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**INFLUÊNCIA DE FATORES ENDODÔNTICOS E CORONÁRIOS NO  
STATUS PERIAPICAL: ESTUDO TRANSVERSAL EM UMA  
POPULAÇÃO RURAL DO SUL DO BRASIL**

Santa Maria, RS  
2019

**Mônica Pagliarini Buligon**

**INFLUÊNCIA DE FATORES ENDODÔNTICOS E CORONÁRIOS NO STATUS  
PERIAPICAL: ESTUDO TRANSVERSAL EM UMA POPULAÇÃO RURAL DO SUL  
DO BRASIL**

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

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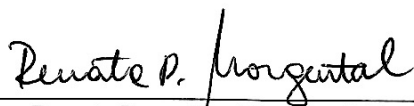
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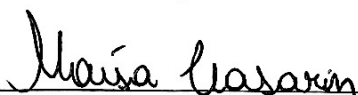
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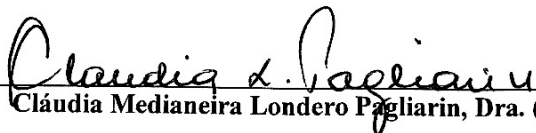
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## RESUMO

### INFLUÊNCIA DE FATORES ENDODÔNTICOS E CORONÁRIOS NO STATUS PERIAPICAL: ESTUDO TRANSVERSAL EM UMA POPULAÇÃO RURAL DO SUL DO BRASIL

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ORIENTADORA: Renata Dornelles Morgental

No Brasil, cerca de 15% da população vive em áreas rurais, totalizando mais de 30 milhões de pessoas. Estudos sobre as condições de saúde bucal dessa população são escassos, especialmente em relação à periodontite apical (PA) e tratamento endodôntico (TE). O objetivo desta pesquisa foi identificar possíveis associações entre PA e as condições endodônticas e coronárias dos dentes, dentre outras variáveis, em uma amostra representativa da população rural de Rosário do Sul/RS. Este estudo transversal faz parte de um levantamento epidemiológico, conduzido no período de maio de 2015 a maio de 2016. Foram avaliados 584 indivíduos adultos, não edêntulos, apresentando levantamento radiográfico periapical completo. A análise do status periapical foi realizada por meio do Índice Periapical (PAI), uma escala ordinal com 5 escores, onde 1 e 2 são considerados “saúde” (PA ausente) e os demais são considerados “doença” (PA presente). A condição endodôntica (presença e qualidade de TE) foi categorizada, considerando a ocorrência de espaços vazios na massa obturadora e o limite apical da obturação. A presença de retentor intrarradicular também foi registrada. Em dentes multirradiculares, a pontuação atribuída para PA e TE foi a da raiz com pior cenário. A condição coronária foi classificada de acordo com a existência de cáries, restaurações, coroas protéticas e a qualidade das mesmas. Variáveis socioeconômicas e demográficas também foram avaliadas. Os dados foram analisados de forma descritiva e pelo teste Qui-quadrado ( $\alpha=5\%$ ). A prevalência de PA nessa amostra foi elevada (60,45%), tendo associação significativa com gênero, idade, cor da pele, escolaridade e renda. Dos 10396 dentes avaliados, 868 (8,35%) apresentavam PA, a qual se mostrou significativamente associada ao grupo dentário, arcada dentária, posição dentária, presença de TE, retentor intrarradicular e condição coronária. A prevalência de PA em dentes tratados endodonticamente foi de 56,87%, sendo que 71,56% das obturações foram consideradas inadequadas. Quando os dados da qualidade do TE e condição coronária foram agrupados, a associação com PA foi estatisticamente significativa. Os resultados revelaram que a combinação da qualidade do TE e condição coronária impactaram no status periapical dos dentes tratados endodonticamente. PA foi predominante em dentes com TE inadequado e condição coronária inadequada.

