontitis (stage III and IV), analysis of correct periodontitis category classification revealed high levels of sensitivity for both categories (99.8% and 100%, respectively). While the specificity of 2018 EFP/AAP was 13.6% and 43.6%, the positive predictive value (PPV) was 83.4% and 47.4% and the negative predictive value (NPV) was 93.7% and 100% for moderate and severe periodontitis, respectively. Figure 3 shows that overestimation (misclassified) for moderate and severe periodontitis was 16.6% and 52.6%, respectively. Figure 4 shows the ROC curve for definition of a periodontitis case. The AUC is 0.9059 (95% CI = 0.879–0.933) and the optimal cutoff based on the curve is stage III.

DISCUSSION

A proper case definition is necessary to individualize preventive programs or to plan treatments both in primary care and specialty practice (Tonetti et al., 2018). Our study demonstrates how subjects living in a rural area were classified using two different classifications, the 2018 EFP/AAP and the 2012 CDC/AAP classification systems. The comparison between classifications reveals 100% agreement between the classifications for the severe category. We furthermore confirm that the 2018 EFP/AAP classification of periodontal diseases reveals high (>0.90) accuracy (Swets & Swets, 1988) compared with the 2012 CDC/AAP criteria.

The 2018 EFP/AAP classification had high sensitivity, that is, all subjects were considered as a periodontitis case due to its low CAL 1-2 mm cutoff value compared with the 2012 CDC/AAP criteria (CAL ≥3 mm plus PPD measurements). When the extension of disease (considering a CAL of 2 mm) was assessed, the majority of subjects classified as stage I featured localized form of periodontitis. This suggests that these subjects, mean age 20.4 (5.4) years, may have been overestimated as a periodontitis case. Any alterations in probing assessment which generally has error margin of ±1 mm (Armitage, 1996; Greenstein, 1997), such as applied pressure, probe position, probe diameter, and probe type may increase CAL measures and misclassify the category of the periodontal condition (Atassi, Newman, & Bulman, 1992; Donos, 2018; Garnick & Silverstein, 2000). Although the same analysis was performed on severe forms of periodontitis (stage III and IV), a lower possibility of misclassification can be associated because of the more established disease in these subjects.

In diagnostic tests, in some cases, sensitivity is emphasized over specificity, for example, when the disease is highly infectious, or the condition is serious. On the other hand,

specificity may be more important for diseases with low prevalence and high cost of false-positive diagnoses (Liu, 2012). Thus, the choice of the cutoff based on the clinical setting should be related to the cost ratio of false-positive and false-negative test results and also the epidemiologic situation in the target population (e.g. prevalence of disease) (Greiner, Pfeiffer, & Smith, 2000; Informatics, Sciences, Kumar, & Informatics, 2011; Liu, 2012; Perkins & Schisterman, 2006).

Another aspect that should be highlighted is the main objective of the classification systems. The 2012 CDC/AAP case definition was developed for use in surveillance and population-based research (Eke et al., 2012) and seeks to be more specific in severe cases (Page & Eke, 2007). On the other hand, the 2018 EFP/AAP classification system presents high sensitivity from a clinical and subject perspective, considering the complexity of periodontal disease in the concept of integral care that includes additional information (e.g. tooth loss attributed primarily to periodontitis, need for complex rehabilitation, exposure to risk factors, etc.), in order to personalize the periodontal treatment (Caton et al., 2018; Tonetti et al., 2018). On this sample based on PPD, treatment needs had not much complexity, high proportion of sites and teeth presented ≤4mm and probably did not change stages.

At the subject level, a test with high sensitivity is preferred even if the false positive rate is high because early stages of periodontitis can be identified, immediate treatment performed arresting disease progression (Kassebaum et al., 2014; Thomson et al., 2013; Thorbert-Mros et al., 2017). In addition, diagnostic methods as periodontal probing are simple and should be used routinely for all subjects. Therefore, these characteristics emphasize the use of diagnostic tests with high sensitivity at the subject level, the 2018 EFP/AAP classification being an optimal diagnostic tool.

The development of a tool to standardize periodontitis case definition helps to generate reliable data regarding the disease across populations (Holtfreter et al., 2015; Savage et al., 2009). Intersections with previous classifications are important in determining where those intersections are and why they occur. In the present study, the periodontal disease was well reflected by the 2018 EFP/AAP classification as showed by previous studies with different population characteristics (Botelho, Machado, Proença, & Mendes, 2020; Graetz et al., 2019). Thus, the strength of our study is the validity assessment of the current classification of periodontal disease in a population-based surveillance of a rural sample in southern Brazil. Furthermore, this study used gold-standard measures, full-mouth examination protocol in six sites per tooth by calibrated examiners, assessed a minimum number of teeth (>6 teeth), and

used the most up-to-date definitions of periodontitis making these results current and bringing new information to the field.

This study also has some limitations. We do not know the number of teeth lost due to periodontitis, while the 2018 classifications consider it to define severity of disease. Furthermore, the analyzed rural sample may have reduced the external validity due to the high occurrence of severe cases usually not observed in other populations. However, this result was similarly to an urban population in the same Brazilian state of Rio Grande do Sul (Susin et al., 2004). Therefore, the impact of using 2018 EFP/AAP or 2012 CDC/AAP classifications for periodontitis changes according to the population analyzed due to characteristics such as exposure to risk factors, number of missing teeth as well as the prevalence and extent of periodontal outcomes. Future studies should be carried out in different areas of the world to assess the applicability of the classification and how the variation in the prevalence of the disease can affect the performance of such measures.

CONCLUSION

The 2018 EFP/AAP classification demonstrates high accuracy in evaluating a periodontitis case when compared to 2012 CDC/AAP (reference criteria). Our findings contribute to the reliability of this current case definition for surveillance of periodontitis in a rural population with high periodontitis occurrence and its use in future epidemiological surveys.

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Table 1- Demographics, behavior, systemic and clinical characteristics of the sample (n= 588).

