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Leandro Machado Oliveira

INFLUÊNCIA DA INFLAMAÇÃO GENGIVAL NA QUALIDADE DE VIDA RELACIONADA À SAÚDE BUCAL DE INDIVÍDUOS RESIDENTES EM UMA ZONA RURAL DO SUL DO BRASIL

Santa Maria, RS
2020

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

Orientador: Prof. Dr. Fabrício Batistin Zanatta

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Leandro Machado Oliveira

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Santa Maria, RS
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Aos meus pais.

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RESUMO

INFLUÊNCIA DA INFLAMAÇÃO GENGIVAL NA QUALIDADE DE VIDA RELACIONADA À SAÚDE BUCAL DE INDIVÍDUOS RESIDENTES EM UMA ZONA RURAL DO SUL DO BRASIL

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A doença gengival induzida pelo biofilme dentário (BD) determina uma influência negativa na qualidade de vida relacionada à saúde bucal (QVRSB) de crianças e adolescentes. Contudo, o corpo de evidência na população adulta centra-se na relação entre periodontite e QVRSB, e dados relativos a associação independente do desfecho referido com inflamação gengival são inexistentes. Ainda, as disparidades presentes nas zonas rurais relativas a acesso, autopercepção e resiliência em saúde reforçam a importância de estudos nessas áreas, que também são escassos. O objetivo desta dissertação foi apresentar um artigo que avaliou a influência da inflamação gengival, independentemente de sequelas clínicas e autopercebidas de periodontite, na QVRSB em indivíduos residentes em zona rural do sul do Brasil. Este trabalho derivou de uma amostra representativa (n = 688) da população residente na zona rural de Rosário do Sul, Rio Grande do Sul, Brasil. Para a presente análise foram excluídos 71 indivíduos edêntulos, 22 indivíduos com menos de 5 dentes, 4 indivíduos que não responderam ao questionário de QVRSB e 470 indivíduos com valores de profundidade de sondagem (PS) maior que 3 milímetros; sendo assim, a subamostra contou com 121 indivíduos. Os participantes foram examinados clinicamente para cárie dentária, doença periodontal – seis sítios por dente e todos os dentes excluindo terceiros molares - BD, cálculo, uso de prótese e perda dentária. Medidas antropométricas e coleta sanguínea para aferição de hemoglobina glicada também foram realizadas. Foram aplicados questionários socioeconômico semiestruturado para coleta de características sociodemográficas, comportamental para coleta de hábitos de higiene, fumo e uso de serviço odontológico, e questionários estruturados e validados para mensuração da autopercepção de doença periodontal e estresse e QVRSB. A presença de inflamação gengival foi definida como presença de sangramento a sondagem, mensurada pelo Índice de Sangramento a Sondagem (SS), em mais que 20% dos sítios em toda boca e em mais que 10% dos sítios na região anterior (todos os sítios dos elementos 13 ao 23 e 43 ao 33) de pacientes que não apresentassem profundidade de sondagem maior que 3 milímetros. O desfecho QVRSB pela versão reduzida do questionário validado Oral Health Impact Profile (OHIP-14). Variáveis contextuais relacionadas aos distritos foram obtidas a partir de publicações oficiais do município. Os dados foram analisados por meio de Modelos Multiníveis de Regressão de Poisson com inclusão hierárquica das variáveis. Os achados confirmam a hipótese de que inflamação gengival exerce uma influência negativa na QVRSB de indivíduos residentes em uma zona rural do sul do Brasil. Aqueles indivíduos que apresentavam SS em mais que 20% dos sítios em toda boca ou em 10% dos sítios na região anterior apresentaram piores escores de OHIP-14. Esses achados suportam a necessidade de implementação de políticas públicas não só para as condições periodontais de maior severidade, como também às menores.

Palavras chave: Qualidade de vida. Gengivite. Epidemiologia. Saúde da população rural.

ABSTRACT

THE INFLUENCE OF GINGIVITIS ON ORAL HEALTH-RELATED QUALITY OF LIFE IN INDIVIDUALS LIVING IN A RURAL AREA OF SOUTHERN BRAZIL

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The plaque induced gingival disease determines a negative influence on oral health-related quality of life (OHRQoL) in children and adolescents. However, the body of evidence in the adult population focuses on the relationship between periodontitis and OHRQoL, and there is no data regarding the independent association of the referred outcome related to gingival inflammation. Moreover, the disparities present in rural areas regarding access, self-perception and resilience in health reinforce the importance of studies in these regions, which are also scarce. The aim of this dissertation was to present an article that evaluated the influence of gingival inflammation, regardless of clinical and self-perceived sequelae of periodontitis, on OHRQoL in individuals living in rural areas of southern Brazil. The present study was derived from a representative sample (n = 688) of the population living in the rural area of Rosário do Sul, Rio Grande do Sul, Brazil. For the present analysis, 71 edentulous, 22 with less than 5 teeth, 4 who did not answer the OHRQoL questionnaire and 470 individuals with probing depth (PD) values greater than three millimeters were excluded; therefore, the subsample had 121 individuals. Participants were examined clinically for dental caries, periodontal diseases - six sites per tooth and all teeth excluding third molars – visible plaque, calculus, prosthesis use and tooth loss. Anthropometric measurements and blood collection for the measurement of glycated hemoglobin were also performed. Semi-structured socioeconomic questionnaires were applied to collect sociodemographic characteristics, behavioral to collect hygiene habits, smoking and use of dental services, and structured and validated questionnaires to measure self-perceived periodontal disease and stress and OHRQoL. Gingival inflammation was defined as the presence of more than 20% of sites in whole mouth and more than 10% of sites in the anterior region (all sites of elements 13 to 23 and 43 to 33) with bleeding on probing, measured by the Bleeding on Probing Index (BoP), and no site exceeding three millimeters of PD. The OHRQoL was measured by the reduced version of the validated Oral Health Impact Profile (OHIP-14) questionnaire. Contextual variables related to the districts were obtained from official publications of the municipality. The data were analyzed using Multilevel Poisson Regression Models with hierarchical approach to include variables. The findings confirm the hypothesis that gingival inflammation influences the OHRQoL of individuals living in a rural area of southern Brazil. Those individuals who had BoP in more than 20% of sites in whole mouth and more than 10% of the sites in the anterior region had worse OHIP-14 scores. These findings support the need to implement public policies not only for the conditions of greater periodontal severity, but also for the lesser ones.

Key words: Quality of life. Gingivitis. Epidemiology. Rural health.

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LISTA DE ABREVIATURAS E SIGLAS

BD – Biofilme dentário.

CPI – Community Periodontal Index (Índice Periodontal Comunitário).

CPITN – Community Periodontal Index of Treatment Needs (Índice Periodontal Comunitário de Necessidade de Tratamento).

DP – Desvio padrão.

GI – Índice Gengival.

IBGE – Instituto Brasileiro de Geografia e Estatística.

IPV – Índice de Placa Visível.

NIC – Nível de inserção clínica.

OHIP-14 – Oral Health Impact Profile (Perfil de Impacto da Saúde Bucal).

OMS – Organização Mundial da Saúde.

PS – Profundidade de sondagem.

QVRS – Qualidade de vida relacionada a saúde.

QVRSB – Qualidade de vida relacionada a saúde bucal.

SS – Sangramento a sondagem.

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1 APRESENTAÇÃO

Os padrões de ocorrência e de distribuição das doenças bucais têm sofrido mudanças a nível global durante os últimos anos (WHO, 2003; BRASIL, 2011; KASSEBAUM et al., 2017). Responsáveis por um alto impacto econômico (RIGHOLT et al., 2018), tais doenças atingem cerca de 3,5 bilhões de pessoas em âmbito mundial (KASSEBAUM et al., 2017). Além dos tradicionais fatores biológicos, componentes sócio-econômico-culturais têm um papel fundamental no estabelecimento dessas patologias (SCHUCH et al., 2017; SCHWENDICKE et al., 2015), e esse mecanismo de associação têm surgido como um grande desafio para a saúde pública.

Cerca de 70% dos 1,4 bilhões de pessoas do mundo que são extremamente pobres vivem em áreas rurais. Aproximadamente 56% dos residentes rurais em todo o mundo não têm cobertura legal de saúde (definida como protegida por legislação ou afiliação a um plano de seguro de saúde) - em comparação com 22% da população urbana. Apesar disso, estudos voltados para esse tipo de população a nível regional, nacional e global são extremamente escassos. A ausência desses dados influencia as decisões sobre a alocação de recursos e, por sua vez, perpetua a negligência no planejamento sistemático para populações rurais em muitos países. (THE LANCET, 2015)

Resultados das poucas pesquisas de diferentes países do mundo mostraram que as pessoas que vivem em áreas rurais estão menos satisfeitas com sua saúde bucal e apresentam taxas mais altas de cárie dentária não tratada, doença periodontal e perda dentária (AHN et al., 2011; CROCOMBE; BELL; BARNETT, 2014; SKILLMAN et al., 2010). Além disso, os residentes rurais são menos propensos a se envolver em estratégias de prevenção e em promoção de comportamentos saudáveis, já que há menos recursos para informação em saúde, e possuem uma taxa mais baixa de uso de serviços odontológicos do que indivíduos residentes em zonas urbanas (GABER et al., 2018).

As doenças periodontais - gengivite e periodontite – fazem parte provavelmente das doenças mais comuns da humanidade. De acordo com o estudo "*Global Burden of Diseases, Injuries, and Risk Factors*", a periodontite severa é a sexta doença mais prevalente no mundo, com uma prevalência geral de 11,2% - cerca de 743 milhões de pessoas afetadas - e de 1990 a 2010, essa prevalência global aumentou 57,3% (JIN et al., 2016; KASSEBAUM et al., 2017; TONETTI et al., 2017b). Como a periodontite é a principal causa de perda dentária na população adulta em todo o mundo, esses indivíduos correm o risco de perda múltipla de dentes, edentulismo e disfunção mastigatória, afetando sua nutrição, qualidade de vida e autoestima

(PETERSEN; OGAWA, 2012). O impacto econômico total das doenças periodontais é responsável por um componente importante dos 442 bilhões de dólares causado pelas doenças bucais (RIGHOLT et al., 2018).

Dado crescente envelhecimento da população e a possibilidade de retenção dos dentes, espera-se que a prevalência de periodontite continue a aumentar (JEPSEN et al., 2017; TONETTI et al., 2017a). Em função da sequela vitalícia acarretada por essa doença, a melhor estratégia para redução de tal acréscimo nas taxas de periodontite é a prevenção e o tratamento de sua condição precursora, a gengivite (LANG; SCHÄTZLE; LÖE, 2009; LOE et al., 1986; RAMSEIER et al., 2017; SCHATZLE et al., 2003). Muito menos estudada a nível epidemiológico em populações adultas, considerava-se que essa condição era onipresente em toda população (SHEIHAM, 1997).

Como na grande maioria dos casos a doença gengival induzida por BD é assintomática, comumente não é percebida sua presença pela população em geral; passa a ser percebida, na maioria das vezes, quando sintomas de doença destrutiva já estão presentes. No entanto, em um estudo realizado com estudantes de odontologia, 19 de 20 indivíduos que apresentavam sangramento a sondagem (SS) em menos que 10% dos sítios reportaram não perceberem sangramento gengival, enquanto cerca de metade dos estudantes com SS em mais que 10% dos sítios se identificaram como portadores de doença gengival. Nessa perspectiva, a auto percepção – na amostra de estudantes de odontologia - de doença gengival parece se dar a partir do limite de 10% de sítios com SS presente (BASER et al., 2014).

Ainda, a par do conceito de saúde como “um estado de completo bem-estar físico, mental e social, e não apenas a ausência de doença ou enfermidade” proposto em 1947 (OMS, 2006), torna-se questionável entender um indivíduo portador de gengivite como um indivíduo doente. Dados relativos a percepções dos pacientes adultos, bem como do impacto causado pela condição no bem-estar e atividades diárias são praticamente inexistentes, e a saúde pública carece desse tipo de evidência.

Desde a sua criação, o campo de pesquisa em qualidade de vida se concentrou em trazer a perspectiva do paciente para análise de sáude. Normalmente, a qualidade de vida - devido à sua natureza subjetiva - é medida usando resultados relatados pelo paciente. Isto permite ao profissional obter uma visão da maneira como os pacientes percebem sua própria saúde e facilita a interpretação do domínio físico medido objetivamente pelos exames clínicos (SCHWARTZ; REVICKI, 2015). Ao criar ferramentas para mensuração de desfechos relatados pelo paciente, os pesquisadores ajudaram a trazer a voz e a experiência do paciente ao centro do palco na avaliação de doenças, tratamentos e na consideração de evoluções em saúde (PAAP

et al., 2018). A pesquisa resultante nesse campo em crescimento levou a muitas descobertas que apoiam a validade da perspectiva do paciente - um importante afastamento da ideia de que o profissional de saúde é o único capaz de definir os limites entre saúde e doença. Ademais, essa ênfase crescente na pesquisa centrada no paciente levou a um conceito ainda mais radical: que os pacientes podem e devem estar envolvidos desde o diagnóstico até considerações pós-tratamento (PAAP et al., 2018; SCHWARTZ; REVICKI, 2015).

Desse modo, a presente dissertação apresenta o artigo intitulado **"Gingival inflammation influences oral health-related quality of life in individuals living in a rural area of southern Brazil"**, o qual objetivou explorar se a extensão de inflamação gengival influencia de maneira independente a qualidade de vida relacionada a saúde bucal de residentes em uma zona rural.

1.1 REFERENCIAL TEÓRICO

O entendimento da influência da inflamação gengival na qualidade de vida relacionada à saúde bucal requer um referencial teórico consistente a respeito da evidência disponível. Para tanto, esta sessão está dividida em quatro sessões terciárias.

Na primeira sessão, há contextualização clínica, etiológica e epidemiológica da gengivite, bem como breve descrição – centrada nas condições gengivais induzidas por placa - da mais atual classificação das doenças periodontais, proposta em 2018. Essa sessão subsidia a importância da gengivite e da inflamação gengival na saúde oral e destaca as lacunas na evidência disponível para o contexto epidemiológico.

Na segunda sessão, discute-se o papel da qualidade de vida relacionada a saúde bucal na avaliação dos indivíduos e o instrumento utilizado para sua mensuração empregado no presente estudo.

A terceira sessão explora a relação entre doenças periodontais e qualidade de vida relacionada a saúde bucal. A reflexão teórica permite identificar e interpretar os principais resultados da evidência disponível sobre a temática, e também ressalta aspectos que ainda merecem ser estudados.

Por fim, a quarta sessão apresenta uma breve revisão de literatura sobre o papel do determinante contextual rural na saúde.

1.1.1 As doenças gengivais induzidas por placa

A gengivite caracteriza-se por uma inflamação induzida pelo biofilme dental (BD) e a extensão e severidade dessa resposta inflamatória são influenciadas por vários fatores sistêmicos e orais. Se não tratada ao longo dos anos, evolui para periodontite, condição caracterizada por perda de inserção periodontal, na grande maioria dos indivíduos. Importante ressaltar que o acúmulo do BD ocorre mais rapidamente em sítios que apresentam sangramento que naqueles com ausência de inflamação clínica, criando uma interação dinâmica e complexa entre o BD e a resposta imunoinflamatória do hospedeiro. Contudo, deve ser notado que nem todo sítio que possui sangramento na margem gengival irá apresentar perda de inserção. Ainda não existem preditores confiáveis que indiquem quais sítios com gengivite são suscetíveis a progressão para periodontite (MURAKAMI et al., 2018). Juntamente com as lesões gengivais não associadas primariamente com o BD, a gengivite compõe a classificação das doenças gengivais (CHAPPLE et al., 2018a)

Os sinais clínicos da gengivite são restritos à gengiva marginal e são reversíveis com a remoção do fator etiológico, sem qualquer prejuízo ao periodonto de suporte (LÖE; THEILADE; JENSEN, 1965). Já a periodontite severa afeta cerca de 538 milhões de pessoas (KASSEBAUM et al., 2017), e tão importante quanto paralisar os processos inflamatórios e a progressão da periodontite (DARVEAU; TANNER; PAGE, 1997; LÖE, 2000) é prevenir que novos casos evoluam a tal cenário (HAAS et al., 2012, 2014). Neste contexto, foi observado, em um estudo de coorte, que a gengivite persistente representa uma pré-condição e um potencial fator de risco para perda de inserção periodontal e perda dentária (LANG; SCHÄTZLE; LÖE, 2009). Portanto, a alteração inflamatória gengival, além de indicar o nível de higiene bucal individual, pode predizer o curso clínico da periodontite.