**Palavras-chave:** Endodontia. Estudos Transversais. Periodontite Apical. População Rural.

## ABSTRACT

### **INFLUENCE OF ENDODONTIC AND CORONAL FACTORS ON THE PERIAPICAL STATUS: CROSS-SECTIONAL STUDY IN A SOUTHERN BRAZILIAN RURAL POPULATION**

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ADVISOR: Renata Dornelles Morgental

Brazil has approximately 15% of the population living in rural areas, totalizing more than 30 million people. Studies about oral health conditions in this population are scarce, especially in relation to apical periodontitis (AP) and endodontic treatment (ET). The aim of this research was to identify possible associations between AP and endodontic and coronal conditions of teeth, among other variables, in a representative sample of the rural population of Rosario do Sul/RS. This cross-sectional study is part of an epidemiological survey carried out from May 2015 to May 2016. The sample consisted of 584 non-edentulous adult individuals who presented complete periapical radiographic survey. Periapical status analysis was performed using the Periapical Index (PAI), an ordinal scale with 5 scores, in which 1 and 2 are considered as “health” (absent AP) and the others are considered as “disease” (present AP). The endodontic condition (presence and quality of ET) was categorized, considering the occurrence of voids in the filling material and the root filling length. The presence of intracanal post was also registered. In multi-rooted teeth, the score attributed to AP and ET was the one of the root with the worse scenario. The coronal condition was classified in accordance with the existence of caries, restorations, prosthetic crowns and their qualities. Socioeconomic and demographic variables were also evaluated. Data were analysed descriptively and by the Chi-squared test ( $\alpha=5\%$ ). The prevalence of AP in this sample was high (60.45%), showing a significant association with gender, age, skin colour, education level and household income. Of the 10,396 evaluated teeth, 868 (8.35%) presented AP, which was significantly associated with dental group, dental arch, tooth position, presence of ET, intracanal post and coronal condition. The prevalence of AP in endodontically treated teeth was 56.87% and 71.56% of the root fillings were considered inadequate. When the variables ET quality and coronal condition were grouped, the association with AP was statistically significant. The results revealed that ET quality and coronal condition combined impacted the periapical status of endodontically treated teeth. AP was predominant in teeth with inadequate ET and inadequate coronal condition.

**Keywords:** Endodontics. Cross-sectional Studies. Apical Periodontitis. Rural Population.



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## 1 INTRODUÇÃO

O termo “periodontite apical” (PA) é geralmente utilizado para descrever e agrupar as várias condições inflamatórias periapicais que ocorrem frente a uma infecção endodôntica em um dente com polpa necrótica (ABBOTT, 2005). A PA pode assumir um caráter agudo ou crônico, dependendo de fatores diversos, como a virulência dos agentes microbianos e as condições imunológicas do hospedeiro (SANTOS et al., 2011). Frequentemente, tal patologia segue um curso assintomático, originando lesões periapicais caracterizadas por significativa reabsorção óssea (NAIR; PAJAROLA; SCHROEDER, 1996).

O exame radiográfico é indispensável para o diagnóstico de PA, pois permite a visualização de alterações que afetam o dente e as estruturas de suporte adjacentes, as quais não podem ser vistas clinicamente (SOARES; GOLDBERG, 2011). A tomografia computadorizada de feixe cônico (TCFC) permite uma análise tridimensional das estruturas supracitadas e é identificada como o exame radiográfico mais sensível para a detecção de PA, quando se utilizam achados histopatológicos como padrão-ouro (KANAGASINGAM et al., 2016). No entanto, esse exame não é solicitado rotineiramente por utilizar maior dose de radiação e possuir custo elevado. Nesse contexto, o exame de eleição é a radiografia periapical, a qual possui maior sensibilidade no diagnóstico de PA, se comparada à radiografia panorâmica (ESTRELA et al., 2008a).

Em estudos epidemiológicos que avaliam o status da região periapical, o método de classificação proposto por Ørstavik, Kerekes e Eriksen (1986), conhecido como “*Periapical Index*” (PAI), é o mais empregado (ALEKSEJUNIENE et al., 2000; BERLINCK et al., 2015; CRAVEIRO et al., 2015; DUGAS et al., 2003; GÜNDÜZ et al., 2011; HEBLING et al., 2014; KALENDER et al., 2013; KHULLAR et al., 2013; MASLAMANI; KHALAF; MITRA, 2017; SEGURA-EGEA et al., 2004; THAMPIBUL; JANTARAT; ARAYASANTIPARB, 2018; UREYEN KAYA et al., 2013). O Índice PAI consiste em uma escala ordinal visual com cinco categorias, que variam de estruturas ósseas adjacentes saudáveis à PA grave com características exacerbantes (ANEXO A). Tal índice pode ser dicotomizado, sendo os escores PAI 1 e 2 considerados “saúde” (PA ausente) e os escores PAI  $\geq 3$  considerados “doença” (PA presente) (KIRKEVANG et al., 2001).