	Age group (years)							
	-24	25-34	35-44	45-54	55-64	65-74	75+	Total
Number of subjects n (%)	67 (11.4)	94 (16.0)	115 (19.6)	142 (24.1)	98 (16.7)	50 (8.5)	22 (3.7)	588 (100)
Demographic, behavior and systemic characteristics								
Age, $\bar{x}$ ± (SD)	19.06 (3.1)	30.16 (2.8)	39.82 (2.9)	49.61 (2.9)	58.51 (2.6)	69.34 (3.1)	79.77 (5.5)	45.39 (16.0)
Sex, n (%)								
Male	38 (56.7)	35 (37.2)	48 (41.7)	72 (52.7)	57 (58.2)	33 (66.0)	13 (59.1)	296 (50.3)
Female	29 (43.3)	59 (62.8)	67 (58.3)	70 (49.3)	41 (41.8)	17 (34.0)	9 (40.9)	292 (49.7)
Skin Color, n (%)								
White	43 (64.2)	59 (62.8)	83 (72.2)	100 (70.4)	70 (71.4)	36 (72.0)	12 (54.5)	403 (68.5)
Non-white	24 (35.8)	35 (37.2)	32 (27.8)	42 (29.6)	28 (28.6)	14 (28.0)	10 (45.5)	185 (31.5)
Smoking status, n (%)								
No	58 (87.9)	80 (85.1)	97 (84.3)	116 (81.7)	82 (83.7)	47 (94.0)	19 (90.5)	499 (85.2)
Yes	8 (12.1)	14 (14.9)	18 (15.7)	26 (18.3)	16 (16.3)	3 (6.0)	2 (9.5)	87 (14.8)
Diabetes mellitus, n (%)								
No	35 (100)	79 (96.3)	95 (96.0)	122 (94.6)	78 (90.7)	36 (80.0)	19 (95.0)	464 (93.5)
Yes	0 (0)	3 (3.7)	4 (4.0)	7 (5.4)	8 (9.3)	9 (20.0)	1 (5.0)	32 (6.5)
Clinical parameters *Mean ± (SD)*								
Tooth count†	26.9 (1.4)	25.2 (2.9)	23.2 (4.5)	18.6 (5.9)	15.5 (6.4)	12.8 (6.5)	12.9 (5.7)	20.3 (6.9)
Tooth loss, n (%)								
0	31 (46.3)	21 (22.3)	16 (14.0)	5 (3.5)	1 (1.0)	1 (2.0)	0 (0.0)	75 (12.8)
1 to 4	34 (50.7)	51 (54.3)	50 (43.9)	28 (19.7)	15 (15.3)	4 (8.0)	1 (4.5)	183 (31.2)
≥5	2 (3.0)	22 (23.4)	48 (42.1)	109 (76.8)	82 (83.7)	45 (90.0)	21 (95.5)	329 (56.0)
VPI (%)	50.4 (22.8)	51.6 (23.9)	54.2 (22.1)	64.7 (21.9)	69.6 (20.6)	75.9 (20.6)	74.6 (21.0)	61.1 (23.6)
GBI (%)	21.9 (16.4)	23.9 (17.0)	19.7 (15.8)	24.7 (18.5)	23.9 (18.4)	22.1 (19.6)	25.9 (19.0)	23.0 (17.7)
BOP (%)	35.8 (22.7)	43.3 (24.0)	38.7 (24.4)	48.9 (26.6)	48.9 (24.2)	47.1 (28.3)	46.8 (26.8)	44.3 (25.5)
PPD (mm)	2.1 (0.5)	2.3 (0.6)	2.2 (0.5)	2.4 (0.8)	2.4 (0.7)	2.4 (0.9)	2.3 (0.7)	2.3 (0.7)
CAL (mm)	1.5 (0.8)	2.2 (1.2)	2.5 (1.3)	3.5 (1.7)	4.0 (1.7)	4.3 (1.9)	4.2 (1.7)	3.0 (1.7)

Abbreviations: VPI, Visible Plaque Index; GBI, Gingival Bleeding Index; BOP, bleeding on probing; PPD, periodontal probing depth; CAL, clinical attachment level. †Excluding third molars. Missing data – diabetes.

Table 2 – Overall and age stratified distribution of participants according to the CDC/AAP (Eke et al., 2012) and the EFP/AAP case definition (Tonetti et al., 2018).

Case Definition	**Age group (years)**							
Total n (%)	-24	25-34	35-44	45-54	55-64	65-74	75+	Total
2012 CDC/AAP								
No	33 (41.3)	15 (18.8)	18 (22.5)	8 (10.0)	5 (6.3)	1 (1.3)	0 (0)	80 (13.6)
Mild	9 (30.0)	11 (36.7)	7 (23.3)	3 (10.0)	0 (0)	0 (0)	0 (0)	30 (5.1)
Moderate	20 (7.1)	51 (18.2)	63 (22.5)	69 (24.6)	38 (13.6)	26 (9.3)	13 (4.6)	280 (47.6)
Severe	5 (2.5)	17 (8.6)	27 (13.6)	62 (31.3)	55 (27.8)	26 (11.6)	9 (4.5)	198 (33.7)
2018 EFP/ AAP								
Stage I	13 (81.3)	3 (18.8)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	16 (2.7)
Stage II	35 (22.7)	44 (28.6)	41 (26.6)	19 (12.3)	9 (5.8)	4 (2.6)	2 (1.3)	154 (26.2)
Stage III/ IV	19 (4.5)	47 (11.2)	74 (17.7)	123 (29.4)	89 (21.3)	46 (11.0)	20 (4.8)	418 (71.1)

Table 3 – Diagnostic performance of current classification (2018 EFP/AAP) for periodontitis of moderate and severe categories (reference: 2012 CDC/AAP).

Moderate category n (%)	2012 CDC/AAP			Sn	Sp	PPV	NPV
2018 EFP/AAP	No	Yes	Total	99.8	13.6	83.4	93.7
No	15	1	16				
Yes	95	477	572				
Total	110	478	588				
Severe category n (%)							
	No	Yes	Total	100.0	43.6	47.4	100.0
No	170	0	170				
Yes	220	198	418				
Total	390	198	588				

Sn: sensitivity; Sp: specificity; PPV: positive predictive value; NPV: negative predictive value.

Figure 1 - Flowchart of sampling procedures and study sample.