A gengivite é a doença gengival mais prevalente em crianças e adolescentes, principalmente nos países mais desfavorecidos (CHIAPINOTTO et al., 2013; JÜRGENSEN; PETERSEN, 2009; OH; EBER; WANG, 2002; TOMAZONI et al., 2014). De acordo com os dados do último levantamento em saúde bucal realizado em âmbito nacional (Projeto SB Brasil 2010), 27,1% e 33,8% dos brasileiros aos 12 anos e na faixa etária de 15 a 19 anos, respectivamente, apresentam sangramento gengival (BRASIL, 2011). Dados representativos de escolares de 12 anos de uma cidade do sul do Brasil indicaram uma prevalência de sangramento gengival de 96,2%, com 26,2% das crianças apresentando ≥ 15% dos sítios com gengivite (TOMAZONI et al., 2014). Outros estudos avaliaram a prevalência de gengivite em crianças e adolescentes (CHIAPINOTTO et al., 2013; JÜRGENSEN; PETERSEN, 2009; KRISDAPONG et al., 2012a; OH; EBER; WANG, 2002) e diferem quanto às estimativas encontradas, provavelmente devido a forma de mensuração da condição gengival – o dente índice de

Ramfjord (CHIAPINOTTO et al., 2013) apresenta pior acurácia na detecção de doença, do Índice Periodontal Comunitário (CPI) apresenta resultados intermediários (JÜRGENSEN; PETERSEN, 2009; KRISDAPONG et al., 2012a) e do exame de dois quadrantes contra laterais apresentou os melhores resultados na comparação com os outros protocolos parciais citados (PERES et al., 2012).

Estudos em adultos, tendo em vista os fatores de confusão com a doença destrutiva, são raros. Em um estudo realizado em Porto Alegre, a prevalência foi maior que 90% da população, com extensão de aproximadamente 30% dos sítios (OPPERMANN et al., 2015). De igual modo, um estudo realizado em três cidades sul americanas [Porto Alegre (Brasil), Tucumán (Argentina) e Santiago (Chile)] demonstrou que mais de 90% da população adulta apresenta gengivite (CARVAJAL et al., 2016). Esses dados apontam para o fato de que a gengivite é um problema de ampla ocorrência e que demanda atenção pela Saúde Pública. Em ambas publicações, aspectos sócio-econômicos-culturais estiveram associados a uma maior prevalência.

Apesar de somente alguns casos de gengivite progredirem para periodontite, não é possível identificar em que indivíduos e qual extensão de gengivite está relacionada à ocorrência de destruição dos tecidos periodontais e osso alveolar. Dessa forma, uma alta prevalência e extensão de sangramento gengival na população pode ser preocupante, uma vez que indivíduos com inflamação gengival podem apresentar uma maior frequência de perda de inserção periodontal no futuro quando comparados com indivíduos sem manifestação de inflamação (ALBANDAR et al., 1998).

1.1.1.1 A classificação das doenças periodontais de 2018

A classificação das doenças periodontais proposta em 2017 e publicada em 2018 (TONETTI; GREENWELL; KORNMAN, 2018) identificou e caracterizou objetivamente, pela primeira vez, um quadro de saúde periodontal (LANG; BARTOLD, 2018) e definiu a diferença entre a presença de inflamação gengival em um ou mais sítios e um caso de gengivite (TROMBELLI et al., 2018). Para tanto, esta pondera a distinção entre “classificação” (critério epidemiológico) e “diagnóstico” (critério clínico). Diante da vasta variedade de índices empregados, definiu-se que o SS deve ser o parâmetro principal para definir os limiares para a gengivite (CATON et al., 2018).

Três cenários diferentes do periodonto foram definidos - periodonto intacto, periodonto reduzido devido a outras causas (como cirurgia para aumento de coroa clínica) que não

periodontite e periodonto reduzido por periodontite. Para classificação das doenças periodontais, três situações distintas podem ocorrer (CHAPPLE et al., 2018b; PAPAPANOU et al., 2018):

1) Saúde periodontal: indivíduo sem perda de inserção interproximal devido a periodontite, ou que apresenta em apenas um único dente, com ausência de profundidade de sondagem (PS) maior que 3 mm e com ausência de SS ou atingindo menos que 10% dos sítios. Esta condição pode estar presente em pacientes com periodonto intacto e com periodonto reduzido por outra causa que não periodontite.
2) Gengivite: indivíduo sem perda de inserção interproximal devido a periodontite, ou que apresenta em apenas um único dente, com ausência de PS maior que 3 mm e com presença de SS em mais que 10% dos sítios. Assim como na saúde, esta condição pode se apresentar nos cenários de periodonto intacto e reduzido por outra causa que não periodontite.
3) Periodontite: indivíduo que apresenta perda de inserção interproximal devido a periodontite em pelo menos dois dentes não adjacentes. Um paciente com periodontite permanece com essa classificação por toda a vida pois já manifestou suscetibilidade, mesmo após uma terapia bem-sucedida, e requer cuidados de suporte ao longo da vida para evitar a recorrência da doença.

Na perspectiva de diagnóstico, tanto saúde periodontal quanto gengivite seguem os mesmos critérios supracitados a termo de classificação. Gengivite continua sendo uma condição reversível após adequado controle do BD. Entretanto, três padrões diferentes para periodontite após conclusão do tratamento bem-sucedido são propostos (CHAPPLE et al., 2018b):

1) Periodonto estável: indivíduo com ausência de PS maior que 3 mm e com presença de SS em menos que 10% dos sítios. Ainda, pode apresentar bolsas de 4 mm, desde que estas não apresentem SS.
2) Remissão de doença: indivíduo com ausência de PS maior que 3 mm e com presença de SS em mais que 10% dos sítios. Ainda, pode apresentar bolsas de 4 mm, desde que estas não apresentem SS. Objetivamente este quadro é idêntico a definição de caso de gengivite, no entanto, em função de já existir histórico de periodontite e, uma vez dado tal diagnóstico, este passa a valer para o resto da vida, semanticamente opta-se pela denominação “inflamação gengival”.
3) Paciente com periodonto instável: paciente que apresenta PS maior que 3 mm com presença de SS.

Dada esta breve descrição – que se centrou nas condições gengivais - da classificação proposta em 2018, cabe aqui sumarizar que gengivite e periodontite não coexistem em um mesmo indivíduo. O diagnóstico e classificação de gengivite só podem ser determinados quando não existe presença de histórico de periodontite. Uma vez detectada perda de inserção causada por periodontite e realizado tratamento adequado, mas sem efetivo controle do BD realizado pelo paciente, inicia-se o processo de remissão de doença com inflamação gengival.

1.1.2 A qualidade de vida relacionada à saúde bucal

Contemporaneamente, uma nova perspectiva vem sendo adotada aos estudos em saúde bucal, nos quais desfechos de saúde orientados para o paciente, como a auto percepção de saúde bucal e a qualidade de vida relacionada à saúde bucal (QVRSB) são utilizados (LAMARCA et al., 2014; TURRELL et al., 2007). A QVRSB, nesse contexto, tem sido amplamente preconizada como um adjunto aos parâmetros clínicos no planejamento de políticas de saúde pública para a priorização de serviços e na avaliação de estratégias de saúde bucal (SISCHO; BRODER, 2011).

A qualidade de vida é considerada um parâmetro válido na avaliação do paciente em todas as áreas dos cuidados de saúde, e a saúde bucal e suas dimensões funcionais e psicológicas têm sido cada vez mais apontadas como uma parte integrante da saúde geral e do bem-estar dos indivíduos (GLICK et al., 2016; SISCHO; BRODER, 2011). Ela é influenciada de forma contínua pelos valores e atitudes das pessoas e das comunidades e reflete os atributos fisiológicos, sociais e psicológicos essenciais à qualidade de vida (GLICK et al., 2016).

A QVRSB, por conseguinte, é definida como um constructo multidimensional que se refere à extensão com a qual as desordens bucais interferem nas funções diárias e bem-estar dos indivíduos (BAKER, 2007; LOCKER; ALLEN, 2007). A avaliação subjetiva da QVRSB reflete o conforto das pessoas ao comer, dormir e se envolver em interações sociais, sua autoestima e sua satisfação com relação à sua saúde bucal (KLOTZ et al., 2018). Assim, QVRSB é um desfecho importante e que resulta da interação entre as condições de saúde bucal, saúde geral, fatores sociais e contextuais (LOCKER; ALLEN, 2007).

Diversos instrumentos têm sido desenvolvidos para mensurar a QVRSB, sendo em sua maioria questionários autoaplicáveis, também denominados de indicadores odontológicos ou sócio dentários (OLIVEIRA; NADANOVSKY, 2005; SLADE, 1997). Esses têm sido desenvolvidos e testados a fim de sedimentar as relações entre medidas subjetivas e objetivas

de saúde bucal, contribuindo para gerar estimativas válidas sobre as necessidades de uma determinada população (LOCKER; GIBSON, 2005).

Dentre esses instrumentos, encontra-se Perfil de Impacto da Saúde Oral (Oral Health Impact Profile – OHIP) – uma adaptação com foco a saúde oral (LOCKER; ALLEN, 2002) baseada no "International Classification of Impairments, Disabilities and Handicaps" (ICIDH) (WHO, 1980) que permite, numa única administração, recolher informações relativas à gravidade, extensão e prevalência dos impactos negativos na QVRSB (LOCKER; ALLEN, 2002). Somado a isto, a ferramenta apresenta boas qualidades psicométricas e permite medir a auto percepção das consequências inerentes às condições orais (LOCKER; ALLEN, 2007; SLADE, 1997).

O OHIP-14 (versão reduzida do OHIP) constitui um indicador subjetivo que visa fornecer uma medida da incapacidade (*Disability*), dor (*Pain*), limitação (*Limitation*) desconforto (*Discomfort*) e desvantagem/deficiência (*Handicap*) atribuída à condição oral, através de autoavaliação (LOCKER; ALLEN, 2002). Baseia-se no modelo de saúde oral que considera que as doenças provocam deficiências e limitações funcionais e que, consequentemente, o indivíduo pode ficar incapacitado ou pode ficar com uma desvantagem na sociedade (LOCKER; QUIÑONEZ, 2011). Esta versão reduzida do OHIP-49 (versão integral do OHIP) integra apenas duas perguntas para cada uma das sete dimensões: limitação funcional, dor física, desconforto psicológico, incapacidade física, incapacidade psicológica, incapacidade social e desvantagem/deficiência. Faz-se necessário mencionar que os conceitos de saúde e doença não são absolutos, mas sim variáveis dinâmicas e contínuas, que oscilam entre diferentes graus e variam entre o estado ótimo, num extremo, e a morte, no outro (LOCKER; QUIÑONEZ, 2011).

1.1.3 Doenças periodontais e qualidade de vida relacionada à saúde bucal

Dado este cenário, estudos utilizando a periodontite como condição clínica preditora a uma pior QVRSB têm encontrado, em sua maioria, associação positiva (ACHARYA; BHAT; ACHARYA, 2009; BERNABÉ; MARCENES, 2010a; HE et al., 2018; LAWRENCE et al., 2008; MASOOD et al., 2019; MULLIGAN et al., 2008; NG; LEUNG, 2006; OLIVEIRA et al., 2020). Entretanto, aspectos metodológicos presentes em alguns desses estudos podem ter interferido nesta associação, como: (1) uso de análise não-ajustada para possíveis variáveis de confusão, como o efeito concorrente de outras condições bucais, e a presença de covariáveis relacionadas à doença periodontal e QVRSB, como posição socioeconômica e fatores

demográficos (ACHARYA; BHAT; ACHARYA, 2009; JOWETT et al., 2009; NG; LEUNG, 2006); (2) avaliação de parâmetros periodontais por meio de protocolos parciais (BERNABÉ; MARCENES, 2010b; BRENNAN; SPENCER; ROBERTS-THOMSON, 2008; LAWRENCE et al., 2008; LÓPEZ; BAELUM, 2007; MARIÑO et al., 2007) o que pode superestimar a extensão e gravidade da doença e interferir nas medidas de associação entre a periodontite e QVRSB.

Tratando-se de gengivite, a presença de níveis extensos de doença está associada a impactos negativos na QVRSB de crianças e adolescentes (KRISDAPONG et al., 2012a, 2012b; LÓPEZ; BAELUM, 2007; TOMAZONI et al., 2014). Em uma coorte de 1.034 crianças tailandesas foi evidenciado que, enquanto 97% da amostra necessitava de abordagem terapêutica para inflamação gengival, a auto percepção dessa condição foi limitado a 27,1% de sujeitos (GHERUNPONG, 2004). Esta relação pode ocorrer porque os indivíduos percebem somente os sinais clínicos de gengivite que comprometem a estética do sorriso, fazendo com que se sintam chateados, irritados ou frustrados. Outra hipótese sugerida é que os indivíduos podem perceber sangramento gengival durante a escovação dentária, o que pode causar preocupação e insatisfação sobre o que os outros pensariam sobre sua condição oral (TOMAZONI et al., 2014).

No geral, os dados desses estudos indicam que - embora altamente prevalente, a gengivite tem um impacto limitado na QVRSB. No entanto, a extensão da gengivite pode aumentar os efeitos negativos no impacto referido e na auto percepção, isto é, um nível crescente de concordância entre o impacto da gengivite (CPI = 1 vs. CPI = 2) na QVRSB e a presença de necessidade de tratamento foi relatado (GHERUNPONG, 2004; TSAKOS; GHERUNPONG; SHEIHAM, 2006). Dados relativos a esta associação são inexistentes na população adulta, principalmente em função da sobreposição de determinados sinais clínicos com a doença periodontal destrutiva, e são de fundamental importância para somarem-se aos indicadores objetivos (sangramento a sondagem, vermelhidão) nas avaliações de necessidade de tratamento, já que capturam o impacto do estado de saúde bucal no bem-estar funcional, social e psicológico (TSAKOS; GHERUNPONG; SHEIHAM, 2006).

O Quadro 1 resume estudos que avaliaram a associação entre doenças periodontais e QVRSB. Duas recentes revisões sistemáticas (BUSET et al., 2016; FERREIRA et al., 2017) sumarizaram os resultados dos estudos que avaliaram a relação entre periodontite e QVRSB publicados até 2014; desse modo, a estratégia de busca empregada na base de dados PubMed anteriormente foi adaptada para realização da presente análise descritiva:

((((((gingivitis[MeSH Terms]) OR gingival bleeding on probing[MeSH Terms]) OR periodontitis[MeSH Terms]) OR periodontal disease[MeSH Terms]) OR gingival inflammation)) AND (quality of life[MeSH Terms])

No total, 695 artigos foram encontrados (até 1 de fevereiro de 2020). Os critérios de seleção foram: estudos transversais que utilizaram o OHIP-14 como questionário para avaliação da QVRSB quando a variável independente era periodontite. Quando a variável independente era gengivite, foram incluídos estudos que utilizassem qualquer tipo de questionário para mensuração. As principais características destacadas são identificação do estudo, características da amostra e da mensuração de doença periodontal, análise dos dados, principais achados e análise do risco de viés baseado na escala *Newcastle-Ottawa Quality Assessment Scale.*

Quadro 1 – Estudos sobre doenças periodontais e qualidade de vida relacionada a saúde bucal.