A prevalência de PA tem se mostrado elevada na população mundial, podendo estar relacionada a fatores individuais, tais como: idade, gênero, saúde sistêmica e status socioeconômico (PERSOON; ÖZOK, 2017). Vários autores já descreveram a prevalência de PA pelo mundo: 70% na Lituânia (ALEKSEJUNIENE et al., 2000); 61% na Alemanha

(WEIGER et al., 1997), 40% na Bélgica (MOOR et al., 2000), 39% na Holanda (CLEEN et al., 1993) e 27% na Finlândia (HUUMONEN; SUOMINEN; VEHKALAHTI, 2017). No Brasil, ainda existem poucos estudos epidemiológicos em Endodontia, apesar de ser percebido um maior volume de publicações nessa área nas duas últimas décadas (BUENO; ESTRELA, 2008; GUIMARÃES et al., 2018). As prevalências de PA variam de 42,9% a 67,5% em diferentes regiões brasileiras, sendo que a maioria das investigações envolve amostras de conveniência provenientes de universidades ou clínicas particulares localizadas em áreas urbanas (Tabela 1).

O tratamento endodôntico (TE) é o tratamento de escolha em casos de PA e consiste na remoção do agente causador através da limpeza, modelagem e preenchimento dos canais radiculares com materiais biocompatíveis (MOOR et al., 2000). É bem aceito que o sucesso do TE está positivamente relacionado à qualidade técnica da obturação endodôntica (SJÖGREN et al., 1990; NAIR, 2006). Pesquisadores têm discutido a influência da qualidade do TE e da restauração coronária no status dos tecidos periapicais, tentando estabelecer qual delas seria o fator mais importante para o melhor prognóstico (GILLEN et al., 2011). Alguns trabalhos revelam que a qualidade do TE é mais crítica para a prevalência de PA pós-tratamento do que a qualidade da restauração (GÜNDÜZ et al., 2011; RICUCCI; BERGENHOLTZ, 2003; SIQUEIRA et al., 2005). Em estudos brasileiros, dentes tratados endodonticamente apresentam taxas de prevalência de PA variando entre 16,7% e 65,1% (Tabela 1), de forma semelhante a outros países (SEGURA-EGEA et al., 2004; UREYEN KAYA et al., 2013). Os tratamentos com baixa qualidade técnica tendem ao fracasso (CHALA; ABOUQAL; ABDALLAOUI, 2011; CRAVEIRO et al., 2015; ESTRELA et al., 2008b; KIRKEVANG; WENZEL, 2003; MORENO et al., 2013), pois permitem a permanência de microrganismos ou a reinfecção do sistema de canais radiculares (NAIR, 2006).

Infecções endodônticas secundárias são causadas por bactérias que não estavam presentes na cavidade pulpar antes do TE e que ganham acesso ao local, por exemplo, por uma falha da restauração coronária (VIEIRA et al., 2012). Estudos *in vitro* demonstram que dentes deixados sem selamento da porção coronária, com franca exposição do material obturador endodôntico à saliva, se tornam contaminados com bactérias ao longo de todo o comprimento radicular em um período entre 30 e 60 dias (TORABINEJAD et al., 1990; SIQUEIRA et al., 2000). Desta forma, a perda ou falha do selamento coronário poderia influenciar no status dos tecidos periapicais (KAKEHASHI; STANLEY; FITZGERALD, 1965; MÖLLER et al., 2004), comprometendo o sucesso do TE (SRITHARAN, 2002).

Tabela 1 – Prevalência de periodontite apical (PA) e tratamento endodôntico (TE) em estudos transversais no Brasil.