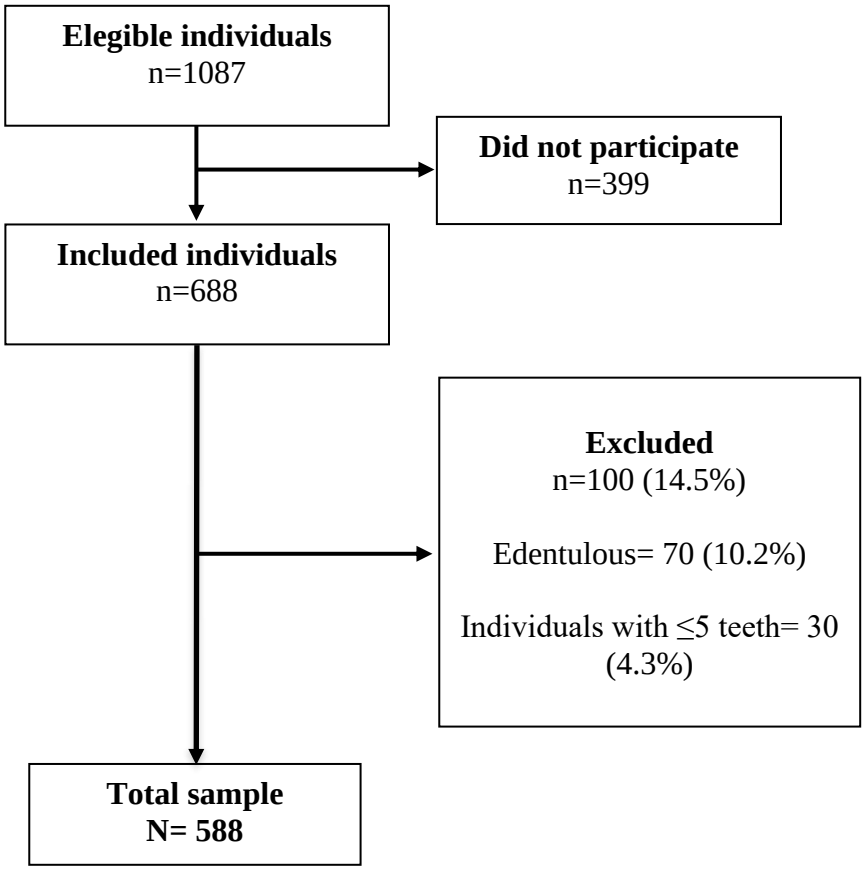
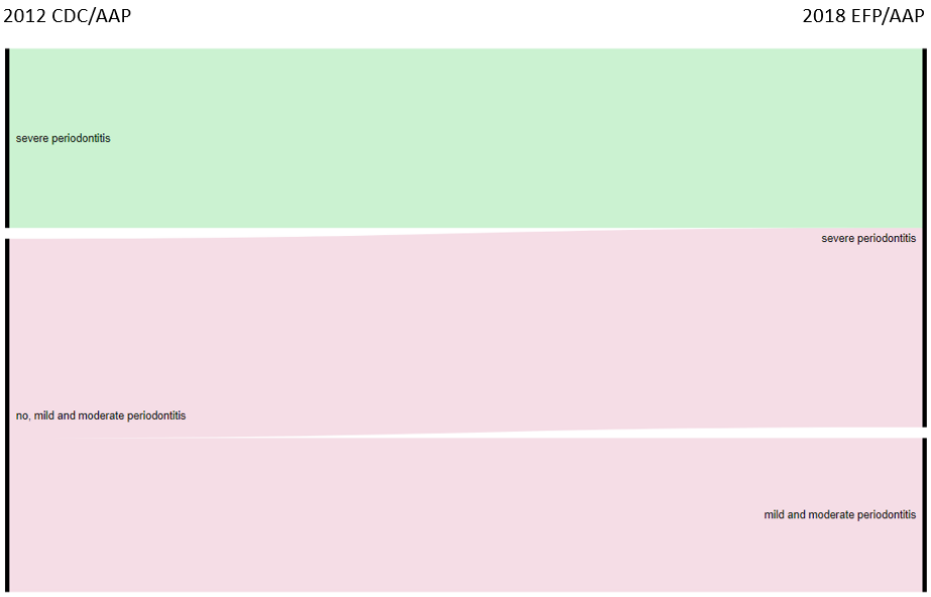


Figure 2 - Comparison of cases detected using the CDC/AAP definition (left vertical lines) Versus the EFP/AAP definition (right vertical lines) according to categories stratified distribution (no/mild/moderate periodontitis and severe category) **(A)** and overall, according to categories and stages **(B)**.

A



B

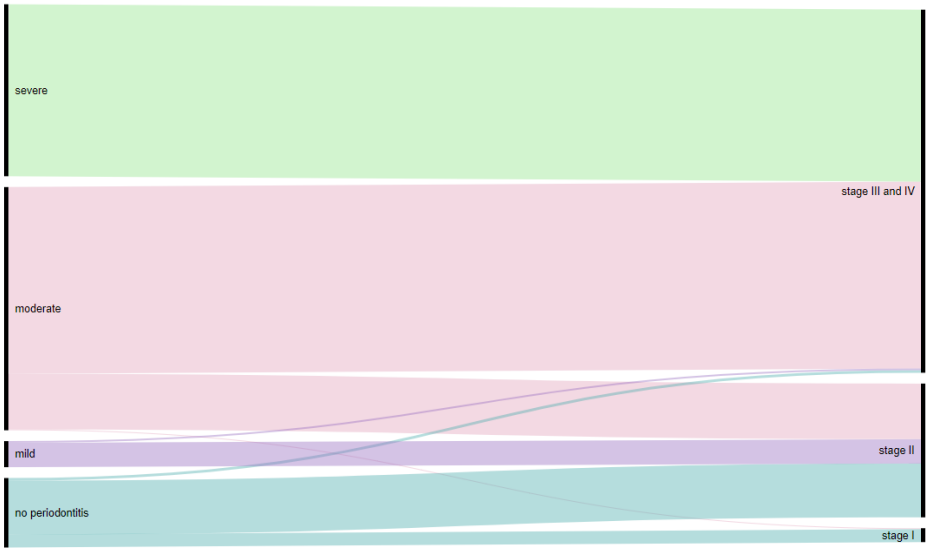


Figure 3 – Sensitivity, specificity and overestimation (incorrect classifications) of EFP/AAP 2018 definition for moderate and severe categories of periodontitis (reference: CDC/AAP 2012).