Autor (ano) **País** **Desenho**	**Amostra**	**Grupos de exposição**	**Variável independente**		**Análise dos dados**	**Resultados**	**Conclusões**	**Risco de viés[&]**
			Características do exame periodontal	Diagnóstico de doença periodontal				
Ng & Leung (2006) China	Conveniência; 727 indivíduos (53% do sexo feminino) de 25 a 64 anos de idade.	Periodontite: 143 indivíduos; Saúde: 584 indivíduos.	Examinadores calibrados; Exames em 6 sítios de todos os dentes.	Periodontite: média de NIC > 3 mm; Saúde: média de NIC ≤ 2mm.	Análise multivariada; ANCOVA; Variáveis de ajuste: idade, educação e número de dentes.	Associação estatisticamente significante entre periodontite (média de NIC > 3 mm) e QVRSB; Média ± DP OHIP-14 Escore total: 25.09 ± 5.94 ($p < 0.05$) Limitação funcional: 5.41 ± 1.24 ($p < 0.01$) Dor física: 4.86 ± 1.26 ($p < 0.05$) Desconforto psicológico 3.95 ± 1.12 ($p < 0.05$) Incapacidade física 5.33 ± 1.23	Indivíduos com melhor condição periodontal parecem apresentar melhor qualidade de vida. Isso demonstra que a destruição periodontal afeta diretamente a QVRSB.	Seleção ** Comparabilidade * Desfecho **

Quadro 1 – Estudos sobre doenças periodontais e qualidade de vida relacionada a saúde bucal

(continuação)

Autor (ano) **País** **Desenho**	**Amostra**	**Grupos de exposição**	**Variável independente**		**Análise dos dados**	**Resultados**	**Conclusões**	**Risco de viés[&]**
			Características do exame periodontal	Diagnóstico de doença periodontal				
						(p < 0.05) Incapacidade psicológica: 4.38 ± 1.09 (p < 0.05).		
Lawrence et al. (2008) New Zealand	Representativa; 924 indivíduos (48.9% do sexo feminino) de 32 anos.	Periodontite: 19.6% dos indivíduos.	Examinadores calibrados; Exames em 3 sítios (somente vestibulares) por dente de todos os dentes.	≥ 2 sítios com NIC ≥ 4 mm e ≥ 1 sítio com NIC ≥ 4 mm (o último ponto de corte para comparação com outros estudos)	Análise multivariada; Regressão Logística e Regressão de Poisson; Variáveis de ajuste: sexo, status socioeconômico e CPO-D.	Associação estatisticamente significante entre periodontite (≥ 2 sítios com NIC ≥ 4 mm) e QVRSB (severidade e prevalência) IRR 1.14; 95% CI 1.05 – 1.23. Mulheres: OR 3.11; 95% CI 1.84 - 5.27. Homens OR 1.70; 95% CI 1.05 - 2.75. Associação não	Histórico de doença periodontal esteve associado a pior QVRSB, e este impacto é maior em mulheres que em homens.	Seleção *** Comparabilidade Desfecho *

Quadro 1 – Estudos sobre doenças periodontais e qualidade de vida relacionada a saúde bucal

(continuação)

Autor (ano) **País** **Desenho**	**Amostra**	**Grupos de exposição**	**Variável independente**		**Análise dos dados**	**Resultados**	**Conclusões**	**Risco de viés[&]**
			Características do exame periodontal	Diagnóstico de doença periodontal				
						estatisticamente significante entre periodontite e extensão de QVRSB IRR 1.14; 95% CI 0.86-1.53.		
Mariño et al. (2008) Austrália	Conveniência; 603 indivíduos (63.7% do sexo feminino) com média de idade de 67.7 anos.	PS 3-5 mm: 121 indivíduos; PS > 5 mm: 44 indivíduos.	Examinadores calibrados; CPITN.	Não apresentado.	Análise bivariada; ANOVA.	Associação não estatisticamente significante entre periodontite e QVRSB. Média ± DP OHIP-14: 5.57 ± 9.12 em bolsas rasas (3-5mm) e 8.16 ± 11.95 em bolsas profundas (>5mm).	Ter periodontite não impactou em piora na QVRSB dos indivíduos.	Seleção *** Comparabilidade Desfecho *
Mulligan et	Subamostra de	Média PS: HIV negativo	Examinadores	Não apresentado.	Análise	Associação estatisticamente	Periodontite	Seleção **

Quadro 1 – Estudos sobre doenças periodontais e qualidade de vida relacionada a saúde bucal

(continuação)

Autor (ano) **País** **Desenho**	**Amostra**	**Grupos de exposição**	**Variável independente**		**Análise dos dados**	**Resultados**	**Conclusões**	**Risco de viés[&]**
			Características do exame periodontal	Diagnóstico de doença periodontal				
al. (2008) EUA	amostra representativa; 689 indivíduos do sexo feminino, com idades de 19 a 64 anos (média: 38.6).	1.7mm HIV positivo 1.9mm % de sítios com NIC > 2mm: HIV negativo 10.7 HIV positivo 16.7 % de sítios com PS > 4mm: HIV negativo 0 HIV positivo 0.	calibrados; Exame em 4 sítios (3 sítios vestibulares e mesiolingual) de um quadrante escolhido via randomização.		multinível; Regressão Linear; Variáveis de ajuste: fumo, cárie, número de dentes, número da visita no estudo, outros.	significante entre periodontite (% de sítios com NIC > 2mm) e QVRSB. Estimativa de parâmetro=0.06± 0.02 (p=0.01). Associação estatisticamente significante entre severidade de periodontite e QVRSB. 1mm de aumento na média de PS foi associado a um escore 2.6% pior de QVRSB (p=0.04) 1mm de aumento	impacta negativamente a QVRSB de mulheres HIV positivo.	Comparabilidade Desfecho *

Quadro 1 – Estudos sobre doenças periodontais e qualidade de vida relacionada a saúde bucal

(continuação)

Autor (ano) **País** **Desenho**	**Amostra**	**Grupos de exposição**	**Variável independente**		**Análise dos dados**	**Resultados**	**Conclusões**	**Risco de viés[&]**
			Características do exame periodontal	Diagnóstico de doença periodontal				
						na média de NIC foi associado a um escore 3.2% pior de QVRSB ($p < 0.001$).		
Acharya et al. (2009) Índia	Conveniência; 259 indivíduos do sexo feminino, de 20 a 37 anos (média: 26 anos).	PS ≥4mm: 33.2% dos indivíduos.	Examinadores calibrados; CPITN.	Não apresentado.	Análise bivariada; Correlação de Spearman;	Associação estatisticamente significante entre periodontite (escore CPITN) e QVRSB. Escore total: $r=0.19$ ($p <0.01$); Limitação funcional: $r=0.12$ ($p=0.05$); Dor física: $r=0.19$ ($p<0.01$) Incapacidade física: $r=0.17$	Periodontite impacta negativamente a QVRSB de mulheres grávidas.	Seleção ** Comparabilidade Desfecho **

Quadro 1 – Estudos sobre doenças periodontais e qualidade de vida relacionada a saúde bucal

(continuação)

Autor (ano) **País** **Desenho**	**Amostra**	**Grupos de exposição**	**Variável independente**		**Análise dos dados**	**Resultados**	**Conclusões**	**Risco de viés[&]**
			Características do exame periodontal	Diagnóstico de doença periodontal				
						(p<0.01).		
Guzeldemir et al. (2009) Túrquia	Conveniência; 43 indivíduos em hemodiálise (48.9% do sexo feminino), de 18 a 75 anos (média de 46.4).	Média de PS ± DP: 2.17 ± 0.53 mm	Não apresentado.	Não apresentado.	Análise bivariada; Correlação de Spearman;	Associação não estatisticamente significante entre periodontite e QVRSB. r=0.055 (p=0.726).	Ter periodontite não impactou em piora na QVRSB de indivíduos em hemodiálise.	Seleção Comparabilidade Desfecho *
Jowett et al. (2009) Reino Unido	Conveniência; 27 indivíduos (13 grupo teste e 14 grupo controle); Teste: 27 a 61 anos (média de 39.5)	Exame periodontal básico (BPE) ≥ 3: 13 indivíduos.	Não apresenta informação sobre calibragem; Exame em 6 sítios de todos os dentes, mas escore dado para o sextante.	BPE ≥ 3	Análise bivariada; Teste de Mann-Whitney	Associação estatisticamente significante entre periodontite (BPE ≥3) e QVRSB. Mediana do número de impactos: Controle 0.5 Teste 5 (p<0.05).	Pacientes com doença periodontal apresentam pior QVRSB que não doentes.	Seleção ** Comparabilidade Desfecho *

Quadro 1 – Estudos sobre doenças periodontais e qualidade de vida relacionada a saúde bucal

(continuação)

Autor (ano) **País** **Desenho**	**Amostra**	**Grupos de exposição**	**Variável independente**		**Análise dos dados**	**Resultados**	**Conclusões**	**Risco de viés[&]**
			Características do exame periodontal	Diagnóstico de doença periodontal				
	Controle: 26 a 53 anos (média 41).							
Montero-Martin et al. (2009) Espanha	Conveniência; 270 indivíduos (54.4% do sexo feminino), com média de idade de 45.2 anos.	CPI = 0 na média de 3.1± 2.2 sextantes.	Examinadores calibrados; CPI.	Não apresentado.	Análise bivariada; Correlação de Pearson.	Associação não estatisticamente significante entre periodontite (escores de CPI) e QVRSB. Severidade r=0.01 (p > 0.05) Prevalência r=0.04 (p > 0.05)	Os escores de CPI não estiveram relacionados aos maiores escores de OHIP-14.	Seleção *** Comparabilidade Desfecho *
Bernabe & Marcenes (2010)	Representativa; 3122 indivíduos (54.3% do sexo feminino) de 16 a 93 anos	Média de número de dentes com PS ≥ 4mm: 3.18 ± 4.73	Examinadores não calibrados. Exame em dois sítios (proximais) de todos os dentes os dentes.	≥2 sítios proximais com NIC ≥ 4mm e ≥ 1 sítio proximal com PS ≥ 4mm (não necessa-	Análise multivariada; Regressão binomial negativa;	Associação estatisticamente significante entre periodontite e QVRSB. RR 1.26; 95% CI 1.16 - 1.38	Periodontite foi associada a QVRSB independente de fatores socioeconômi-	Seleção ** Comparabilidade * Desfecho *

Quadro 1 – Estudos sobre doenças periodontais e qualidade de vida relacionada a saúde bucal

(continuação)

Autor (ano) **País** **Desenho**	**Amostra**	**Grupos de exposição**	**Variável independente**		**Análise dos dados**	**Resultados**	**Conclusões**	**Risco de viés[&]**
			Características do exame periodontal	Diagnóstico de doença periodontal				
Reino Unido	(média de 41.2 anos).	Média de número de dentes com NIC ≥ 4mm: 2.39 ± 4.35.		riamente no mesmo dente.	Variáveis de ajuste: sexo, idade, região, escolaridade, renda, número de dentes, uso de prótese, cárie, trauma e desgaste dentário.	Associação estatisticamente significante entre severidade de periodontite (número de dentes com PS ≥ 4mm) e QVRSB. 1-4 dentes: RR 1.21; 95%CI 1.12-1.31; 5-9 dentes: RR 1.26; 95%CI 1.20-1.31; ≥ 10 dentes**:** RR 1.40; 95%CI 1.13-1.72; Associação estatisticamente significante entre severidade de	cos e outras doenças orais.	

Quadro 1 – Estudos sobre doenças periodontais e qualidade de vida relacionada a saúde bucal

(continuação)

Autor (ano) **País** **Desenho**	**Amostra**	**Grupos de exposição**	**Variável independente**		**Análise dos dados**	**Resultados**	**Conclusões**	**Risco de viés[&]**
			Características do exame periodontal	Diagnóstico de doença periodontal				
						periodontite (NIC ≥ 4mm) e QVRSB; 5-9 dentes: RR 1.27; 95%CI 1.09-1.48; ≥10 dentes**:** RR 1.42; 95%CI 1.41-1.44		
Krisdapong et al. (2012) Tailândia	Representativa; 1874 indivíduos (1063 indivíduos de 12 anos e 811 indivíduos de 15 anos).	Indivíduos de 12 anos: 319 apresentavam gengivite em 1 a 2 sextantes; 395 apresentavam gengivite em pelo menos 3 sextantes;	Examinadores calibrados; CPI.	Escore 1 = sangramento gengival com ausência de cálculo; Escore 5 = sangramento gengival com presença de cálculo.	Análise multivariada; Regressão logística; Variáveis de ajuste: Tipo de escola, bairro que reside, renda, cálculo e	Associação estatisticamente significante entre gengivite e QVRSB. Indivíduos de 12 anos: Severidade - 1-2 sextantes:	Impactos na qualidade de vida relacionada a saúde bucal estão associados a presença de gengivite.	Seleção *** Comparabilidade * Desfecho **

Quadro 1 – Estudos sobre doenças periodontais e qualidade de vida relacionada a saúde bucal

(continuação)

Autor (ano) **País** **Desenho**	**Amostra**	**Grupos de exposição**	**Variável independente**		**Análise dos dados**	**Resultados**	**Conclusões**	**Risco de viés[&]**
			Características do exame periodontal	Diagnóstico de doença periodontal				
		Indivíduos de 15 anos: 269 apresentavam gengivite em 1 a 2 sextantes; 287 apresentavam gengivite em pelo menos 3 sextantes;			hábitos de higiene	OR 2.1; 95%CI 1.4 – 3.2; 3 – 6 sextantes: OR 2.7; 95%CI 1.9 – 4.0; Prevalência – 3 – 6 sextantes: OR 2.1; 95%CI 1.3 – 3.3; Indivíduos de 15 anos: Severidade – 1 – 2 sextantes: OR 1.6; 95%CI 1.1 – 2.5; 3 – 6 sextantes: OR 3.4; 95% CI 2.2 – 5.2; Prevalência – 3 – 6 sextantes:		

Quadro 1 – Estudos sobre doenças periodontais e qualidade de vida relacionada a saúde bucal

(continuação)

Autor (ano) **País** **Desenho**	**Amostra**	**Grupos de exposição**	**Variável independente**		**Análise dos dados**	**Resultados**	**Conclusões**	**Risco de viés[&]**
			Características do exame periodontal	Diagnóstico de doença periodontal				
						OR 2.2; 95%CI 1.2 – 4.1.		
Al Habashneh et al. (2012) Jordânia	Conveniência; 400 indivíduos (59% do sexo feminino) com idades de 18 a 60 anos (média de 36.7 anos).	Gengivite: 41.8% Periodontite leve: 19.8% Periodontite moderada: 23.3% Periodontite severa: 15.3%	Examinadores calibrados; Exame em 6 sítios de todos os dentes.	≥ 4 dentes com mais de 1 sítio com PS ≥ 4mm e NIC ≥ 3mm Leve: NIC 1-2 mm; Moderada: NIC 3-4 mm; Severa: NIC ≥ 5 mm.	Análise multivariada; Regressão Linear; Váriaveis de ajuste: sexo, idade, doenças sistêmicas, fumo, renda e escolaridade.	Associação estatisticamente significante entre severidade de doença periodontal e QVRSB. Escore total: aumenta 9.53 ± 7.12 na gengivite em comparação a periodontite moderada (12.55 ± 7.35) e severa (15.57 ± 7.49) e na periodontite leve 8.93 ± 6.61 em comparação a periodontite	Periodontite impacta a qualidade de vida relacionada a saúde bucal e indivíduos com periodontite severa apresentam piores escores de OHIP.	Seleção: *** Comparabilidade: * Desfecho: **

Quadro 1 – Estudos sobre doenças periodontais e qualidade de vida relacionada a saúde bucal

(continuação)

Autor (ano) **País** **Desenho**	**Amostra**	**Grupos de exposição**	**Variável independente**		**Análise dos dados**	**Resultados**	**Conclusões**	**Risco de viés[&]**
			Características do exame periodontal	Diagnóstico de doença periodontal				
						moderada e severa.		
Palma et al. (2013) Brasil	Conveniência; 150 indivíduos (62% do sexo feminino) com média de 47 anos.	RPS 1: 3 indivíduos RPS 2: 35 indivíduos RPS 3: 104 indivíduos RPS 4: 8 indivíduos	Examinadores calibrados; Exame em 6 sítios de todos os dentes, mas valor do pior sextante é generalizado para o paciente.	RPS maior ou igual a 1	Análise multivariada; Regressão Linear; Variáveis de ajuste: idade, auto percepção, cárie, renda e escolaridade.	Associação estatisticamente significante entre periodontite e severidade de periodontite e QVRSB β = 0.110 (p=0.058); Escore total: Gengivite 3.74 ± 2.68 Periodontite 4.90 ± 2.59 (p=0.017)	Ter periodontite prediz uma pior qualidade de vida, e a piora aumenta de acordo com o aumento de severidade de doença.	Seleção: *** Comparabilidade: * Desfecho: **
Tomazoni et al. (2014)	Representativa; 1134 indivíduos (54.1% do sexo	≥ 15% dos sítios com CPI=1: 298	Examinadores calibrados; Exame em seis	CPI=1	Análise multinível; Regressão de	Associação estatisticamente significante entre gengivite e		

Quadro 1 – Estudos sobre doenças periodontais e qualidade de vida relacionada a saúde bucal

(continuação)