Autor	Local	Técnica radiográfica	Crítérios de avaliação da PA	Idade (anos)	Pacientes (N)	Dentes (N)	PA em pacientes (%)	PA em dentes (%)	Faixa etária mais afetada (anos)	Grupo dental mais afetado	TE em pacientes (%)	TE em dentes (%)	PA em dentes com TE (%)
Siqueira et al. 2005	Arquivos da Universidade Estácio de Sá, Rio de Janeiro/RJ	Periapical ou panorâmica	Presença de radiolucidez perirradicular (avaliou apenas dentes com TE)	N.I.	1139	2051	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	50,3
Terças et al. 2006	Arquivos de 4 protesistas e 5 periodontistas, São Luís/MA	Periapical	Índice PAI*	>20	200	5008	67,5	5,9%	≥60	Incisivos superiores	N.I.	11	42,5
Estrela et al. 2008b	Arquivos da Associação Brasileira de Odontologia, Goiânia/GO	Periapical	Presença de PA (avaliou apenas dentes com TE)**	18-60	N.I.	1372	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	37,9
Hollanda et al. 2008	Arquivos de clínica privada de Radiologia, Cuiabá/MT	Panorâmica	N.I. (avaliou apenas TE)	N.I.	1401	29467	N.I.	N.I.	N.I.	N.I.	N.I.	21,4	N.I.
Fernandes et al. 2013	Arquivos de clínica privada de Radiologia, Bauru/SP	Tomografia Cone Beam	Índice CBCT-PAI***	>12 (média 41,5)	300	5585	51,4	3,4%	60-69	Molares inferiores	N.I.	7,4	41,2
Hebling et al. 2014	Arquivos de 2 instituições geriátricas, Piracicaba SP	Periapical	Índice PAI*	60-94 (média 74)	98	942	42,9	12,1%	N.I.	N.I.	49%	13,4	65,1
Berlinck et al. 2015	Arquivos da Universidade Estadual do Rio de Janeiro, Rio de Janeiro/RJ	Periapical	Índice PAI*	Média 37,1	1126	25292	N.I.	7,87%	30-49	Incisivos superiores	N.I.	6,9	16,7
Pedro et al. 2016	Arquivos de clínica privada de Radiologia, Cuiabá/MT	Panorâmica	Índice PAI*	15-65 (média 34,9)	1398	37928	N.I.	N.I.	N.I.	Molares	N.I.	6,1	52,4
Oliveira et al. 2017	Arquivos da Universidade Federal de Pernambuco, Recife/PE	Periapical	Presença de PA (avaliou apenas dentes com TE)	N.I.	1346	N.I.	42,6	N.I.	≥60	Incisivos superiores e pré-molares inferiores	N.I.	N.I.	40,1
Marin et al. 2018	Amostra representativa da população rural, Rosário do Sul/RS	Periapical	Índice PAI*	18-93 (média 47,3)	584	11600	60,3	5,4	50-59	Pré-molares superiores	N.I.	1,2	50,7

CBCT-PAI: Índice Periapical adaptado para uso em Tomografia Cone Beam (ESTRELA et al., 2008c). N.I.: Não informado. PA: Periodontite apical. PAI: Índice Periapical (ØRSTAVIK; KEREKES; ERIKSEN, 1986). TE: Tratamento endodôntico. \*Escores 1 e 2 considerados saúde; escores 3 a 5 considerados doença (periodontite apical). \*\*PA foi considerada presente em casos de: mudanças no espaço do ligamento periodontal, perda de integridade da lâmina dura, alterações na estrutura óssea com áreas radiolúcidas bem definidas. \*\*\*Escore 0 considerado saúde; escores 1 a 5 considerados doença (PA).

Neste contexto, o estudo retrospectivo de Ray e Trope (1995) avaliou 1010 radiografias periapicais de dentes tratados endodonticamente e concluiu que a qualidade da restauração coronária seria significativamente mais importante do que a qualidade do TE para o sucesso terapêutico. Seus achados surpreenderam os endodontistas e causaram grande discussão na comunidade científica (SRITHARAN, 2002). Os autores justificaram seus resultados, afirmando que mesmo quando o TE está adequado, os produtos tóxicos provenientes de bactérias presentes na coroa podem se deslocar até o ápice radicular, estimulando uma resposta inflamatória. Entretanto, a revisão sistemática e meta-análise realizada por Gillen et al. (2011), comparando o impacto da qualidade do TE *versus* qualidade da restauração no sucesso do tratamento, verificou que ambas têm a mesma importância. Os autores compilaram os resultados de 9 estudos, incluindo a pesquisa de Ray e Trope (1995). Seus achados demonstraram que as chances de reparo periapical reduziram com as duas combinações – TE inadequado/restauração adequada e TE adequado/restauração inadequada – sem diferença entre elas.