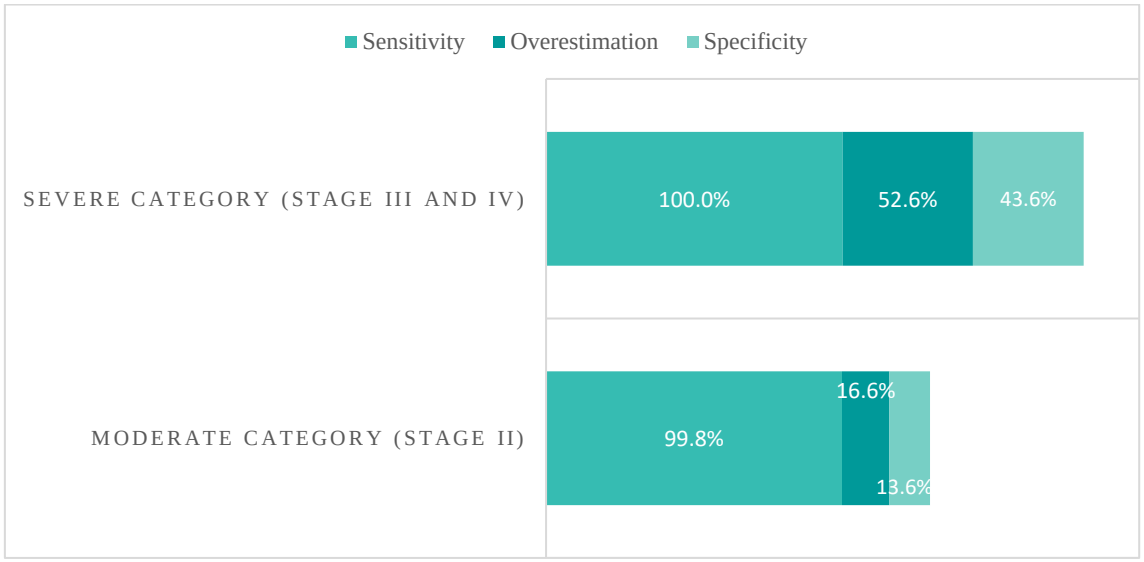
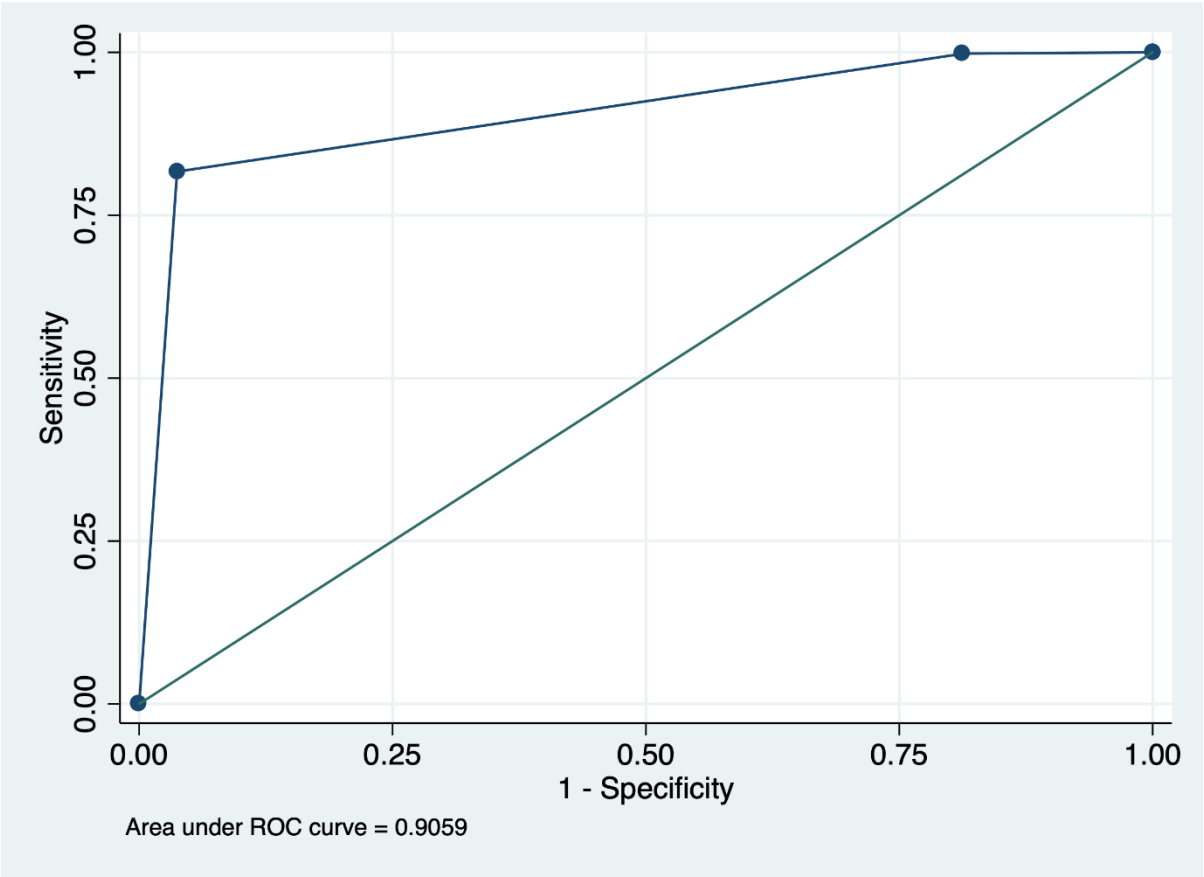
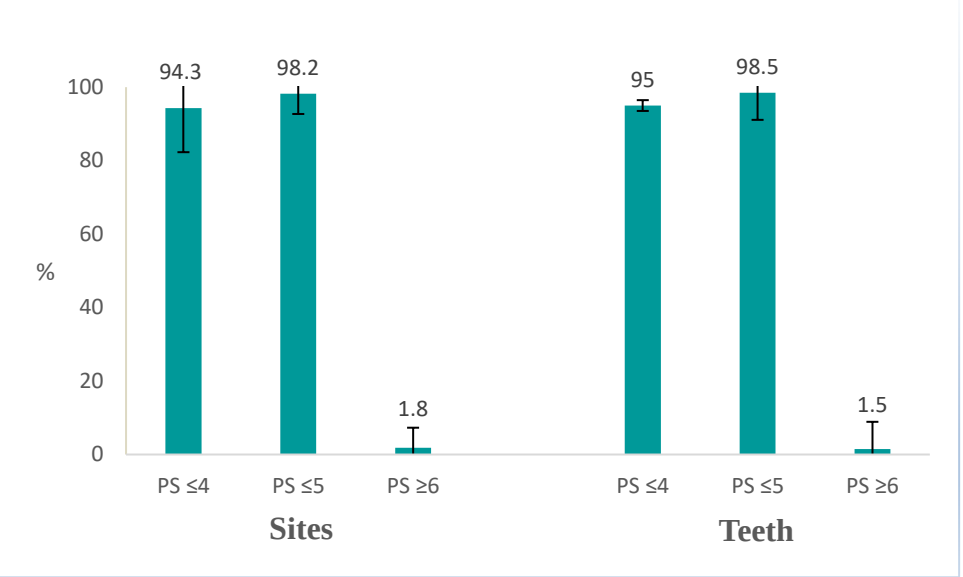


Figure 4 - ROC curve for number of subjects discriminating those with/without periodontitis. AUC = 0.9059 (95% CI = 0.879–0.933). Optimal cutoff based on curve = stage III.