Autor (ano) **País** **Desenho**	**Amostra**	**Grupos de exposição**	**Variável independente**		**Análise dos dados**	**Resultados**	**Conclusões**	**Risco de viés[&]**
			Características do exame periodontal	Diagnóstico de doença periodontal				
Brasil.	feminino) de 12 anos de idade.	indivíduos (26.2%)	sítios de todos os dentes.		Poisson; Variáveis de ajuste: sexo, cor, renda, escolaridade materna, cárie, trauma e maloclusão.	QVRSB; RP 1.15; 95%CI 1.10 – 1.21	A presença de níveis extensos de gengivite influencia negativamente a QVRSB.	Seleção: *** Comparabilidade: * Desfecho: **
Irani et al. (2015) Reino Unido	Conveniência; 135 indivíduos [61 portadores de diabetes (média de idade 48.2 anos) e 74 não diabéticos (média de idade 47.7 anos)]	Não diabéticos com gengivite: 17 indivíduos; Diabéticos com gengivite: 20 indivíduos; Não diabéticos com	Não apresentado.	Gengivite: ausência de PS > 4 mm, SS em mais que 15% dos sítios, sem perda de inserção. Periodontite: ≥ 6 sítios com PS ≥ 5 mm em	Análise bivariada; Teste de Mann-Whitney.	Associação não estatisticamente significante entre periodontite e QVRSB para o grupo diabético. Associação estatisticamente significante entre gengivite e QVRSB ($p<0.05$) e periodontite e	A doença periodontal não impacta a qualidade de vida de pacientes diabéticos.	Seleção: *** Comparabilidade: * Desfecho: **

Quadro 1 – Estudos sobre doenças periodontais e qualidade de vida relacionada a saúde bucal

(continuação)

Autor (ano) **País** **Desenho**	**Amostra**	**Grupos de exposição**	**Variável independente**		**Análise dos dados**	**Resultados**	**Conclusões**	**Risco de viés[&]**
			Características do exame periodontal	Diagnóstico de doença periodontal				
		periodontite: 40 indivíduos; Diabéticos com periodontite: 26 indivíduos.		dentes não adjacentes, com perda de inserção e perda óssea alveolar confirmada via radiografia.		QVRSB ($p<0.01$);		
Pakpour et al. (2015) Irã	Conveniência; 767 indivíduos (512 indivíduos em hemodiálise e 255 saudáveis).	Pacientes em hemodiálise: Média (DP) de GI: 1.59 (0.97); CPI 0: 25 indivíduos; CPI 1: 88 indivíduos CPI 2: 126 indivíduos CPI 3: 162 indivíduos	Examinadores calibrados; GI: seis sítios de todos os dentes; CPI: protocolo parcial.	Não apresentado;	Análise multivariada; Regressão Linear; Variáveis de ajuste: sexo, idade, renda, escolaridade, IMC, diabetes, IPV,	Associação estatisticamente significante entre gengivite e periodontite e QVRSB (apenas pacientes em hemodiálise). GI: $\beta = 0.255$ ($p<0.05$) CPI: $\beta = 0.136$ ($p<0.05$).	Doenças periodontais predizem uma pior QVRSB em indivíduos em hemodiálise.	Seleção: ** Comparabilidade: * Desfecho: **

Quadro 1 – Estudos sobre doenças periodontais e qualidade de vida relacionada a saúde bucal

(continuação)

Autor (ano) **País** **Desenho**	**Amostra**	**Grupos de exposição**	**Variável independente**		**Análise dos dados**	**Resultados**	**Conclusões**	**Risco de viés[&]**
			Características do exame periodontal	Diagnóstico de doença periodontal				
					cárie, hábitos de higiene oral, fumo, visitas ao dentista, QVRS e eficácia da diálise.			
He et al. (2017) China	Representativa; 480 indivíduos (237 do sexo feminino e 243 do sexo masculino).	Periodontite leve: 56 indivíduos; Periodontite moderada: 191 indivíduos Periodontite severa: 49 indivíduos.	Examinadores calibrados; Exame em seis sítios de todos os dentes.	Definição proposta por Eke et al. (2012)	Análise multivariada; Regressão logística; Variáveis de ajuste: sexo, idade, local de moradia, escolaridade, renda, fumo, visitas ao	Associação estatisticamente significante entre periodontite e QVRSB. Periodontite moderada: OR 1.42; 95%CI 1.29 -1.63	Indivíduos que apresentavam periodontite possuíam pior QVRSB, com maior severidade apresentando piores escores de OHIP-14.	Seleção: *** Comparabilidade: * Desfecho: ***

Quadro 1 – Estudos sobre doenças periodontais e qualidade de vida relacionada a saúde bucal

(continuação)

Autor (ano) **País** **Desenho**	**Amostra**	**Grupos de exposição**	**Variável independente**		**Análise dos dados**	**Resultados**	**Conclusões**	**Risco de viés[&]**
			Características do exame periodontal	Diagnóstico de doença periodontal				
					dentista, número de dentes, cárie, uso de prótese e doença sistêmica.	Periodontite severa: 1.63; 95%CI 1.41 – 1.98.		
Maroneze et al. (2018) Brasil	Conveniência; 67 adolescentes (38 do sexo masculino).	15 a 45% de sangramento gengival: 22 indivíduos. > 45% de sangramento gengival: 45 indivíduos	Examinadores calibrados; Exame em seis sítios de todos os dentes; Avaliação de cor e edema e Índice de Sangramento Gengival	Não apresentado.	Análise multivariada; Regressão de Poisson; Variáveis de ajuste: renda familiar, sexo, cárie e placa visível.	Associação estatisticamente significante entre sangramento gengival na região anterior e QVRSB. 44%-64% de sangramento gengival: RP 1.32; 95% CI 1.08-1.61;	A presença de níveis altos de sangramento gengival na região anterior esteve associada a uma pior QVRSB de adolescentes	Seleção ** Comparabilidade * Desfecho **

Quadro 1 – Estudos sobre doenças periodontais e qualidade de vida relacionada a saúde bucal

(continuação)

Autor (ano) **País** **Desenho**	**Amostra**	**Grupos de exposição**	**Variável independente**		**Análise dos dados**	**Resultados**	**Conclusões**	**Risco de viés[&]**
			Características do exame periodontal	Diagnóstico de doença periodontal				
Masood et al. (2019) Reino Unido	Representativa; 6378 indivíduos (54.3% do sexo feminino) com 36.2% apresentando idades entre 45-64 anos.	PS até 3.5 mm: 52.7% 3.5 – 5.5 mm: 38.3% Maiores que 5.5 mm: 9%	Não apresentado; Exame nos sítios mesial e distal da face vestibular dos dentes superiores e da face lingual dos inferiores em todos os dentes	Presença de PS > 3.5 mm	Análise multivariada; Regressão de Poisson; Variáveis de ajuste: sexo, idade, raça, estado civil, escolaridade, classe social, Índice de Privação Múltipla (IPM), fumo, percepção de saúde, CPO-D e desgaste anterior.	Associação estatisticamente significante entre prevalência e severidade de PS e QVRSB (escore total e domínios). PS de 3.5 - 5.5 mm: RP 1.05; CI 1.02 – 1.10; PS > 5.5 mm: RP 1.23; CI 1.18 – 1.29;	A presença e severidade de doença foi associada ao escore total e todos os domínios de QVRSB.	Seleção: *** Comparabilidade: * Desfecho: ***

Quadro 1 – Estudos sobre doenças periodontais e qualidade de vida relacionada a saúde bucal

(continuação)

Autor (ano) **País** **Desenho**	**Amostra**	**Grupos de exposição**	**Variável independente**		**Análise dos dados**	**Resultados**	**Conclusões**	**Risco de viés[&]**
			Características do exame periodontal	Diagnóstico de doença periodontal				
Oliveira et al. (2020) Brasil	Conveniência; 180 indivíduos em hemodiálise (55% do sexo masculino) de idades entre 21 a 82 anos.	Ausência de doença: 24 indivíduos; Periodontite leve ou moderada: 82 indivíduos Periodontite severa: 74 indivíduos.	Examinadores calibrados; Exame em seis sítios de todos os dentes.	Definição proposta por Eke et al. (2012)	Análise multivariada; Regressão de Poisson; Variáveis de ajuste: raça, idade, escolaridade, renda, fumo e placa visível	Associação estatisticamente significante entre periodontite e QVRSB (escore total e domínios). Periodontite leve/moderada: RR 1.49; 95% CI 1.16 -1.41; Periodontite severa: RR 1.77; 95% CI 1.36 - 2.30;	A periodontite impacta a QVRSB de indivíduos em hemodiálise.	Seleção: ** Comparabilidade: * Desfecho: ***

1.1.4 O determinante contextual rural

No âmbito de fatores contextuais, é elucidado que populações rurais brasileiras diferem das urbanas em uma série de fatores que influenciam a QVRSB, apresentando menor escolaridade e renda média mensal, segundo o IBGE. Ademais, o menor acesso a serviços e planos de saúde já foi descrito nessas regiões (KOSTKA; BOROWIAK; KOSTKA, 2014; SKILLMAN et al., 2010). Entretanto, o conhecimento sobre aspectos de saúde e de QVRSB dessa considerável parcela da população é escasso (GABER et al., 2018).

O modelo comportamental da utilização dos serviços de saúde proposto por Andersen tem sido amplamente aceito como uma abordagem preditiva e explicativa para avaliar o papel do lugar na determinação de desfechos em saúde e em saúde bucal (ANDERSEN R, 1995). De acordo com esse modelo, o desfecho saúde bucal é função de fatores predisponentes, recursos permitidos e necessidade de atendimento odontológico (ANDERSEN R, 1995; ANDERSEN, 2008). Tem sido demonstrado que as características contextuais de lugar geográfico podem desempenhar um papel significativo na desigualdade geral do meio rural-urbano na saúde bucal (PAMPALON; HAMEL; GAMACHE, 2010a, 2010b; RICKETTS, 2002). O ambiente urbano pode atenuar a potencial influência negativa das características do ambiente rural como o afastamento geográfico, privação socioeconômica e acesso inadequado aos serviços de saúde bucal, o que pode contribuir para melhora na saúde bucal ou QVRSB (DOBARIA et al., 2015; ESPINOZA et al., 2013; GABER et al., 2018; KRANJČIĆ et al., 2014; TEIXEIRA et al., 2015; WILLIAMS; PARKER; JAMIESON, 2010).

Resultados de pesquisas em diferentes nações do mundo demonstraram que as pessoas que vivem em áreas rurais estão menos satisfeitas com sua saúde bucal e têm maiores taxas de cárie dentária não tratada, doença periodontal e perda dentária (AHN et al., 2011; CROCOMBE; BELL; BARNETT, 2014; SKILLMAN et al., 2010).

Além disso, os residentes rurais são menos propensos a se envolver na prevenção de doenças e na promoção de comportamentos saudáveis, porque há menos informações em saúde, recursos humanos e aconselhamento inadequado dos profissionais (NAGARAJAN, 2004). A utilização de serviços de saúde é um importante determinante da saúde bucal, mas está longe de ser igual, geograficamente. Esta disparidade pode ser explicada principalmente pela distribuição desigual dos profissionais, bem como o acesso desigual e inadequado aos serviços de saúde em zonas rurais e remotas (OGUNBODEDE et al., 2015). Essas variações podem afetar diretamente a saúde bucal, tanto em termos de morbidade quanto na percepção da saúde bucal.

Em um estudo qualitativo realizado em uma região rural de Quebec para explorar como os residentes rurais percebem saúde e acesso ao atendimento odontológico foi mostrado que, embora residentes rurais não percebem a ruralidade como uma ameaça à sua saúde, eles estavam preocupados com o acesso limitado a cuidados. A distância geográfica e a falta de transporte público foram relatados como grandes barreiras à saúde bucal, especialmente para pessoas com deficiências físicas (EMAMI et al., 2014).

Corroborando a esses resultados, estudos recentes ao redor do mundo encontraram maior prevalência, severidade e extensão de doença periodontal em áreas rurais (AWUTI, et al., 2012; WANG, et al., 2007; SYRJALA; YLOSTALO; KNUUTTILA, 2010; MAMAI-HOMATA, et al., 2010; CHATRCHAIWIWATANA, 2007). No Brasil, um estudo na zona rural da Bahia observou uma prevalência de periodontite de 46,9% em indivíduos de 41 a 50 anos (DE MACEDO, et al., 2006). Contudo, dados relativos a gengivite são inexistentes em vista da dificuldade de dissociação dos sinais clínicos marginais com os respectivos de periodontite severa.

Rosário do Sul é uma cidade do interior do Rio Grande do Sul, localizada na região da fronteira oeste do estado. É uma cidade praticamente agrícola, voltada ao cultivo de arroz, soja, citricultura e eucalipto (PREFEITURA MUNICIPAL, 2014). De acordo com o último censo populacional, a cidade teria cerca de 40 mil habitantes em 2013. A população rural residente é de 4776 indivíduos, sendo que aproximadamente 4 mil pessoas (n=3992) têm 15 anos ou mais (IBGE, 2010). A área rural é dividida em seis regiões, sendo uma delas a zona rural de Rosário do Sul (1886 habitantes) e cinco consideradas como distritos (IBGE, 2010): Campo Seco, Caverá, Mangueiras, São Carlos e Touro Passo. Caverá é o mais populoso deles com 880 habitantes, seguido, em ordem decrescente de população, de Campo Seco (787), Touro Passo (489), Mangueiras (375) e São Carlos (359).

1.2 PROPOSIÇÃO

Este estudo transversal apresenta o objetivo de determinar se a presença de inflamação gengival exerce alguma influência na QVRSB de indivíduos residentes em uma zona rural do sul do Brasil.

1.3 HIPÓTESES CONCEITUAIS

A hipótese conceitual do estudo dessa dissertação foi testada de acordo com modelo conceitual pré-existente (FERRANS et al., 2005): a inflamação gengival pode ser influenciada pelo contexto em que o indivíduo se insere e suas condições individuais socioeconômicas, demográficas e comportamentais e impacta negativamente a QVRSB de indivíduos residentes em zona rural.

2 ARTIGO 1 - GINGIVAL INFLAMMATION INFLUENCES ORAL HEALTH-RELATED QUALITY OF LIFE IN INDIVIDUALS LIVING IN A RURAL AREA OF SOUTHERN BRAZIL

Este artigo foi publicado e é propriedade intelectual ao periódico Journal of Clinical Periodontology, ISSN: 1600-051X, fator de impacto 5.241 e qualis A1. As normas para publicação estão descritas no Anexo B.

Gingival inflammation influences oral health-related quality of life in individuals living in a rural area of southern Brazil

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Running title: Gingival inflammation and OHRQoL in rural adults.

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ABSTRACT

Aim: The aim of the present cross-sectional study was to evaluate whether the extent of gingival inflammation (GI) in whole mouth or restricted to the anterior region are independently associated with oral health-related quality of life (OHRQoL) in individuals living in a rural area of southern Brazil.

Materials and Methods: A probability sample of 688 individuals was submitted to a full-mouth periodontal examination at six sites on each tooth. Extent of GI in whole mouth and restricted to anterior region were dichotomously considered when bleeding on probing (BoP) occurred at 20% or more of whole mouth sites and at 10% or more of anterior region sites, respectively, in individuals with probing depths ≤ 3 mm, totaling 121 individuals analyzed, aged 15 to 82 years. OHRQoL was assessed using the simplified version of the Oral Health Impact Profile ($OHIP_{14}$) questionnaire. Adjusted multilevel Poisson regression analysis was used with a conceptual hierarchical approach to calculate the rate ratio (RR) of $OHIP_{14}$ scores.

Results: In the adjusted model, higher extent levels of full mouth GI [RR = 1.23; 95% confidence interval: 1.06 to 1.44; p value = 0.004] and GI restricted to the anterior region (RR = 1.29; 95% confidence interval: 1.11 to 1.51; p value ≤ 0.001) were significantly associated with poorer OHRQoL.

Conclusions: The extent of GI in whole mouth (≥ 20% of sites with BoP) and in the anterior region (≥ 10% of sites with BoP) was independently associated with OHRQoL in individuals living in a rural area.

KEY WORDS: Rural health; oral health; quality of life; gingivitis; cross-sectional study.

Clinical Relevance

Scientific rationale for study: It is well established that periodontitis is associated with worse oral health-related quality of life (OHRQoL). However, the association between extent of gingival inflammation (GI) and OHRQoL has not previously been reported in adults.

Principal findings: GI in whole mouth and in the anterior region was independently associated with worse OHRQoL after adjusting for confounding variables.

Practical implications: Our findings highlight the importance of access to periodontal treatment and prevention measures for the promotion of oral health and the improvement of quality of life in individuals living in rural areas.

INTRODUCTION

Oral health-related quality of life (OHRQoL) is a subjective measure that results from the interaction between oral health status and social/contextual factors. This multidimensional construct is used to measure the influence of oral health conditions on the wellbeing of individuals (Locker & Allen, 2007). Due to the potential impact on one's overall perception of life, OHRQoL has been broadly employed as a complement to clinical parameters when evaluating public oral health strategies (Sischo & Broder, 2011).