A grande maioria dos estudos propõe que a combinação TE adequado/restauração adequada é a que apresenta o melhor prognóstico (KHULLAR et al., 2013; MORENO et al., 2013; RAY; TROPE, 1995; SEGURA-EGEA et al., 2004; SONG et al., 2014; THAMPIBUL; JANTARAT; ARAYASANTIPARB, 2018; UREYEN KAYA et al., 2013). Craveiro et al. (2015), em um estudo de coorte retrospectivo, com 523 dentes tratados endodonticamente e acompanhados por um período de 2 a 10 anos, relataram que dentes com TE inadequado/restauração inadequada tiveram 16,15 vezes maior chance de falha do que dentes com TE adequado/restauração adequada. Uma revisão sistemática descreveu que ambos, o preenchimento radicular sem espaços vazios com extensão de no máximo 2 mm do ápice radiográfico e a presença de restauração coronária bem adaptada, melhoraram significativamente o sucesso do TE (NG et al., 2008).

A maioria dos estudos aqui citados avaliou a prevalência de PA e sua relação com fatores endodônticos e coronários em pacientes provenientes de áreas urbanas. No Brasil, o censo nacional demonstrou que 15,6% da população vive em áreas rurais, totalizando aproximadamente 30 milhões de pessoas (IBGE, 2010). A maioria das localidades rurais não possui um serviço de saúde especializado em suas proximidades, principalmente devido às dificuldades de acesso, precariedade nos serviços de transporte e distância entre as propriedades (ARRUDA; MAIA; ALVES, 2018; SALIBA et al., 2010). Esse também pode ser apontado como um dos motivos para a escassez de estudos envolvendo a população rural. Na tentativa

de traçar um perfil epidemiológico das condições de saúde bucal dessa população, percebem-se ainda poucos trabalhos publicados na literatura (CASARIN, 2018; CAVALCANTI; SILVEIRA; GOES, 2012; COHEN-CARNEIRO et al., 2010; FERREIRA et al., 2019; MARIN, 2018; MELLO; ANTUNES, 2004; MOURA et al., 2014; NICO et al., 2016; SALIBA et al., 2010; SANTILLO et al., 2014). A falta de informações sobre a população rural compromete a prevenção e tratamento de doenças crônicas, inclusive as de origem dentária.

Ao analisar os dados de indicadores sociais brasileiros (renda, escolaridade e saneamento básico), os piores achados estão concentrados em áreas rurais (IBGE, 2016). Populações com baixos indicadores sociais tendem a ter maior prevalência de doenças bucais, como a cárie dentária, quando comparadas às localidades com melhores condições de vida (MELLO; ANTUNES, 2004). Os estudos conduzidos em populações rurais revelam valores elevados para o índice CPO-D e para a média de dentes perdidos em diferentes faixas etárias (ALVES et al., 2008; SALIBA et al., 2010; SANTILLO et al., 2013, 2014). No trabalho de Saliba et al. (2010), foi relatado que 17,8% dos trabalhadores rurais avaliados eram edêntulos totais, sendo que mais da metade dos indivíduos acima de 45 anos utilizavam próteses totais nas arcadas superior e inferior. Além disso, dados da Pesquisa Nacional de Saúde, que avaliou a saúde bucal autorreferida da população brasileira, demonstraram que indivíduos residentes em áreas rurais apresentam piores indicadores em relação àqueles residentes em áreas urbanas. Apenas 56,6% avaliaram a sua saúde bucal como boa ou muito boa, 30,4% relataram possuir escova de dente, creme dental e fio dental para realizar a higiene bucal e 33,1% relataram perda de treze ou mais dentes (NICO et al., 2016).

No campo da Endodontia, os estudos também são escassos. Marin (2018) avaliou a prevalência de PA em uma amostra representativa de uma população rural do sul do Brasil. A prevalência foi elevada, compreendendo 60,3% dos indivíduos e 5,4% dos dentes analisados. Quando considerados apenas os dentes tratados endodonticamente, a prevalência de PA aumentou para 50,7%. Gündüz et al. (2011) avaliaram o mesmo desfecho em uma amostra de conveniência da área rural da Turquia. Foram examinados apenas dentes com TE, dos quais 67,9% apresentavam PA. Neste estudo, os autores concluíram que a qualidade técnica da obturação endodôntica é o fator-chave para um prognóstico mais favorável pós-tratamento.