Supporting information.

Supplementary figure 1. Extent (proportion) of sites and teeth according to three probing pocket depth (PPD) cut-points: ≤4 mm, ≤5 mm and ≥6 mm.



5 CONSIDERAÇÕES FINAIS

Espera-se que o uso de diferentes critérios para estabelecer um caso de periodontite interfira nos estudos analíticos e descritivos dessa doença em uma população. Baseado nesse estudo, a atual classificação periodontal - EFP/AAP 2018 (diagnóstico individual) demonstrou um aumento no número de casos de periodontite quando comparada com a classificação CDC/AAP 2012 (estudos epidemiológicos).

Para a escolha entre um alto ou baixo ponto de corte para classificar os indivíduos, deve-se levar em consideração as implicações clínicas dos falso-positivos (proporção de indivíduos não-doentes cujo resultado foi positivo) e falso-negativos (proporção de doentes cujo resultado foi negativo). Visto que, a alta sensibilidade (menor número de falso-negativos) de um critério diagnóstico é interessante para doenças de fácil tratamento, quando é possível prevenir/impedir o desenvolvimento de uma forma mais severa, quando o tratamento da enfermidade é de baixo custo financeiro e com pouco ou nenhum efeito adverso, testes sensíveis para a periodontite podem ser indicados (diagnóstico individual).

No entanto, no plano da saúde coletiva, outros fatores devem ser levados em consideração, como, por exemplo, a influência na implementação de políticas públicas de saúde e políticas de investimento. Nesse contexto, prioridades em saúde devem ser estabelecidas, dentre elas, a saúde bucal. Portanto, de acordo com as necessidades de cada população, testes mais específicos podem ser sugeridos para a doença periodontal em questão.

Conclui-se que o principal achado deste estudo foi a alta validade da classificação EFP/AAP 2018 analisada em uma população rural do Sul do Brasil com alta ocorrência de periodontite. Dessa forma, demostrou-se que o uso do atual sistema de classificação é muito promissor para uma avaliação acurada em estudos baseados na população, levando, assim, a melhorias no diagnóstico e no tratamento de pacientes com periodontite.

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APÊNDICE A - Ficha de exame supragengival

Data: ___/___/ 20___ Nº: _____

Nome:_____Gênero: ☐ F ☐ M
Idade: _____ anos. Data de nascimento: ___/___/_____
Telefone(s): _____
Nome e contato de um parente:_____

Distrito: ☐ Campo Seco ☐ Caverá ☐ Mangueiras ☐ Rosário ☐ São Carlos ☐ Touro Passo

EXAME PERIODONTAL SUPRAGENGIVAL

	17			16			15			14			13			12			11			21			22			23			24			25			26			27		
	D	V	M	D	V	M	D	V	M	D	V	M	D	V	M	D	V	M	D	V	M	M	V	D	M	V	D	M	V	D	M	V	D	M	V	D	M	V	D	M	V	D
IPV																																									
ISG																																									
FRP																																									
	D	P	M	D	P	M	D	P	M	D	P	M	D	P	M	D	P	M	D	P	M	M	P	D	M	P	D	M	P	D	M	P	D	M	P	D	M	P	D	M	P	D
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ISG																																									
FRP																																									
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	D	V	M	D	V	M	D	V	M	D	V	M	D	V	M	D	V	M	D	V	M	M	V	D	M	V	D	M	V	D	M	V	D	M	V	D	M	V	D	M	V	D
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ISG																																									
FRP																																									
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IPV																																									
ISG																																									
FRP																																									

PRESENTES:

☐ 18 ☐ 28
☐ 48 ☐ 38

USO DE PRÓTESES: ☐ Sim ☐ Não

Superior: ☐ PT ☐ PPR (___ elementos)

Inferior: ☐ PT ☐ PPR (___ elementos)

(PT: Prótese total/ PPR: Prótese parcial removível)

APÊNDICE B - Ficha de exame subgengival

Data: ____/____/ 20____ Nº: _____

Nome:_____ Gênero: ☐ F ☐ M
Idade: _____ anos. Data de nascimento: ____/____/_____
Telefone(s): _____
Nome e contato de um parente:_____

Distrito: ☐ Campo Seco ☐ Caverá ☐ Mangueiras ☐ Rosário ☐ São Carlos ☐ Touro Passo

EXAME PERIODONTAL SUBGENGIVAL

	17			16			15			14			13			12			11			21			22			23			24			25			26			27		
	D	V	M	D	V	M	D	V	M	D	V	M	D	V	M	D	V	M	D	V	M	M	V	D	M	V	D	M	V	D	M	V	D	M	V	D	M	V	D	M	V	D
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SS																																									
NIC																																									
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PS																																									
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NIC																																									
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	D	V	M	D	V	M	D	V	M	D	V	M	D	V	M	D	V	M	D	V	M	M	V	D	M	V	D	M	V	D	M	V	D	M	V	D	M	V	D	M	V	D
PS																																									
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PS																																									
SS																																									
NIC																																									

Lesões de furca:

17 V: 0 1 2 3 M: 0 1 2 3 D: 0 1 2 3	16 V: 0 1 2 3 M: 0 1 2 3 D: 0 1 2 3	V: 0 1 2 3 M: 0 1 2 3 D: 0 1 2 3 26	V: 0 1 2 3 M: 0 1 2 3 D: 0 1 2 3 27
47 V: 0 1 2 3 L: 0 1 2 3	48 V: 0 1 2 3 L: 0 1 2 3	V: 0 1 2 3 L: 0 1 2 3 36	V: 0 1 2 3 L: 0 1 2 3 37

APÊNDICE C - Parecer do Comitê de Ética em Pesquisa (CEP)

UNIVERSIDADE FEDERAL DE SANTA MARIA/ PRÓ-REITORIA DE PÓS-GRADUAÇÃO E

PARECER CONSUBSTANCIADO DO CEP

DADOS DA EMENDA

Título da Pesquisa: LEVANTAMENTO EPIDEMIOLÓGICO NA ÁREA RURAL DE ROSÁRIO DO SUL/RS