Among the contextual components of OHRQoL, place of residence contributes to the explanation of disparities in health outcomes. The rural environment is a challenging social, cultural and geographical context for general and oral health outcomes (Bernard et al., 2007; De Koninck & Pampalon, 2007). Inadequate access to oral healthcare services due to geographical remoteness and socioeconomic deprivation may contribute to worse oral health and OHRQoL (Espinoza et al., 2013; Kranjcic et al., 2014; Dobaria et al., 2015). Moreover, less health information and inadequate counselling from healthcare providers may lead to less engagement in disease prevention and healthy behaviors (Nagarajan, 2004).

Research findings from different nations worldwide have shown that individuals living in rural areas are less satisfied with their oral health and have higher rates of periodontal diseases and tooth loss (Skillman et al., 2010; Ahn et al., 2011; Crocombe et al., 2014). A recently published systematic review involving 34 studies found that periodontitis has a significant negative effect on OHRQoL, with greater disease severity causing a greater impact (Ferreira et al., 2017). Individuals with periodontal diseases also have a negative perception of their oral health status and poorer quality of life compared to healthy individuals (Bernabe & Marcenes, 2010).

Gingivitis is the precursor of periodontitis (Löe et al., 1986; Albandar et al., 1998; Schatzle et al., 2003; Lang et al., 2009; Ramseier et al., 2017) and managing this disease is a primary preventive strategy for periodontitis (Axelsson et al., 2004, Tonetti et al., 2018). Since clinical attachment loss (CAL) is detected, individuals will be periodontitis cases for life (Chapple et al., 2018). In this context, three distinct

scenarios emerge: stability, remission or unstable cases. Remission stage differs from stability due to presence of gingival inflammation (GI) and similar to gingivitis, managing this disease is the preventive strategy for unstable periodontitis. Patients may notice symptoms such as bleeding while brushing, gingival swelling and redness and even halitosis (Quirynen et al., 2009; Chapple et al., 2018; Murakami et al., 2018; Trombelli et al., 2018). Moreover, despite its importance to the etiopathogenesis of periodontitis, to the best of our knowledge, there is no evidence regarding the association between GI and OHRQoL in adults.

From the epidemiological perspective, understanding the association between GI and OHRQoL can contribute to emphasize yet more its meaning and early treatment and monitoring, which can be used to develop public health programs. Thus, the aim of the present study was to determine whether GI exerts an influence on the OHRQoL of individuals living in a rural area of southern Brazil. We hypothesized that individuals with higher extent levels of GI in whole mouth and restricted to anterior region would report higher overall Oral Health Impact Profile scores than their counterparts.

MATERIALS AND METHODS

Design and sampling process

This study is part of a population-based cross-sectional survey. The surveyed population comprised individuals aged 15 years or older living in a rural area of the city of Rosário do Sul, in southern Brazil. The majority of rural areas are distant from the urban center and access roads are generally precarious. These characteristics hamper transport to the city, thereby restricting the use of crucial urban services, such as health care.

The fieldwork was conducted between March 2015 and May 2016. All procedures were in accordance with the standards of the regional research ethics committee and the Declaration of Helsinki. Each participant received a full explanation regarding the objectives and procedures of the study and agreed to participate by signing a statement of informed consent (protocol number: 1.500.519).

The sample size for the whole survey was estimated using the worst-case scenario of periodontal disease (prevalence of 50%) and was also adjusted for finite

populations. Considering a 4% precision level, a design effect of 1.3 and 95% confidence interval, the estimated sample size was 580 individuals. This number was increased by 15% (667 individuals) to compensate for the non-response rate (Ferreira et al., 2018).

A total of 1087 individuals were considered eligible, 397 (36.5%) did not participate in the survey. The exclusion criteria were a systemic disease or condition that impeded the clinical examination or would require a prophylactic regimen of antibiotics prior to the examination, a diagnosis or family report of psychiatric or mental problems and alcohol or drug intoxication. A total of 690 individuals were included in the population-based cross-sectional survey, 617 (89.7%) were dentate. For the present investigation, we excluded 71 edentulous individuals, 22 with less than five teeth, four who did not answer the oral impact questionnaire ($OHIP_{14}$), two who refuse to participate of the clinical examination and 470 with periodontal probing depths (PPD) > 3 mm (Trombelli et al., 2018), leading to a total of 121 individuals aged 15 to 82 years. The sampling process is shown in Figure 1.

The power of the present study sample was estimated taking into account the following parameters: 1) a non-paired design; 2) α error of 0.05; 3) mean and standard deviation (SD) differences of overall $OHIP_{14}$ scores between both exposed and non-exposed groups of 2.93 (SD = 0.27) and 2.55 (SD = 0.23) for extent of gingival inflammation in whole mouth and restricted to anterior region, respectively. Taking these parameters into consideration, the power of the sample reached 100% for both independent variables of interest. We were unable to calculate the sample size required to test our hypothesis due to lack of similar studies.

Training and calibration process

Training involved definitions of the clinical and physical parameters, measuring instruments, correct measuring techniques and the administration of the questionnaire. Training for bleeding on probing (BoP) (Van der Velden, 1979) was performed on five individuals with the supervision of an experienced examiner. Calibration for periodontal probing depth was performed 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. Reproducibility was considered satisfactory (ICC > 0.80). Besides the

training and calibration process, the research team also tested the data collection procedures in a pilot study (Ferreira et al., 2018).

Data collection

Six examiners performed the fieldwork for this study. Trained dentists conducted face-to-face interviews administering the questionnaires and clinical examinations individually in a mobile unit. The interviews addressed sociodemographic, economic, medical and behavioral factors as well as an investigation of the impact of oral health on quality of life, using the Oral Health Impact Profile [$OHIP_{14}$ (Slade, 1997)], Perceived Stress Scale [PSS_{14} (Cohen et al., 1983)] and perceptions regarding periodontal disease (Cyrino et al., 2011). One researcher visited each selected sector one day before the start of the data collection to invite individuals to participate. Individuals were not included only after the third attempt at invitation. All permanent fully erupted teeth were examined at six sites [distobuccal (DB), mid-buccal (B), mesiobuccal (MB), distolingual (DL), mid-lingual (L) and mesiolingual (ML)] (WHO, 1997) by two periodontists using a manual periodontal probe (UNC-15 probe; Neumar®, São Paulo, Brazil).

Independent and dependent variables

The explanatory variables considered in the present study were age (< 60 years or ≥ 60 years), sex (male or female), self-reported skin color (white or non-white), body mass index [ideal weight (BMI < 25 kg/m^2), overweight (BMI = 25-29.9 kg/m^2) or obese (≥ 30kg/m^2)], visit to a dentist in the previous year (no visit or ≥ one visit), diabetes mellitus status [absent (Hb1Ac < 5.7%), pre-diabetic (Hb1Ac ≥ 5.7% and < 6.5%) or diabetic (Hb1Ac ≥ 6.5%)] (WHO, 2011). Schooling was dichotomized as less than eight (corresponding to primary school incomplete) or ≥ eight years of study. Household income was dichotomized as ≤ 1.2 or > 1.2 times the Brazilian monthly minimum wage (BMMW). The Perceived Stress Scale (PSS-14) was used as coping variable and its score was dichotomized as ≤ 24 or > 24 (Faro, 2015). Smoking status was categorized in non-smokers (those who never smoked and those who ceased the habit over 10 years), ex-smokers (those who ceased the habit in less than 10 years) and current

smokers. The oral health-related variables were the number of natural teeth (< 20 or ≥ 20), clinical attachment loss (< 5 mm, ≥ 5 mm in < 30% of teeth or ≥ 5 mm in ≥ 30% of teeth) (Tonetti et al., 2018), prosthetics (total or partial removable) use (yes or no) and the D component of the DMFT index (used to determine the number of teeth with untreated dental caries).

Besides the clinical assessment of clinical attachment loss, the history of periodontitis was determined based on the answers to the following questions: “Have you ever noticed that your front teeth have moved forward (toward the lip) or that gaps have developed between your front teeth?” and “Have you ever had any teeth become loose on their own without any injury?” (for the assessment of the migration of anterior teeth and mobility, respectively). Oral health perceptions were investigated using the following question: “Overall, how would you rate the health of your teeth and gums?”, for which the response options were “excellent,” “very good,” “good,” “fair” and “poor.” For the purposes of analysis, this variable was categorized as excellent/very good/good or fair/poor. Mean household income of the district (≤ 1.5 BMMW or > 1.5 BMMW) was the contextual variable considered.

Full-mouth extent of GI was categorized as either higher extent level (≥ 20% of sites with BoP) or low extent level (less than 20% of sites with BoP) (Kinney et al., 2014). Extent of gingival inflammation in the anterior region (all sites from elements 13 to 23 and 43 to 33) was also categorized as higher level (≥ 10% of sites with BoP) and low level (< 10% of sites with BoP).

The Brazilian simplified version of the Oral Health Impact Profile ($OHIP_{14}$) was used to estimate the influence of oral health on quality of life (Oliveira & Nadanovsky, 2005). The $OHIP_{14}$ is a multidimensional questionnaire that measures the frequency of problems associated with the oral cavity in seven distinct conceptual domains: functional limitation (e.g., difficulty chewing), physical pain (pain in the mouth and discomfort eating foods), psychological discomfort (feeling self-conscious and tense), physical disability (interrupted meals and unsatisfactory diet), psychological disability (embarrassment and difficulty relaxing), social disability (avoiding social interactions) and handicap (inability to function). The response options are scored on ordinal scale: 0 = never, 1 = hardly ever, 2 = occasionally, 3 = fairly often and 4 = very often. The OHIP-14 scores were computed by summing the coded responses within each domain to obtain the subscale scores (Locker & Quiñonez, 2011).

Data analysis

The data were analyzed using the STATA 14.0 statistical software. The outcome was the overall $OHIP_{14}$ score. The Shapiro-Wilk test was used to determine the distribution (normal or non-normal) of the data. Descriptive analysis was performed to provide summary statistics using Stata's "svy" command for complex data samples for assessing the association between the outcome and covariates. For the inferential process, the 'diabetic' category of 'diabetes mellitus status' was combined with 'pre-diabetic' due to the low number of individuals. Likewise, 'heavy smokers' was combined with 'light smokers' for the smoking status variable. Stepwise forward selection was used in the multilevel Poisson regression models to test associations between OHRQoL and distal, intermediate and proximal determinants according to a theoretical hierarchical framework based on the revised Wilson and Cleary model (Ferrans et al., 2005) (Figure 2): Block 1 included the contextual variable; Block 2 was composed of individual characteristics (demographic, socioeconomic, medical, behavioral and coping variables); Block 3 was composed of oral health-related variables; Block 4 was composed of oral symptoms (symptoms of history of periodontitis) and Block 5 included the oral health perception variable (Victora et al., 1997). Six models were created with this approach. Variables with a higher P-value were removed from the model one by one until only those with a P-value < 0.05 remained. Model 1 ("empty model") was an unconditional model; Model 2 included the contextual variable; Model 3 was composed of Model 2 plus variables from Block 2 and the results were used to adjust the subsequent models until the final model was obtained. In the final model, association measures were estimated after adjustments for variables in the same or previous level that remained in the multilevel model. This strategy enabled the estimation of rate ratios (RRs) between comparison groups and respective 95% confidence intervals (CIs) adjusted for the effects. RRs were calculated as the ratio of the arithmetic mean of the $OHIP_{14}$ scores between exposed and non-exposed groups. In all models, deviance (-2log likelihood) was measured to access the quality of fit.

RESULTS

Table 1 displays the distribution of the contextual and individual characteristics of the sample. Most individuals were female, with less than 60 years. Only eight individuals were under 18 years of age. In the whole sample, all individuals presented detectable interdental CAL of at least 1 mm in ≥ 2 non-adjacent teeth. Regarding GI in whole mouth, 54.3% of the present sample had higher extent levels (≥ 20% of BoP sites) and 85.4% had ≥ 10% of BoP sites. According to anterior region, the prevalence of higher extent levels of GI (≥ 10% of BoP sites) was 68.4%.

Table 2 displays the distribution of the overall $OHIP_{14}$ scores according to the independent variables. The mean overall $OHIP_{14}$ score was 7.90 (SD = 0.85). Individuals with higher overall $OHIP_{14}$ scores perceived their overall oral health as fair/poor, reported mobility and non-white skin color and had higher PSS_{14} scores. Moreover, present ≥ 20% of the whole mouth sites with BoP [mean overall score of 9.24 (SD = 1.43)] and ≥ 10% of sites with BoP in the anterior region [mean overall score of 8.70 (SD = 1.08)] were associated with worse OHRQoL when compared with the respectively counterparts [mean overall score 6.31 (1.22) and 6.15 (SD = 1.32)].

Table 3 displays the results of the unadjusted and adjusted multilevel Poisson regression analyses. Statistically significant unadjusted associations were found between $OHIP_{14}$ scores and higher extent levels of GI in the whole mouth and in the anterior region. In both final models, skin color (non-white), smoking status (light and heavy smokers) and PSS_{14} scores higher than 24 points were associated with higher overall $OHIP_{14}$ scores. Moreover, having less than 20 natural teeth, higher extent levels of GI in whole mouth (RR = 1.23; 95% CI: 1.06 to 1.44) and in the anterior region (RR = 1.29; 95% CI: 1.11 to 1.51) were related to poor OHRQoL. Regarding symptoms, individuals with self-perceived migration of anterior teeth reported worse OHRQoL. Self-rated oral health as fair/poor was also associated with higher $OHIP_{14}$ scores. For more information on the models, see the tables in the supplemental material (Supplementary table 1 and 2).

DISCUSSION

The present findings support the hypothesis that extended levels of GI in whole mouth (≥ 20% of sites with BoP) and restricted to anterior region (≥ 10% of sites with BoP) exert an influence on OHRQoL among periodontitis individuals living in a rural area of southern Brazil. Also, higher $OHIP_{14}$ scores were presented by non-white individuals, light and heavy smokers, those with less than 20 natural teeth, projected anterior teeth, which self-perceived as poor oral health and with higher self-perception of stress. In contrast, individuals aged 60 years or older and those who wore prosthesis (total or partial removable) exhibited better OHRQoL. Regarding the contextual variable, individuals living in districts with mean income of less than 1.5 BMMW had higher mean of $OHIP_{14}$ scores, but this difference did not achieve statistical significance.

Recent studies report that marginal manifestations of periodontal diseases (BoP) are related to OHRQoL in children (Krisdapong et al., 2012a,b; Tomazoni et al., 2014) and adolescents (López & Baelum, 2007; Maroneze et al., 2018). However, the association between GI and OHRQoL in a sample involving adults has not previously been explored. This may be due to the difficulty in distinguishing bleeding related to GI or unstable periodontitis in individuals with clinical attachment loss. Thus, beyond using the actual periodontal diseases classification, which considers GI separately from unstable periodontitis, we used severity and extent of CAL, tooth mobility and the migration of anterior teeth as a proxy for history of periodontitis. Independently these confounding factors, higher extent levels of GI remained significantly associated with poorer OHRQoL scores.

The explanatory pathway for the reduction in OHRQoL caused by GI may be the increase in erythema, edema, bleeding, tenderness and enlargement (Trombelli et al., 2004; White et al., 2012; Tonetti et al., 2015; Antoniazzi et al., 2017), which are signs and symptoms that could clarify the impact mediated by psychological disabilities in the form of negative social interactions and low satisfaction with one's self-image, mainly in the anterior region (Zanatta et al., 2012). Moreover, the occurrence of bleeding during routine activities, such as toothbrushing, may have influenced the perception of oral health and consequently contributed to the association found in the present study. Individuals may be more likely to feel worried or upset about their oral health status as a result of gingival bleeding, which can influence other aspects of their quality of life (Oliveira & Nadanovsky, 2005). Thus, the overall $OHIP_{14}$ score should be used to determine risk priority-setting. As individuals with GI have poorer overall $OHIP_{14}$ scores, treatment interventions should prioritize this group. Interestingly, severity and extent of

CAL were associated with lower $OHIP_{14}$ scores in the unadjusted model. This may be explained by statistical interactions between this variable and confounders, which also may justify why such association was not statistically significant after the course of the hierarchical approach.

Characteristics of resilience and resistance increase the likelihood of rural populations to adapt to the environment (context) in such a way that makes them resistant to seeking care and present less expectations on health improvements (Gaber et al., 2018). On the other hand, urban populations are less resilient and, as part of the allostatic process, they tolerate less disease conditions and present higher self-perceived health status (Chen, Wang, & Yan, 2016). This may justify why we adopt the full mouth cutoff point of ≥ 20% of sites with BoP (Kinney et al., 2014) instead the proposed one in the recent World Workshop (Trombelli et al., 2018).

High levels of gingival bleeding and untreated dental caries may be explained also by a lack of knowledge regarding the importance of oral health. Moreover, oral health education and motivation by dentists can be affected by inefficiently allocated health resources in rural regions and this may clarify why at least one visit to dentist per year had no impact on OHRQoL, since optimal access to these resources is an important factor to improving OHRQoL (Emami et al., 2016). Other plausibility is that rural populations may present higher differences on rates of curative compared to preventive treatments. Lower educational level and oral health literacy may influence the lower access to preventive dental services, and therefore it can impact the OHRQoL on long-term. Taken together, these factors underscore the importance of studying OHRQoL in residents of rural areas (Wen et al., 2017).

The present study considered the influence of contextual variables on different hierarchical levels. Understanding the relation of factors on different levels of influence is essential to the planning of health policies aimed at reducing inequities, as such factors affect oral health and have consequences for the quality of life of individuals.

This study has some limitations of the cross-sectional design and some degree of detection bias may have occurred. Although the data make up part of a representative population-based survey, we only analyzed individuals exhibiting the components of the case definition for GI. However, this subsample yielded a high power to test our hypothesis. It is also important to mention that this subsample may represent the most susceptible group for unstable periodontium and progressive CAL, due to history of periodontitis. As we excluded those individuals with PPD > 3mm, according to the World

Workshop Consensus on 2018 (Trombelli et al., 2018), there were no probability of multicollinearity between BoP and the cumulative effect of the periodontal pocket condition.

Besides that, in epidemiological perspective, this group may had been addressed in a “healthy or mild severity group” due to the low PPD, or in more advanced severities due to CAL. Thus, until 2018, there were no consensus of the real classification of this population, and this may have mitigated the impact of GI on OHRQoL.

CONCLUSIONS

The present findings indicate that GI exerts an influence on OHRQoL among individuals with history of periodontitis and living in a rural area of southern Brazil. Individuals with bleeding on probing on 20% or more of full-mouth sites and on 10% or more of anterior region sites have worse OHRQoL than their counterparts.

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Table 1: Characteristics of study sample (n= 121).

	Age group (years)		Total
	< 60	≥ 60	
Number of subjects	90	31	121
Mean age ± SD	39.47 ± 1.30	68.87 ± 0.91	47.86 ± 2.39
Contextual-level variables			
Census sector variable			
District's mean income			
> 1.5 BMMW	40 (57.7%)	17 (61.9%)	57 (58.9%)
≤ 1.5 BMMW	50 (42.3%)	14 (38.1%)	64 (41.1%)
Individual-level variables			
Demographic variables			
Sex			
Male	37 (39.9%)	15 (55.4%)	52 (44.3%)
Female	53 (60.1%)	16 (44.6%)	69 (55.7%)
Skin color			
White	69 (74.9%)	22 (71.7%)	91 (74.0%)
Non-white	21 (25.1%)	9 (28.3%)	30 (26.0%)
Socioeconomic variables			
Schooling			
≥ 8 years	38 (40.6%)	2 (4.2%)	40 (30.2%)
< 8 years	52 (59.4%)	29 (95.8%)	81 (69.8%)
Income			
> 1.2 x BMMW	32 (33.9%)	22 (76.2%)	54 (46.1%)
≤ 1.2 x BMMW	57 (66.1%)	9 (23.8%)	66 (53.9%)
Medical variables			
Body Mass Index			
< 25 kg/m^2	28 (30.2%)	10 (33.2%)	38 (31.0%)
25 – 29.9 kg/m^2	31 (36.7%)	8 (29.5%)	39 (34.7%)
≥ 30 kg/m^2	31 (33.1%)	13 (37.3%)	44 (34.3%)
Diabetes mellitus			

Absent	41 (58.1%)	8 (27.3%)	49 (48.7%)
Pre-diabetic	27 (34.1%)	14 (59.8%)	41 (42.0%)
Diabetic	5 (7.7%)	4 (12.9%)	9 (9.3%)
Behavioral variables			
Smoking status			
Non-smokers	76 (86.9%)	18 (59.4%)	94 (79.3%)
Ex-smokers	10 (9.1%)	13 (40.6%)	23 (17.8%)
Current smokers	4 (4.0%)	0 (0%)	4 (2.9%)
Visit to dentist			
≥ 1 visit/year	33 (39.7%)	20 (56.3%)	53 (44.4%)
< 1 visit/year	57 (60.3%)	11 (43.7%)	68 (55.6%)
Coping variable			
Perceived Stress Scale			
$PSS_{14} \leq 24$	62 (64.9%)	25 (82.9%)	87 (70%)
$PSS_{14} > 24$	28 (35.1%)	6 (17.1%)	34 (30%)
Oral health-related variables			
Prosthetics use			
No	67 (75.2%)	9 (31.4%)	76 (62.7%)
Yes	23 (24.8%)	22 (68.6%)	45 (37.3%)
Number of teeth in whole mouth			
≥ 20 teeth	64 (69.5%)	6 (22.7%)	70 (56.2%)
< 20 teeth	26 (30.5%)	25 (77.3%)	51 (43.8%)
Number of teeth in anterior region			
12 teeth	55 (60.9%)	6 (23.9%)	61 (50.3%)
< 12 teeth	35 (39.1%)	25 (76.1%)	60 (49.7%)
Untreated dental caries			
Absent	44 (47.2%)	16 (52.5%)	60 (48.7%)
Present	46 (52.8%)	15 (47.5%)	61 (51.3%)
Full-mouth clinical attachment loss			
< 5 mm	59 (63.3%)	5 (10.6%)	64 (48.3%)

≥ 5 mm in < 30% of teeth	24 (29.5%)	10 (40.0%)	34 (32.5%)
≥ 5 mm in ≥ 30% of teeth	7 (7.2%)	16 (49.4%)	23 (19.2%)
Clinical attachment loss in anterior region			
< 5 mm	64 (70.7%)	7 (20.7%)	71 (56.4%)
≥ 5 mm in < 30% of teeth	16 (19.3%)	7 (28.2%)	23 (21.8%)
≥ 5 mm in ≥ 30% of teeth	10 (10.0%)	17 (51.1%)	27 (21.8%)
Extent of gingival inflammation in whole mouth			
Low level (< 20% of BoP sites)	45 (46.5%)	13 (43.5%)	58 (45.7%)
High level (≥ 20% of BoP sites)	45 (53.5%)	18 (56.5%)	63 (54.3%)
Extent of gingival inflammation in anterior region			
Low level (< 10% of BoP sites)	32 (32.4%)	9 (29.3%)	41 (31.6%)
High level (≥ 10% of BoP sites)	58 (67.6%)	22 (70.7%)	80 (68.4%)
Symptoms of history of periodontitis (self-reported)			
Migration of anterior teeth			
No	65 (74.7%)	24 (83.3%)	89 (77.1%)
Yes	25 (25.3%)	7 (16.7%)	32 (22.9%)
Tooth mobility			
No	72 (79.1%)	26 (86.2%)	98 (81.2%)
Yes	18 (20.9%)	5 (13.8%)	23 (18.8%)
Oral health perception			
Overall oral health perception			
Excellent/very good/good	63 (68.5%)	27 (85.2%)	90 (73.2%)
Fair/poor	27 (31.5%)	4 (14.8%)	31 (26.8%)

Table 2: Distribution of overall OHIP-14 scores according to independent variables.

Variables	Overall OHIP-14 score Mean (SD)
Contextual-level variables	
Census sector variable	
District's mean income	
> 1.5 BMMW	7.15 (1.32)
≤ 1.5 BMMW	8.97 (1.17)
Individual-level variables	
Demographic variables	
Sex	
Male	5.63 (0.77)
Female	9.70 (1.54)
Skin color	
White	6.30 (0.78)
Non-white	12.46 (1.55)
Age	
< 60 years	9.05 (1.22)
≥ 60 years	5.03 (1.00)
Socioeconomic variables	
Schooling	
≥ 8 years	6.72 (1.40)
< 8 years	8.41 (0.95)
Income	
> 1.2 x BMMW	5.48 (0.82)
≤ 1.2 x BMMW	10.04 (1.27)
Medical variables	
Body Mass Index	
< 25 kg/m^2	6.16 (1.43)
25 – 29.9 kg/m^2	9.70 (1.72)

≥ 30 kg/m^2	7.66 (1.16)
Diabetes mellitus	
Absent	7.75 (1.19)
Pre-diabetic and diabetic	8.02 (1.15)
Behavioral variables	
Smoking status	
Non-smokers	7.33 (1.05)
Ex and current smokers	9.37 (1.54)
Visit to dentist	
≥ 1 visit/year	7.83 (1.01)
< 1 visit/year	7.98 (1.06)
Coping variable	
Perceived Stress Scale	
$PSS_{14} \leq 24$	5.86 (0.76)
$PSS_{14} > 24$	12.66 (1.70)
Oral health-related variables	
Prosthetics use	
No	7.93 (0.91)
Yes	7.86 (1.36)
Number of teeth in whole mouth	
≥ 20 teeth	6.83 (0.87)
< 20 teeth	9.27 (1.18)
Number of teeth in anterior region	
12 teeth	7.35 (0.91)
< 12 teeth	8.46 (1.10)
Untreated dental caries	
Absent	5.63 (1.01)
Present	10.05 (1.22)
Clinical attachment loss in whole mouth	
< 5 mm	7.92 (1.20)
≥ 5 mm in < 30% of teeth	9.60 (1.21)
≥ 5 mm in ≥ 30% of teeth	4.96 (0.67)

Clinical attachment loss in anterior region	
< 5 mm	8.97 (1.29)
≥ 5 mm in < 30% of teeth	7.47 (1.11)
≥ 5 mm in ≥ 30% of teeth	5.56 (0.94)
Extent of gingival inflammation in whole mouth	
Low level (< 20% of BoP sites)	6.31 (1.22)
High level (≥ 20% of BoP sites)	9.24 (1.43)
Extent of gingival inflammation in anterior region	
Low level (< 10% of BoP sites)	6.15 (1.32)
High level (≥ 10% of BoP sites)	8.70 (1.08)
Symptoms of history of periodontitis (self-reported)	
Migration of anterior teeth	
No	6.71 (0.90)
Yes	11.90 (2.05)
Tooth mobility	
No	6.52 (0.87)
Yes	13.85 (2.71)
Oral health perception	
Overall oral health perception	
Excellent/very good/good	5.19 (0.56)
Fair/poor	15.32 (1.25)

Table 3: Unadjusted and adjusted associations between extent of gingival inflammation in whole mouth (≥ 20% of sites) and restricted to anterior region (≥ 10% of sites of anterior region), other variables of interest and overall $OHIP_{14}$ scores determined using multilevel Poisson regression with hierarchical approach.

Variables	Unadjusted RR[a] (95% CI[b])	Final Model 1[d] RR (95% CI)	Final Model 2[e] RR (95% CI)
Fixed component			
Intercept		1.72 (1.24 – 2.37)	1.59 (1.12 – 2.24)
Contextual-level variables			
Census sector variable			
District's mean income		§	§
> 1.5 BMMW	1		
≤ 1.5 BMMW	1.70 (0.89 – 3.28)		
Individual-level variables			
Demographic variables			
Sex		§	§
Male	1		
Female	1.63 (1.42 – 1.88)***		
Skin color			
White	1	1	1
Non-white	1.91 (1.65 – 2.20)***	1.73 (1.49 – 2.00)***	1.73 (1.49 – 2.00)***
Age			
< 60	1	1	1
≥ 60	0.61 (0.50 – 0.73)***	0.58 (0.47 – 0.70)***	0.58 (0.47 – 0.70)***
Socioeconomic variables			
Schooling		§	§
≥ 8 years	1		
< 8 years	1.04 (0.89 – 1.22)		

Income		§	§
> 1.2 x BMMW [c]	1		
≤ 1.2 x BMMW	1.49 (1.29 – 1.73)***		
Medical variables			
Body Mass Index		§	§
< 25 kg/m^2	1		
25 – 29.9 kg/m^2	1.18 (0.99 – 1.40)		
≥ 30 kg/m^2	1.09 (0.91 – 1.30)		
Diabetes mellitus		§	§
Absent	1		
Pre-diabetic and diabetic	0.98 (0.84 – 1.14)		
Behavioral variables			
Smoking status			
Non-smokers	1	1	1
Ex and current smokers	1.43 (1.21 – 1.61)***	1.62 (1.40 – 1.89)***	1.62 (1.40 – 1.89)***
Visit to dentist		§	§
≥ 1 visit/year	1		
< 1 visit/year	0.99 (0.86 – 1.15)		
Coping variable			
Perceived Stress Scale			
$PSS_{14} \leq 24$	1	1	1
$PSS_{14} > 24$	1.78 (1.56 – 2.04)***	1.80 (1.56 – 2.08)***	1.80 (1.56 – 2.08)***
Oral health-related variables			
Prosthetics use			
No	1	1	1
Yes	1.07 (0.93 – 1.22)	0.55 (0.46 – 0.67)***	0.57 (0.47 – 0.69)***
Number of teeth			
≥ 20 teeth	1	1	1
< 20 teeth	1.42 (1.23 – 1.63)***	2.43 (1.99 – 2.95)***	2.37 (1.95 – 2.88)***

Untreated dental caries			§	§
Absent	1			
Present	1.35 (1.18 – 1.55)***			
Clinical attachment loss in whole mouth¶			§	-
< 5 mm	1			
≥ 5 mm in < 30% of teeth	1.16 (1.00 – 1.35)*			
≥ 5 mm in ≥ 30% of teeth	0.64 (0.52 – 0.79)***			
Clinical attachment loss in anterior region†			-	§
< 5 mm	1			
≥ 5 mm in < 30% of teeth	0.80 (0.68 – 0.96)*			
≥ 5 mm in ≥ 30% of teeth	0.72 (0.60 – 0.86)***			
Extent of gingival inflammation in whole mouth¶				-
Low level (< 20% of BoP sites)	1		1	
High level (≥ 20% of BoP sites)	1.37 (1.19 – 1.58)***		1.23 (1.06 – 1.44)**	
Extent of gingival inflammation in anterior region†			-	
Low level (< 10% of BoP sites)	1			1
High level (≥ 10% of BoP sites)	1.38 (1.19 – 1.59)***			1.29 (1.11 – 1.51)***

Symptoms of history of periodontitis (self-reported)			
Migration of anterior teeth			
No	1	1	1
Yes	1.48 (1.28 – 1.71)***	1.39 (1.18 – 1.62)***	1.40 (1.19 – 1.64)***
Tooth mobility		§	§
No	1		
Yes	1.58 (1.36 – 1.84)***		
Oral health perception			
Overall oral health perception			
Excellent/very good/good	1	1	1
Fair/poor	2.71 (2.37 – 3.09)***	2.03 (1.75 – 2.36)***	2.00 (1.72 – 2.32)***
Random component			
Deviance = (-2 log likelihood)		921.1416	919.91138

[a] RR, Rate ratio;

[b] CI, Confidence interval;

[c] Brazilian monthly minimum wage ≈ US$ 265 during study period;

[d] Final model 1: Model for whole mouth. Adjusted for clinical attachment loss and extent of gingival inflammation in whole mouth;

[e] Final model 2: Model for anterior region. Adjusted for clinical attachment loss and extent of gingival inflammation in anterior region;

¶ Variables only included for adjustment in model 1 (whole mouth);

† Variables only included for adjustment in model 2 (anterior region);

§ Variables not included in final hierarchical approach after adjustment;

*p < 0.05; **p ≤ 0.005; ***p ≤ 0.001

Figure 1: Flowchart of sampling procedures and study sample.