Pesquisador: CARLOS HEITOR CUNHA MOREIRA

Área Temática:

Versão: 4

CAAE: 37862414.5.0000.5346

Instituição Proponente: Universidade Federal de Santa Maria/ Pró-Reitoria de Pós-Graduação e

Patrocinador Principal: Financiamento Próprio
Universidade Federal de Santa Maria/ Pró-Reitoria de Pós-Graduação e Pesquisa

DADOS DO PARECER

Número do Parecer: 1.500.519

Apresentação do Projeto:

Pela emenda o proponente solicita alteração no orçamento do projeto original. O mesmo informa que "o projeto apresentado inicialmente descreve e detalha, de uma maneira ampla, os materiais e orçamentos referentes à coleta. A partir do momento no qual se iniciam as análises dos dados, mais especificamente a análise microbiológica, será necessário adquirir alguns materiais referentes ao processamento das amostras. Estes de fundamental importância por serem os reagentes utilizados no processamento. O recurso para a compra dos mesmos já está disponível."

Pelo que foi apresentado, entende-se que a solicitação pode ser aprovada.

Objetivo da Pesquisa:

-

Avaliação dos Riscos e Benefícios:

Endereço: Av. Roraima, 1000 - prédio da Reitoria - 2º andar
Bairro: Camobi CEP: 97.105-970
UF: RS Município: SANTA MARIA
Telefone: (55)3220-9362 E-mail: cep.ufsm@gmail.com

UNIVERSIDADE FEDERAL DE SANTA MARIA/ PRÓ-REITORIA DE PÓS-GRADUAÇÃO E

Plataforma Brasil

Continuação do Parecer: 1.500.519

Comentários e Considerações sobre a Pesquisa:

.

Considerações sobre os Termos de apresentação obrigatória:

.

Recomendações:

Veja no site do CEP - http://w3.ufsm.br/nucleodecomites/index.php/cep - na aba "orientações gerais", modelos e orientações para apresentação dos documentos. ACOMPANHE AS ORIENTAÇÕES DISPONÍVEIS, EVITE PENDÊNCIAS E AGILIZE A TRAMITAÇÃO DO SEU PROJETO.

Conclusões ou Pendências e Lista de Inadequações:

.

Considerações Finais a critério do CEP:

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_695043_E3.pdf	09/04/2016 23:39:25		Aceito
Orçamento	ORCAMENTO_1.pdf	09/04/2016 23:24:52	CARLOS HEITOR CUNHA MOREIRA	Aceito
Outros	emenda_orcamento.pdf	09/04/2016 23:20:42	CARLOS HEITOR CUNHA MOREIRA	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	Assentimento. escolas urbanas.pdf	03/08/2015 16:29:52		Aceito
Outros	emenda. escolares urbanos.pdf	03/08/2015 16:29:24		Aceito
Outros	QRR.pdf	13/02/2015 15:18:39		Aceito
Outros	AUTOPERCEPÇÃO DE DP.pdf	12/02/2015 21:08:27		Aceito
Outros	ESTRESSE PERCEBIDO.pdf	12/02/2015 21:07:04		Aceito

Endereço: Av. Roraima, 1000 - prédio da Reitoria - 2º andar
Bairro: Camobi **CEP:** 97.105-970
UF: RS **Município:** SANTA MARIA
Telefone: (55)3220-9362 **E-mail:** cep.ufsm@gmail.com

UNIVERSIDADE FEDERAL DE SANTA MARIA/ PRÓ-REITORIA DE PÓS-GRADUAÇÃO E

Continuação do Parecer: 1.500.519

TCLE / Termos de Assentimento / Justificativa de Ausência	TCLE_10 a 14 anos.pdf	12/02/2015 21:06:26		Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	emenda TCLE menor de 18anos.pdf	12/02/2015 21:06:05		Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	emenda TCLE maior de 18anos.pdf	12/02/2015 21:05:51		Aceito
Projeto Detalhado / Brochura Investigador	EMENDA CONDIÇÃO ENDODÔNTICA.pdf	12/02/2015 21:05:28		Aceito
Outros	EMENDAlevantamento epidemiol..pdf	12/02/2015 21:04:55		Aceito
Outros	AUTORIZAÇÃO Institucional.pdf	23/10/2014 16:52:50		Aceito
Folha de Rosto	folha de rosto plataforma.pdf	23/10/2014 16:51:08		Aceito
Declaração de Pesquisadores	Projetos na íntegra. SIE.pdf	22/10/2014 14:33:13		Aceito
Outros	Termo de Confidencialidade.levantamento.pdf	22/10/2014 14:31:11		Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	TCLE maior de 18 anos.pdf	21/10/2014 21:41:15		Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	assentimento menor de 18 anos.pdf	21/10/2014 21:41:00		Aceito
Outros	AUTORIZAÇÃO. exames laboratoriais.pdf	21/10/2014 20:46:46		Aceito
Outros	AUTORIZAÇÃO . unidade móvel.pdf	21/10/2014 20:46:26		Aceito
Outros	AUTORIZAÇÃO para execução.pdf	21/10/2014 20:46:06		Aceito
Projeto Detalhado / Brochura Investigador	PROJETO. 21.10.14.pdf	21/10/2014 20:42:20		Aceito

Situação do Parecer:
Aprovado

Necessita Apreciação da CONEP:
Não

Endereço: Av. Roraima, 1000 - prédio da Reitoria - 2º andar
Bairro: Camobi **CEP:** 97.105-970
UF: RS **Município:** SANTA MARIA
Telefone: (55)3220-9362 **E-mail:** cep.ufsm@gmail.com

UNIVERSIDADE FEDERAL DE SANTA MARIA/ PRÓ-REITORIA DE PÓS-GRADUAÇÃO E

Continuação do Parecer: 1.500.519

SANTA MARIA, 14 de Abril de 2016

Assinado por:
CLAUDEMIR DE QUADROS
(Coordenador)

Endereço: Av. Roraima, 1000 - prédio da Reitoria - 2º andar
Bairro: Camobi CEP: 97.105-970
UF: RS Município: SANTA MARIA
Telefone: (55)3220-9362 E-mail: cep.ufsm@gmail.com

ANEXO A - Normas para publicação no periódico Journal of Clinical Periodontology

Author Guidelines

Sections

1. SUBMISSION

Authors should kindly note that submission implies that the content has not been published or submitted for publication elsewhere except as a brief abstract in the proceedings of a scientific meeting or symposium.