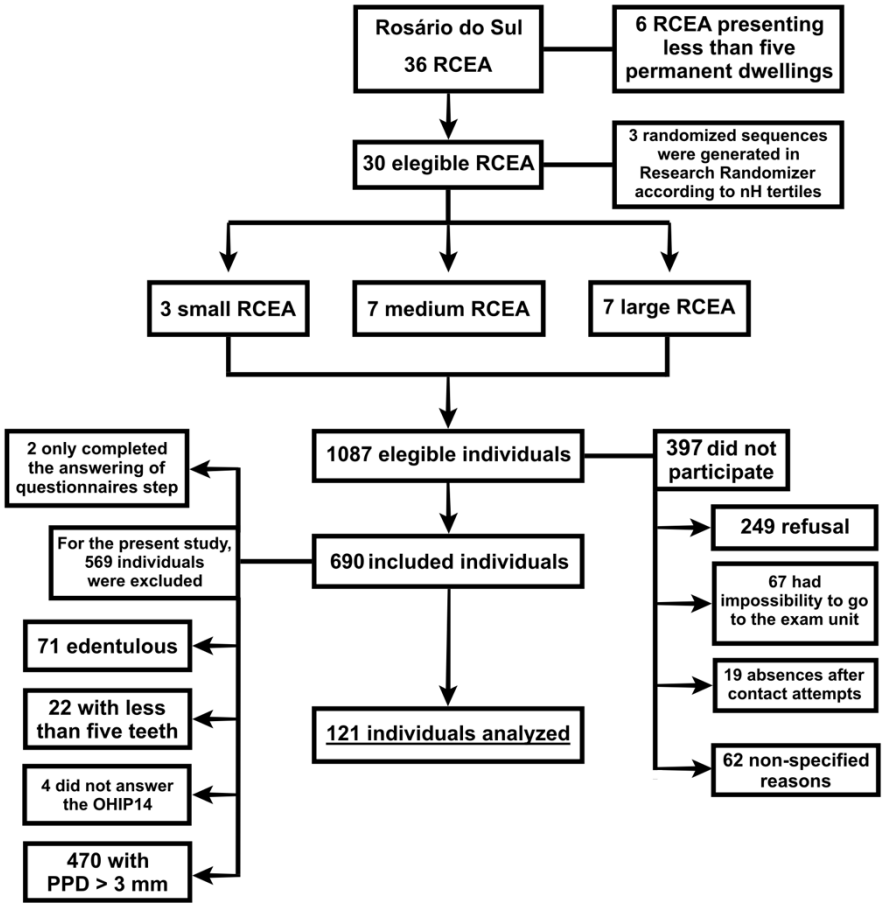
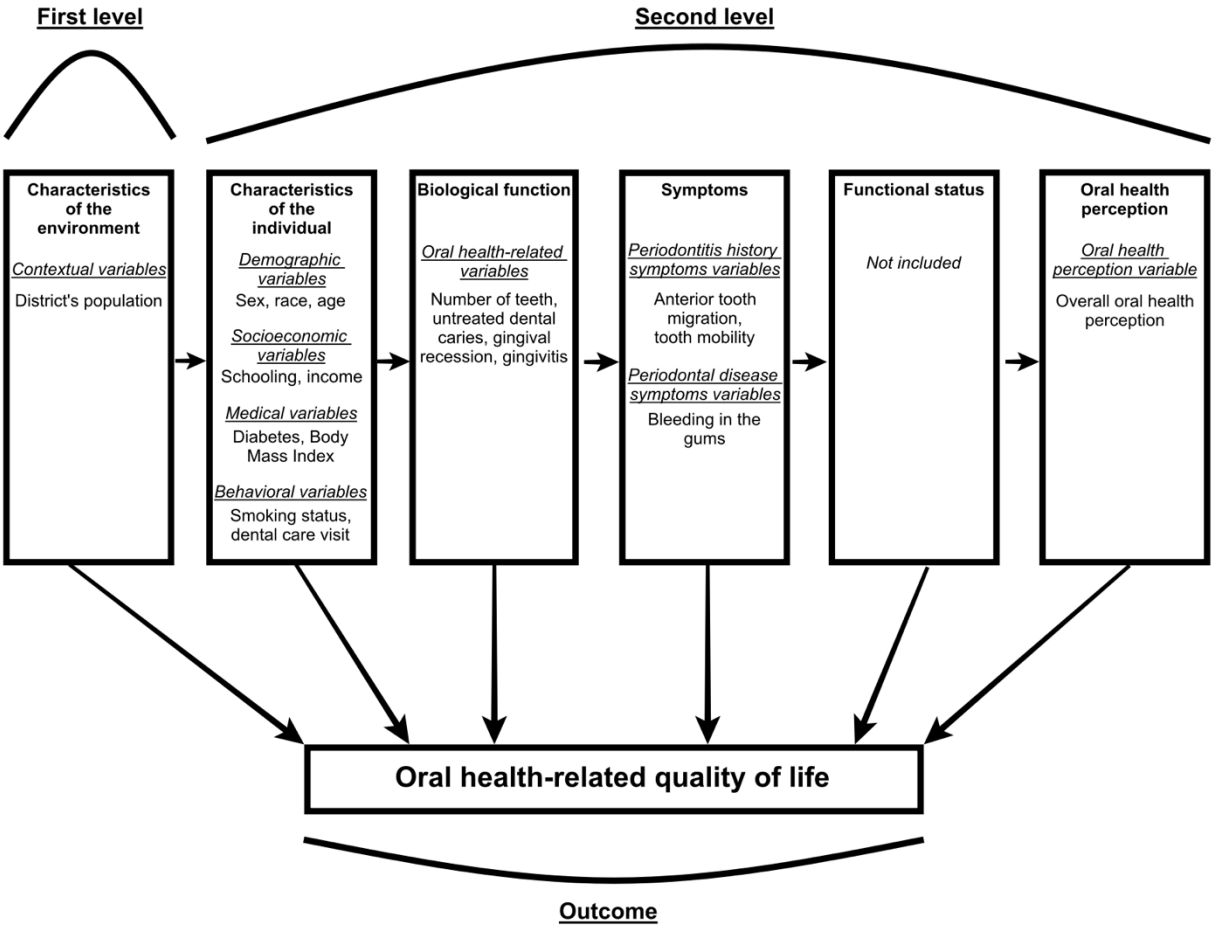


Figure 2: Conceptual hierarchical framework of associations between contextual and individual variables and impact on oral health-related quality of life (OHRQoL), adapted from the revised Wilson and Cleary model (Ferrans et al., 2005).



Gingival inflammation influences oral health-related quality of life in individuals living in a rural area of southern Brazil

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Appendices

Supporting Information Legends

Appendix S1. Sampling process and response rate.

Appendix S2. Supplementary table 1: Adjusted association between extent of gingival inflammation in whole mouth, other independent variables and overall $OHIP_{14}$ score, determined using multilevel Poisson regression (all models).

Appendix S3. Supplementary table 2: Adjusted association between extent of gingival inflammation in anterior region, other independent variables and overall $OHIP_{14}$ score, determined using multilevel Poisson regression (all models).

Appendix S1. Sampling process and response rate.

The city of Rosário do Sul is located in the western portion of the state of Rio Grande do Sul in southern Brazil, neighboring Argentina and Uruguay. The city has approximately 4.4 thousand km^2 and 40,000 residents, 4,776 of whom live in rural areas (Brazilian Institute of Geography and Statistics, 2010a).

The sample was obtained employing a multistage probability strategy and territorial maps (.kmz format, Google Earth program) provided by the Brazilian Institute of Geography and Statistics (Brazilian Institute of Geography and Statistics, 2010b), as described in detail elsewhere (Ferreira et al., 2018). In the first stage, 30 rural census sectors were divided into three strata (small, medium and large) according to the number of households. Three randomized sequences were then generated in Research Randomizer (Urbaniak & Plous, 2014) to select 17 sectors (three small, seven medium and seven large). This enabled the inclusion of all six districts of the municipality. Thus, the sampling process accounted for the number of individuals and dwellings registered in each sector according to the Brazilian Institute of Geography and Statistics.

Response rate

A questionnaire addressing sex, age, schooling, skin color, family income, tobacco use and the number of natural teeth was administered to non-respondents, 66 (16.5%) of whom refused to answer the specific questionnaire and 40 (10.0%) failed to provide all the required information (at least one unanswered question). Men predominated slightly in the data from the Brazilian Institute of Geography and Statistic and among the eligible individuals. The sample of the examined individuals was equally divided between males and females, whereas more than 60% of the non-respondents were men. The statistical analyses accounted for the nonresponse rate using the inverse probability weighting strategy (Hernan et al., 2004).

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Appendix S2. Supplementary table 1: Adjusted association between extent of gingival inflammation in whole mouth, other independent variables and overall $OHIP_{14}$ score, determined using multilevel Poisson regression (all models).

Variables	Model 1 RR[a] (95% CI[b])	Model 2 RR (95% CI)	Model 3 RR (95% CI)	Model 4 RR (95% CI)	Model 5 RR (95% CI)	Model 6 RR (95% CI)
Fixed component						
Intercept	6.40 (4.48 – 9.14)	5.00 (3.17 – 7.90)	1.77 (1.07 – 2.93)	1.77 (1.16 – 2.70)	1.68 (1.19 – 2.37)	1.72 (1.24 – 2.37)
Contextual-level variables						
Census sector variable						
District's mean income						
> 1.5 BMMW		1	-	-	-	-
≤ 1.5 BMMW		1.70 (0.89 – 3.28)				
Individual-level variables						
Demographic variables						
Sex						
Male			1	1	-	-
Female			1.51 (1.25 – 1.84)***	1.22 (1.05 – 1.42)*		
Skin color						
White			1	1	1	1
Non-white			1.28 (1.08 – 1.52)**	1.64 (1.40 – 1.92)***	1.73 (1.49 – 2.00)***	1.73 (1.49 – 2.00)***

Age				
< 60	1	1	1	1
≥ 60	0.61 (0.48 – 0.78)***	0.63 (0.51 – 0.77)***	0.58 (0.47 – 0.70)***	0.58 (0.47 – 0.70)***
Socioeconomic variables				
Schooling				
≥ 8 years	1	-	-	-
< 8 years	1.26 (1.02 – 1.55)*			
Income				
> 1.2 x BMMW	1	1	-	-
≤ 1.2 x BMMW	1.38 (1.15 – 1.66)***	1.25 (1.07 – 1.47)**		
Medical variables				
Body Mass Index				
< 25 kg/m^2	1	-	-	-
25 – 29.9 kg/m^2	1.02 (0.83 – 1.27)			
≥ 30 kg/m^2	0.90 (0.71 – 1.13)			
Diabetes mellitus				
Absent	1	-	-	-
Pre diabetic and diabetic	1.07 (0.89 – 1.27)			
Behavioral variables				
Smoking status				
Non-smoker	1	1	1	1

Ex and current smokers		1.92 (1.63 – 2.34)***	1.68 (1.44 – 1.96)***	1.62 (1.40 – 1.89)***	1.62 (1.40 – 1.89)***
Dental care visit					
≥ 1 visit/year		1	-	-	-
< 1 visit/year		1.10 (0.92 – 1.30)			
Coping variable					
Perceived Stress Scale					
$PSS_{14} \leq 24$		1	1	1	1
$PSS_{14} > 24$		1.55 (1.30 – 1.85)***	1.68 (1.45 – 1.97)***	1.80 (1.56 – 2.08)***	1.80 (1.56 – 2.08)***
Oral health-related variables					
Prosthetics use					
No			1	1	1
Yes			0.56 (0.45 – 0.69)***	0.55 (0.46 – 0.67)***	0.55 (0.46 – 0.67)***
Number of teeth					
≥ 20 teeth			1	1	1
< 20 teeth			2.29 (1.86 – 2.82)***	2.43 (1.99 – 2.95)***	2.43 (1.99 – 2.95)***
Untreated dental caries					
Absent			1	-	-
Present			1.02 (0.88 – 1.20)		

Clinical attachment loss in whole mouth				
< 5 mm		1	-	-
≥ 5 mm in < 30% of teeth		1.02 (0.86 – 1.21)		
≥ 5 mm in ≥ 30% of teeth		1.00 (0.76 – 1.31)		
Extent of gingival inflammation in whole mouth				
Low level (< 20% of BoP sites)		1	1	1
High level (≥ 20% of BoP sites)		1.18 (1.00 – 1.39)	1.23 (1.06 – 1.44)**	1.23 (1.06 – 1.44)**
Symptoms of periodontal disease				
History of symptoms of periodontitis variables				
Migration of anterior teeth				
No			1	1
Yes			1.33 (1.12 – 1.58)***	1.39 (1.18 – 1.62)***
Tooth mobility				
No			1	-

Yes					1.12 (0.93 – 1.35)	
Oral health perception variable						
Overall oral health perception						
Excelent/very good/good						1
Fair/poor						2.03 (1.75 – 2.36)***
Random component						
Deviance = (-2 log likelihood)	1291.2906	1288.88	846.4496	1003.8549	1001.9917	921.1416

* $p \leq 0.05$

** $p \leq 0.005$

*** $p \leq 0.001$

[a] RR, Rate ratio

[b] CI, Confidence interval

Appendix S3. Supplementary table 2: Adjusted association between extent of gingival inflammation in anterior region, other independent variables and overall $OHIP_{14}$ score, determined using multilevel Poisson regression (all models).

Variables	Model 1 RR[a] (95% CI[b])	Model 2 RR (95% CI)	Model 3 RR (95% CI)	Model 4 RR (95% CI)	Model 5 RR (95% CI)	Model 6 RR (95% CI)
Fixed component						
Intercept	6.40 (4.48 – 9.14)	5.00 (3.17 – 7.90)	1.77 (1.07 – 2.93)	1.64 (1.09 – 2.46)	1.51 (1.04 – 2.18)	1.59 (1.12 – 2.24)
Contextual-level variables						
Census sector variable						
District's mean income						
> 1.5 BMMW		1	-	-	-	-
≤ 1.5 BMMW		1.70 (0.89 – 3.28)				
Individual-level variables						
Demographic variables						
Sex						
Male			1	1	-	-
Female			1.51 (1.25 – 1.84)***	1.22 (1.05 – 1.42)*		
Skin color						
White			1	1	1	1
Non-white			1.28 (1.08 – 1.52)**	1.64 (1.40 – 1.92)***	1.73 (1.49 – 2.00)***	1.73 (1.49 – 2.00)***

Age				
< 60	1	1	1	1
≥ 60	0.61 (0.48 – 0.78)***	0.63 (0.51 – 0.77)***	0.58 (0.47 – 0.70)***	0.58 (0.47 – 0.70)***
Socioeconomic variables				
Schooling				
≥ 8 years	1	-	-	-
< 8 years	1.26 (1.02 – 1.55)*			
Income				
> 1.2 x BMMW	1	1	-	-
≤ 1.2 x BMMW	1.38 (1.15 – 1.66)***	1.25 (1.07 – 1.47)**		
Medical variables				
Body Mass Index				
< 25 kg/m^2	1	-	-	-
25 – 29.9 kg/m^2	1.02 (0.83 – 1.27)			
≥ 30 kg/m^2	0.90 (0.71 – 1.13)			
Diabetes mellitus				
Absent	1	-	-	-
Pre diabetic and diabetic	1.07 (0.89 – 1.27)			
Behavioral variables				
Smoking status				
Non-smoker	1	1	1	1

Ex and current smokers	1.92 (1.63 – 2.34)***	1.68 (1.44 – 1.96)***	1.62 (1.40 – 1.89)***	1.62 (1.40 – 1.89)***
Dental care visit				
≥ 1 visit/year	1	-	-	-
< 1 visit/year	1.10 (0.92 – 1.30)			
Coping variable				
Perceived Stress Scale				
$PSS_{14} \leq 24$	1	1	1	1
$PSS_{14} > 24$	1.55 (1.30 – 1.85)***	1.68 (1.45 – 1.97)***	1.80 (1.56 – 2.08)***	1.80 (1.56 – 2.08)***
Oral health-related variables				
Prosthetics use				
No		1	1	1
Yes		0.58 (0.47 – 0.72)***	0.57 (0.47 – 0.69)***	0.57 (0.47 – 0.69)***
Number of teeth				
≥ 20 teeth		1	1	1
< 20 teeth		2.26 (1.84 – 2.76)***	2.37 (1.95 – 2.88)***	2.37 (1.95 – 2.88)***
Untreated dental caries				
Absent		1	-	-
Present		1.03 (0.88 – 1.20)		

Clinical attachment loss in anterior region				
< 5 mm		1	-	-
≥ 5 mm in < 30% of teeth		0.89 (0.73 – 1.08)		
≥ 5 mm in ≥ 30% of teeth		1.05 (0.85 – 1.30)		
Extent of gingival inflammation in anterior region				
Low level (< 10% of BoP sites)		1	1	1
High level (≥ 10% of BoP sites)		1.27 (1.08 – 1.49)**	1.29 (1.11 – 1.51)***	1.29 (1.11 – 1.51)***
Symptoms of periodontal disease				
History of symptoms of periodontitis variables				
Migration of anterior teeth				
No			1	1
Yes			1.35 (1.14 – 1.61)***	1.40 (1.19 – 1.64)***
Tooth mobility				
No			1	-

Yes					1.10 (0.91 – 1.32)	
Oral health perception variable						
Overall oral health perception						
Excelent/very good/good						1
Fair/poor						2.00 (1.72 – 2.32)***
Random component						
Deviance = (-2 log likelihood)	1291.2906	1288.88	846.4496	996.34446	998.218	919.91138

* $p \leq 0.05$

** $p \leq 0.005$

*** $p \leq 0.001$

[a] RR, Rate ratio

[b] CI, Confidence inte

3 CONSIDERAÇÕES FINAIS

O presente estudo avaliou a influência da inflamação gengival, em uma subamostra de uma amostra representativa de indivíduos, que em sua maioria eram adultos, residentes em uma zona rural do sul do Brasil, na qualidade de vida relacionada à saúde bucal (QVRSB). Indivíduos que apresentavam sangramento a sondagem em mais que 10% dos sítios da região anterior e em mais que 20% dos sítios em toda boca exibiram uma pior QVRSB. Esse é o primeiro estudo que avaliou a relação de condições gengivais, ajustando para sequelas percebidas de periodontite, e QVRSB.

Características como resiliência aumentam a capacidade das populações rurais de se adaptarem ao ambiente (contexto), de uma maneira que os faz resistentes a procura de serviços de saúde. Isso pode levar a adoção de comportamentos ineficientes em saúde, com consequente impacto na saúde oral. Altos níveis de inflamação gengival podem ser explicados pela falta de conhecimento relativos à saúde bucal. Além disso, a educação em saúde e a motivação dos profissionais pode ser afetada pela falta de recursos nas áreas rurais, e é mostrado que a execução e o acesso a pesquisas em saúde oral é um importante fator indireto para aumentar a QVRSB. Em conjunto, esses aspectos simbolizam a importância do estudo da qualidade de vida em residentes rurais.

Estes achados justificariam políticas públicas que levem em consideração não só as doenças periodontais severas, como também quadros de menor severidade, visando reduzir a desigualdade na QVRSB de indivíduos residentes em zona rural.

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ANEXO A – APROVAÇÃO DO COMITÊ DE ÉTICA DA UNIVERSIDADE FEDERAL DE SANTA MARIA, ANO 2016

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:

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Avaliação dos Riscos e Benefícios:

.

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ANEXO B – NORMAS PARA PUBLICAÇÃO NO PERIÓDICO JOURNAL OF CLINICAL PERIODONTOLOGY

Author Guidelines

Sections

1. Submission
2. Aims and Scope
3. Manuscript Categories and Requirements
4. Preparing the Submission
5. Editorial Policies and Ethical Considerations
6. Author Licensing
7. Publication Process After Acceptance
8. Post Publication
9. Editorial Office Contact Details

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

Click here for more details on how to use ScholarOne.

Data protection

By submitting a manuscript to or reviewing for this publication, your name, email address, and affiliation, and other contact details the publication might require, will be used for the regular operations of the publication, including, when necessary, sharing with the publisher (Wiley) and partners for production and publication. The publication and the publisher recognize the importance of protecting the personal information collected from users in the operation of these services, and have practices in place to ensure that steps are taken to maintain the security, integrity, and privacy of the personal data collected and processed. You can learn more at https://authorservices.wiley.com/statements/data-protection-policy.html.

Preprint policy

Please find the Wiley preprint policy here.

This journal accepts articles previously published on preprint servers.

Journal of Clinical Periodontology will consider for review articles previously available as preprints. Authors may also post the submitted version of a manuscript to a preprint server at any time. Authors are requested to update any pre-publication versions with a link to the final published article.

For help with submissions, please contact: cpeedoffice@wiley.com

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.

Word limit: 3,000 words maximum, excluding references.
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.

Word limit: 4,000 words maximum, excluding references.
Main text: should be organized with Introduction; Review; Discussion and Conclusion.

Revisions and Resubmissions

Please note that all revisions and resubmissions of papers should also include a separate rebuttal and a tracked changes document to assist in peer review.

4. PREPARING THE SUBMISSION

Free Format submission

Journal of Clinical Periodontology now offers Free Format submission for a simplified and streamlined submission process.

Before you submit, you will need:

- Your manuscript: this can be a single file including text, figures, and tables, or separate files – whichever you prefer. All required sections should be contained in your manuscript, including a title page with all author details, including affiliations and email addresses, a statement of clinical relevance, abstract, introduction, methods, results, and conclusions. Figures and tables should have legends. References may be submitted in any style or format, as long as it is consistent throughout the manuscript. If the manuscript, figures or tables are difficult for you to read, they will also be difficult for the editors and reviewers. If your manuscript is difficult to read, the editorial office may send it back to you for revision. *(Why is this important? We need to make sure your manuscript is suitable for review.)*
- Statements relating to our ethics and integrity policies:
    - Conflict of interest disclosure
    - Statement of funding source
    - Ethical approval statement
    - Patient consent statement (if appropriate)
    - permission to reproduce material from other sources

- A separate Conflict of Interest form for each author.
  (Why is this important? We need to uphold rigorous ethical standards for the research we consider for publication.)
- Your co-author details, including affiliation and email address. *(Why is this important? We need to keep all co-authors informed of the outcome of the peer review process.)*
- An ORCID ID, freely available at https://orcid.org. *(Why is this important? Your article, if accepted and published, will be attached to your ORCID profile. Institutions and funders are increasingly requiring authors to have ORCID IDs.)*

To submit, login at **https://mc.manuscriptcentral.com/jcpe** and create a new submission. Follow the submission steps as required and submit the manuscript.

If you are invited to revise your manuscript after peer review, the journal will also request the revised manuscript to be formatted according to journal requirements as described below.

Cover Letters

Cover letters are not mandatory; however, they may be supplied at the author's discretion.

Parts of the Manuscript

The manuscript should be submitted in separate files: main text file; figures.

Main Text File

The text file should be presented in the following order:

i. A short informative title containing the major key words. The title should not contain abbreviations (see Wiley's **best practice SEO tips**);
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.

Authorship

Please refer to the journal's authorship policy the **Editorial Policies and Ethical Considerations section** for details on eligibility for author listing.

Acknowledgments

Contributions from anyone who does not meet the criteria for authorship should be listed, with permission from the contributor, in an Acknowledgments section. Financial and material support should also be mentioned. Thanks to anonymous reviewers are not appropriate.

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.

Colour Figures. Figures submitted in colour may be reproduced in colour online free of charge. Please note, however, that it is preferable that line figures (e.g. graphs and charts) are supplied in black and white so that they are legible if printed by a reader in black and white.

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Data Citation

Please review Wiley's data citation policy here.

Additional Files

Appendices

Appendices will be published after the references. For submission they should be supplied as separate files but referred to in the text.

Supporting Information

Supporting information is information that is not essential to the article, but provides greater depth and background. It is hosted online and appears without editing or typesetting. It may include tables, figures, videos, datasets, etc.

Click here for Wiley's FAQs on supporting information.

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.

Authors are asked to use RRIDs to cite the resources used in their research where applicable in the text, similar to a regular citation or Genbank Accession number. For antibodies, authors should include in the citation the vendor, catalogue number, and RRID both in the text upon first mention in the Methods section. For software tools and databases, please provide the name of the resource followed by the resource website, if available, and the RRID. For model organisms, the RRID alone is sufficient.

Additionally, authors must include the RRIDs in the list of keywords associated with the manuscript.

To Obtain Research Resource Identifiers (RRIDs)

1. Use the Resource Identification Portal, created by the Resource Identification Initiative Working Group.
2. Search for the research resource (please see the section titled “Search Features and Tips” for more information).
3. Click on the “Cite This” button to obtain the citation and insert the citation into the manuscript text.

If there is a resource that is not found within the **Resource Identification Portal**, authors are asked to register the resource with the appropriate resource authority. Information on how to do this is provided in the “Resource Citation Guidelines” section of the Portal.

If any difficulties in obtaining identifiers arise, please contact **rii-help@scicrunch.org** for assistance.

Example Citations

Antibodies: "Wnt3 was localized using a rabbit polyclonal antibody C64F2 against Wnt3 (Cell Signaling Technology, Cat# 2721S, RRID: AB_2215411)"

Model Organisms: "Experiments were conducted in c. elegans strain SP304 (RRID:CGC_SP304)"

Cell lines: "Experiments were conducted in PC12 CLS cells (CLS Cat# 500311/p701_PC-12, RRID:CVCL_0481)"

Tools, Software, and Databases: "Image analysis was conducted with CellProfiler Image Analysis Software, V2.0 (http://www.cellprofiler.org, RRID:nif-0000-00280)"

Wiley Author Resources

Manuscript Preparation Tips: Wiley has a range of resources for authors preparing manuscripts for submission available **here**. In particular, authors may benefit from referring to Wiley’s best practice tips on **Writing for Search Engine Optimization.**

Article Preparation Support: **Wiley Editing Services** offers expert help with English Language Editing, as well as translation, manuscript formatting, figure illustration, figure formatting, and graphical abstract design – so you can submit your manuscript with confidence.

Also, check out our resources for **Preparing Your Article** for general guidance about writing and preparing your manuscript.

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Guidelines for Cover Submission

If you would like to send suggestions for artwork related to your manuscript to be considered to appear on the cover of the journal, **please follow these guidelines**.

5. EDITORIAL POLICIES AND ETHICAL CONSIDERATIONS

Peer Review and Acceptance

The acceptance criteria for all papers are the quality and originality of the research and its significance to journal readership. Manuscripts are single-blind peer reviewed. Papers will only be sent to review if the Editor-in-Chief determines that the paper meets the appropriate quality and relevance requirements.

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Under exception circumstances, authors may appeal the editorial decision. Authors who wish to appeal the decision on their submitted paper may do so by e-mailing the editorial office at **cpeedoffice@wiley.com** with a detailed explanation for why they find reasons to appeal the decision.

Please note that all revisions and resubmissions of papers should also include a separate rebuttal and a tracked changes document to assist in peer review.

Human Studies and Subjects

For manuscripts reporting medical studies that involve human participants, a statement identifying the ethics committee that approved the study and confirmation that the study conforms to recognized standards is required, for example: **Declaration of Helsinki**; **US Federal Policy for the Protection of Human Subjects**; or **European Medicines Agency Guidelines for Good Clinical Practice**. It should also state clearly in the text that all persons gave their informed consent prior to their inclusion in the study.

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).

Animal Studies

A statement indicating that the protocol and procedures employed were ethically reviewed and approved, as well as the name of the body giving approval, must be included in the Methods section of the manuscript. Authors are encouraged to adhere to animal research reporting standards, for example the **ARRIVE guidelines** for reporting study design and statistical analysis; experimental procedures; experimental animals and housing and husbandry. Authors should also state whether experiments were performed in accordance with relevant institutional and national guidelines for the care and use of laboratory animals:

- 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).
- European authors outside the UK should conform to Directive 2010/63/EU.

Clinical Trial Registration

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
  Clinical trials should be reported using the CONSORT guidelines. A CONSORT checklist should also be included in the submission material. If your study is a randomized clinical trial, you will need to fill in all sections of the CONSORT Checklist. If your study is not a randomized trial, not all sections of the checklist might apply to your manuscript, in which case you simply fill in N/A.
- Observational studies : STROBE
- Systematic reviews : PRISMA
- Case reports : CARE
- Qualitative research : SRQR
- Diagnostic / prognostic studies : STARD
- Quality improvement studies : SQUIRE
- Economic evaluations : CHEERS
- Animal pre-clinical studies : ARRIVE
- Study protocols : SPIRIT
- Clinical practice guidelines : AGREE

We also encourage authors to refer to and follow guidelines from:

- Future of Research Communications and e-Scholarship (FORCE11)
- National Research Council's Institute for Laboratory Animal Research guidelines
- The Gold Standard Publication Checklist from Hooijmans and colleagues
- Minimum Information Guidelines from Diverse Bioscience Communities (MIBBI) website
- FAIRsharing website

Species Names

Upon its first use in the title, abstract, and text, the common name of a species should be followed by the scientific name (genus, species, and authority) in parentheses. For well-known species, however, scientific names may be omitted from article titles. If no common name exists in English, only the scientific name should be used.

Genetic Nomenclature

Sequence variants should be described in the text and tables using both DNA and protein designations whenever appropriate. Sequence variant nomenclature must follow the current HGVS guidelines; see **varnomen.hgvs.org**, where examples of acceptable nomenclature are provided.

Sequence Data

Nucleotide sequence data can be submitted in electronic form to any of the three major collaborative databases: DDBJ, EMBL, or GenBank. It is only necessary to submit to one database as data are exchanged between DDBJ, EMBL, and GenBank on a daily basis. The suggested wording for referring to accession-number information is: 'These sequence data have been submitted to the DDBJ/EMBL/GenBank databases under accession number U12345'. Addresses are as follows:

- DNA Data Bank of Japan (DDBJ): www.ddbj.nig.ac.jp
- EMBL Nucleotide Archive: ebi.ac.uk/ena
- GenBank: www.ncbi.nlm.nih.gov/genbank

Proteins sequence data should be submitted to either of the following repositories:

- Protein Information Resource (PIR): pir.georgetown.edu
- SWISS-PROT: expasy.ch/sprot/sprot-top

Structural Data

For papers describing structural data, atomic coordinates and the associated experimental data should be deposited in the appropriate databank (see below). **Please note that the data in databanks must be released, at the latest, upon publication of the article.** We trust in the cooperation of our authors to ensure that atomic coordinates and experimental data are released on time.

- Organic and organometallic compounds: Crystallographic data should not be sent as Supporting Information, but should be deposited with the *Cambridge Crystallographic Data Centre* (CCDC) at ccdc.cam.ac.uk/services/structure%5Fdeposit.
- Inorganic compounds: *Fachinformationszentrum Karlsruhe* (FIZ; fiz-karlsruhe.de).
- Proteins and nucleic acids: *Protein Data Bank* (rcsb.org/pdb).
- NMR spectroscopy data: *BioMagResBank* (bmrb.wisc.edu).

Statistical Analysis

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).

Conflict of Interest

The journal requires that all authors disclose any potential sources of conflict of interest. Any interest or relationship, financial or otherwise that might be perceived as influencing an author's objectivity is considered a potential source of conflict of interest. These must be disclosed when directly relevant or directly related to the work that the authors describe in their manuscript. Potential sources of conflict of interest include, but are not limited to: patent or stock ownership, membership of a company board of directors, membership of an advisory board or committee for a company, and consultancy for or receipt of speaker's fees from a company. The existence of a conflict of interest does not preclude publication. If the authors have no conflict of interest to

declare, they must also state this at submission. It is the responsibility of the corresponding author to review this policy with all authors and collectively to disclose with the submission ALL pertinent commercial and other relationships.

See Editor-in-Chief Maurizio Tonetti's **Editorial on Conflict of Interest and Source of Funding** and **www.icmje.org/#conflicts** for generally accepted definitions.

The above policies are in accordance with the Uniform Requirements for Manuscripts Submitted to Biomedical Journals produced by the International Committee of Medical Journal Editors (**http://www.icmje.org/**). It is the responsibility of the corresponding author to have all authors of a manuscript fill out a conflict of interest disclosure form, and to upload all forms together with the manuscript on submission. The disclosure statement should be included under Acknowledgements. Please find the form below:

Conflict of Interest Disclosure Form

Funding

Authors should list all funding sources at submission. Authors are responsible for the accuracy of their funder designation. If in doubt, please check the Open Funder Registry for the correct nomenclature: **https://www.crossref.org/services/funder-registry/**

Authorship

The journal follows the **ICMJE definition of authorship**, which indicates that authorship be based on the following 4 criteria:

1. Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
2. Drafting the work or revising it critically for important intellectual content; AND
3. Final approval of the version to be published; AND
4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

In addition to being accountable for the parts of the work he or she has done, an author should be able to identify which co-authors are responsible for specific other parts of the work. In addition, authors should have confidence in the integrity of the contributions of their co-authors.

All those designated as authors should meet all four criteria for authorship, and all who meet the four criteria should be identified as authors. Those who do not meet all four criteria should be acknowledged. These authorship criteria are intended to reserve the status of authorship for those who deserve credit and can take responsibility for the work. The criteria are not intended for use as a means to disqualify colleagues from authorship who otherwise meet authorship criteria by denying them the opportunity to meet criterion #s 2 or 3. Therefore, all individuals who meet the first criterion should have the opportunity to participate in the review, drafting, and final approval of the manuscript.

Data Sharing and Data Accessibility

Please review Wiley's policy here. This journal encourages and peer review data sharing.

The journal encourages authors to share the data and other artefacts supporting the results in the paper by archiving it in an appropriate public repository. Authors should include a data accessibility statement, including a link to the repository they have used, in order that this statement can be published alongside their paper.

All accepted manuscripts may elect to publish a data availability statement to confirm the presence or absence of shared data. If you have shared data, this statement will describe how the data can be accessed, and include a persistent identifier (e.g., a DOI for the data, or an accession number) from the repository where you shared the data. **Sample statements are available here**. If published, statements will be placed in the heading of your manuscript.

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