Once the submission materials have been prepared in accordance with the Author Guidelines, manuscripts should be submitted online at https://mc.manuscriptcentral.com/jcpe

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2. AIMS AND SCOPE

The aim of the *Journal of Clinical Periodontology* is to provide the platform for exchange of scientific and clinical progress in the field of Periodontology and allied disciplines, and to do so at the highest possible level. The Journal also aims to facilitate the application of new scientific knowledge to the daily practice of the concerned disciplines and addresses both practicing clinicians and academics. The Journal is the official publication of the European Federation of Periodontology but wishes to retain its international scope.

Journal of Clinical Periodontology publishes original contributions of high scientific merit in the fields of periodontology and implant dentistry. Its scope encompasses the physiology and pathology of the periodontium, the tissue integration of dental implants, the biology and the modulation of periodontal and alveolar bone healing and regeneration, diagnosis, epidemiology, prevention and therapy of periodontal disease, the clinical aspects of tooth replacement with dental implants, and the comprehensive rehabilitation of the periodontal patient. Review articles by experts on new developments in basic and applied periodontal science and associated dental disciplines, advances in periodontal or implant techniques and procedures, and case reports which illustrate important new information are also welcome.

3. MANUSCRIPT CATEGORIES AND REQUIREMENTS

Journal of Clinical Periodontology publishes original research articles, reviews, clinical innovation reports and case reports. The latter will be published only if they provide new fundamental knowledge and if they use language understandable to the clinician. It is expected that any manuscript submitted represents unpublished original research.

i. Original Research Articles

Original Research articles must describe significant and original experimental observations and provide sufficient detail so that the observations can be critically evaluated and, if necessary, repeated. Original articles will be published under the heading of clinical periodontology, implant dentistry or pre-clinical sciences and must conform to the highest international standards in the field.

Word limit: 3,500 words maximum, excluding references.
Abstract: 200 words maximum; must be structured, under the sub-headings: Aim(s), Materials and methods, Results, Conclusion(s).
Figures/Tables: Total of no more than 7 figures and tables.

Introduction: should be focused, outlining the historical or logical origins of the study and not summarize the results; exhaustive literature reviews are not appropriate. It should close with the explicit statement of the specific aims of the investigation.

Material and Methods: must contain sufficient detail such that, in combination with the references cited, all clinical trials and experiments reported can be fully reproduced. As a condition of publication, authors are required to make materials and methods used freely available to academic researchers for their own use. This includes antibodies and the constructs used to make transgenic animals, although not the animals themselves.

Results: should present the observations with minimal reference to earlier literature or to possible interpretations.

Discussion: may usefully start with a brief summary of the major findings, but repetition of parts of the abstract or of the results section should be avoided. The discussion section should end with a brief conclusion and a comment on the potential clinical relevance of the findings. Statements and interpretation of the data should be appropriately supported by original references.

The discussion may usefully be structured with the following points in mind (modified from the proposal by **Richard Horton (2002), The Hidden Research Paper, The Journal of the American Medical Association, 287, 2775-2778)**. Not all points will apply to all studies and its use is optional, but we believe it will improve the discussion section to keep these points in mind.

Summary of key finding

- Primary outcome measure(s)
- Secondary outcome measure(s)
- Results as they relate to a prior hypothesis

Strengths and Limitations of the Study

- Study Question
- Study Design
- Data Collection
- Analysis
- Interpretation
- Possible effects of bias on outcomes

Interpretation and Implications in the Context of the Totality of Evidence

- Is there a systematic review to refer to?
- If not, could one be reasonably done here and now?
- What this study adds to the available evidence
- Effects on patient care and health policy
- Possible mechanisms

Controversies Raised by This Study Future Research Directions

- For this particular research collaboration
- Underlying mechanisms
- Clinical research

ii. Clinical Innovation Reports

Clinical Innovation Reports are suited to describe significant improvements in clinical practice such as the report of a novel surgical technique, a breakthrough in technology or practical approaches to recognized clinical challenges. They should conform to the highest scientific and clinical practice standards.

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Main text: should be organized with Introduction; Clinical Innovation Report; Discussion and Conclusion.
Figures/Tables: Total of no more than 12 figures and tables.

iii. Case Reports

Case Reports illustrating unusual and clinically relevant observations are acceptable, but their merit needs to provide high priority for publication in the Journal. On rare occasions, completed cases displaying non-obvious solutions to significant clinical challenges will be considered.

Main text: should be organised with Introduction; Case report; Discussion and Conclusion.

iv. Reviews and Systematic Reviews

Reviews are selected for their broad general interest; all are refereed by experts in the field who are asked to comment on issues such as timeliness, general interest and balanced treatment of controversies, as well as on scientific accuracy. Reviews should take a broad view of the field rather than merely summarizing the authors´ own previous work, so extensive citation of the authors´ own publications is discouraged.

Wherever possible, reviews should be constructed and submitted as Systematic Reviews, or at the very least provide robust descriptions of the methods that would allow readers to reproduce these. The use of state-of-the-art evidence-based systematic approaches is expected.

Reviews are frequently commissioned by the editors and, as such, authors are encouraged to submit a proposal to the Journal. Review proposals should include a full-page summary of the proposed contents with key references.

Note: For Systematic Reviews, the Journal adheres to the PRISMA reporting guidelines - PRISMA checklists should be included in submissions.

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4. PREPARING THE SUBMISSION

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    - Ethical approval statement
    - Patient consent statement (if appropriate)
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Parts of the Manuscript

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ii. A short running title of less than 40 characters;
iii. The full names of the authors;
iv. The author's institutional affiliations where the work was conducted, with a footnote for the author's present address if different from where the work was conducted;
v. Acknowledgments;
vi. Abstract and keywords;
vii. Clinical Relevance
viii. Main text;
ix. References;
x. Tables (each table complete with title and footnotes);

xi. Figure legends;
xiii. Appendices (if relevant).

Figures and supporting information should be supplied as separate files.

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Acknowledgments

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Conflict of Interest Statement

Authors will be asked to provide a conflict of interest statement during the submission process. For details on what to include in this section, see the section 'Conflict of Interest' in the **Editorial Policies and Ethical Considerations section** below. Submitting authors should ensure they liaise with all co-authors to confirm agreement with the final statement.

Abstract

The abstract is limited to 200 words in length and should not contain abbreviations or references. The abstract should be organized according to the content of the paper.

For Original Research Articles the abstract should be organized with aim, materials and methods, results and conclusions.

For clinical trials, it is encouraged that the abstract finish with the clinical trial registration number on a free public database such as clinicaltrials.gov.

Keywords

Please provide 1-5 keywords. When appropriate keywords are available, they should be taken from those recommended by the US National Library of Medicine's Medical Subject Headings (MeSH) browser list at **www.nlm.nih.gov/mesh**. Authors may add specific keywords.

Main Text

All manuscripts should emphasize clarity and brevity. Authors should pay special attention to the presentation of their findings so that they may be communicated clearly. Technical jargon should be avoided as much as possible and be clearly explained where its use is unavoidable.

Clinical Relevance

This section is aimed at giving clinicians a reading light to put the present research in perspective. It should be no more than 100 words and should not be a repetition of the abstract. It should provide a clear and concise explanation of the rationale for the study, of what was known before and of how the present results advance knowledge of this field. If appropriate, it may also contain suggestions for clinical practice.

It should be structured with the following headings: Scientific rationale for study; Principal findings; Practical implications.

Authors should pay particular attention to this text as it will be published in a highlighted box within their manuscript; ideally, reading this section should leave clinicians wishing to learn more about the topic and encourage them to read the full article.

References

It is the policy of the Journal to encourage reference to the original papers rather than to literature reviews. Authors should therefore keep citations of reviews to the absolute minimum.

References should be prepared according to the Publication Manual of the American Psychological Association (6th edition). This means in text citations should follow the author-date method whereby the author's last name and the year of publication for the source should appear in the text, for example, (Jones, 1998). The complete reference list should appear alphabetically by name at the end of the paper.

A sample of the most common entries in reference lists appears below. Please note that a DOI should be provided for all references where available. For more information about APA referencing style, please refer to the **APA FAQ**. Please note that for journal articles, issue numbers are not included unless each issue in the volume begins with page one.

Journal article

Beers, S. R. , & De Bellis, M. D. (2002). Neuropsychological function in children with maltreatment-related posttraumatic stress disorder. The American Journal of Psychiatry, 159, 483–486. doi:**10.1176/appi.ajp.159.3.483**

Book

Bradley-Johnson, S. (1994). Psychoeducational assessment of students who are visually impaired or blind: Infancy through high school (2nd ed.). Austin, TX: Pro-ed.

Chapter in an Edited Book

Borstrøm, I., & Elbro, C. (1997). Prevention of dyslexia in kindergarten: Effects of phoneme awareness training with children of dyslexic parents. In C. Hulme & M. Snowling (Eds.), Dyslexia: Biology, cognition and intervention (pp. 235–253). London: Whurr.

Internet Document

Norton, R. (2006, November 4). How to train a cat to operate a light switch [Video file]. Retrieved from ***http://www.youtube.com/watch?v=Vja83KLQXZs***

Please note that all unpublished papers (submitted or in press) included in the reference list should be provided in a digital version at submission. The unpublished paper should be uploaded as a supplementary file for review.

Tables

Tables should be self-contained and complement, not duplicate, information contained in the text. They should be supplied as editable files, not pasted as images. Legends should be concise but comprehensive – the table, legend, and footnotes must be understandable without reference to the text. All abbreviations must be defined in footnotes. Footnote symbols: †, ‡, §, ¶, should be used (in that order) and *, **, *** should be reserved for P-values. Statistical measures such as SD or SEM should be identified in the headings.

Figure Legends

Legends should be concise but comprehensive – the figure and its legend must be understandable without reference to the text. Include definitions of any symbols used and define/explain all abbreviations and units of measurement.

Figures

Although authors are encouraged to send the highest-quality figures possible, for peer-review purposes, a wide variety of formats, sizes, and resolutions are accepted.

Click here for the basic figure requirements for figures submitted with manuscripts for initial peer review, as well as the more detailed post-acceptance figure requirements.

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Note: if data, scripts, or other artefacts used to generate the analyses presented in the paper are available via a publicly available data repository, authors should include a reference to the location of the material within their paper.

General Style Points

The following points provide general advice on formatting and style.

- **Abbreviations, Symbols and Nomenclature:** *Journal of Clinical Periodontology* adheres to the conventions outlined in Units, Symbols and Abbreviations: A Guide for Medical and Scientific Editors and Authors. Abbreviations

should be kept to a minimum, particularly those that are not standard. Non-standard abbreviations must be used three or more times and written out completely in the text when first used.

Resource Identification Initiative

The journal supports the **Resource Identification Initiative**, which aims to promote research resource identification, discovery, and reuse. This initiative, led by the **Neuroscience Information Framework** and the **Oregon Health & Science University Library**, provides unique identifiers for antibodies, model organisms, cell lines, and tools including software and databases. These IDs, called Research Resource Identifiers (RRIDs), are machine-readable and can be used to search for all papers where a particular resource was used and to increase access to critical data to help researchers identify suitable reagents and tools.

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Patient anonymity should be preserved. When detailed descriptions, photographs, or videos of faces or identifiable body parts are used that may allow identification, authors should obtain the individual's free prior informed consent. Authors do not need to provide a copy of the consent form to the publisher; however, in signing the author license to publish, authors are required to confirm that consent has been obtained. Wiley has a **standard patient consent form** available for use. Where photographs are used they need to be cropped sufficiently to prevent human subjects being recognized; black eye bars should not be used as they do not sufficiently protect an individual's identity).

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- US authors should cite compliance with the US National Research Council's Guide for the Care and Use of Laboratory Animals, the US Public Health Service's Policy on Humane Care and Use of Laboratory Animals, and Guide for the Care and Use of Laboratory Animals.
- UK authors should conform to UK legislation under the Animals (Scientific Procedures) Act 1986 Amendment Regulations (SI 2012/3039).
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The journal requires that clinical trials are prospectively registered in a publicly accessible database and clinical trial registration numbers should be included in all papers that report their results. Authors are asked to include the name of the trial register and the clinical trial registration number at the end of the abstract. If the trial is not registered, or was registered retrospectively, the reasons for this should be explained.

Research Reporting Guidelines

Accurate and complete reporting enables readers to fully appraise research, replicate it, and use it. Authors are required to adhere to recognised research reporting standards. The EQUATOR Network collects more than 370 reporting guidelines for many study types, including for:

- Randomised trials : CONSORT
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As papers frequently provide insufficient detail as to the performed statistical analyses, please describe with adequate detail. For clinical trials intention to treat analyses are encouraged (the reasons for choosing other types of analysis should be highlighted in the submission letter and clarified in the manuscript).

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