A epidemiologia é parte importante para as boas práticas em saúde pública. Estudos transversais permitem analisar a prevalência de doenças e tratamentos em uma determinada população e em determinado tempo, revelando o contexto atual daquela população. O delineamento transversal, no entanto, não permite avaliar se a doença, no caso a PA, está ativa

ou em processo de reparo (MORENO et al., 2013). Quando coletados em amostras representativas, os dados fornecem informações relevantes sobre as condições de vida da população avaliada e a qualidade dos serviços odontológicos prestados nessas áreas (ERIKSEN; KIRKEVANG; PETERSSON, 2002; THAMPIBUL; JANTARAT; ARAYASANTIPARB, 2018). Assim, os dados descobertos podem servir como ferramentas para planejamento, avaliação e monitoramento das intervenções em saúde bucal (NICO et al., 2016).

Diante do exposto, esse trabalho, que faz parte de um levantamento epidemiológico realizado na área rural da cidade de Rosário do Sul/RS, avaliou as possíveis associações entre PA e as condições endodônticas e coronárias dos dentes, dentre outras variáveis, em uma amostra representativa dessa população. A hipótese científica apresentada é que as condições endodônticas e coronárias estão significativamente associadas à prevalência de PA.

**2 ARTIGO – APICAL PERIODONTITIS RELATED TO ENDODONTIC  
TREATMENT AND CORONAL CONDITION: A CROSS-SECTIONAL STUDY IN A  
SOUTHERN BRAZILIAN RURAL POPULATION**

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**Title:** Apical periodontitis related to endodontic treatment and coronal condition: A cross-sectional study in a southern Brazilian rural population.

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## Abstract

**Aim:** Identify possible associations between apical periodontitis (AP) and endodontic treatment (ET) and coronal conditions of teeth, among other variables, in a representative sample of a Brazilian rural population, from an epidemiological survey.

**Methodology:** The sample of this cross-sectional study consisted of 584 non-edentulous adult individuals who presented complete periapical radiographic survey. Periapical status analysis was performed using the Periapical Index (PAI), an ordinal scale with 5 scores, in which 1 and 2 are considered as “health” (absent AP) and the others are considered as “disease” (present AP). The endodontic condition (presence and quality of ET) was categorized, considering the occurrence of voids in the filling material and the root filling length. The presence of intracanal post was also registered. In multi-rooted teeth, the score attributed to AP and ET was the one of the root with the worse scenario. The coronal condition was classified in accordance with the existence of caries, restorations, prosthetic crowns and their qualities. Socioeconomic and demographic variables were also evaluated. Data were analysed descriptively and by the Chi-squared test ( $\alpha=5\%$ ).

**Results:** The prevalence of AP in this sample was high (60.45%), showing a significant association with gender, age, skin colour, education level and household income. Of the 10,396 evaluated teeth, 868 (8.35%) presented AP, which was significantly associated with dental group, dental arch, tooth position, presence of ET, intracanal post and coronal condition. The prevalence of AP in endodontically treated teeth was 56.87% and 71.56% of the root fillings were considered inadequate. When the variables ET quality and coronal condition were grouped, the association with AP was statistically significant.

**Conclusions:** The results of this study suggest that ET quality and coronal condition combined impact the periapical status of endodontically treated teeth. AP was predominant in teeth with inadequate ET and inadequate coronal condition.

## Introduction

Apical periodontitis (AP) is a worrisome chronic inflammatory disorder (Fillipo *et al.* 2014) that occurs in response to the presence of microorganisms within the root canal system of a necrotic tooth (Kakehashi *et al.* 1965, Sundovist 1976). It can be associated with individual-related factors, such as: age, gender, systemic health and socioeconomic status (Persoon & Özok 2017). Several epidemiological studies have described the prevalence of apical periodontitis (AP) in different populations worldwide, with values between 27% and 70% (Cleen *et al.* 1993, Weiger *et al.* 1997, Aleksejuniene *et al.* 2000, Moor *et al.* 2000, Dugas *et al.* 2003, Huuonen *et al.* 2017).

Endodontic treatment (ET) is the elective therapy for teeth with AP (Moor *et al.* 2000). Its goal is to ensure the reduction of apical radiolucencies until complete bone healing by eliminating endodontic microbiota (Ørstavik & Ford 2007). It is well-known that intracanal infection or reinfection are correlated with ET failure and persistent AP (Sjögren *et al.* 1990, Nair 2006, Craveiro *et al.* 2015). These microorganisms could remain within the root canal system or gain access to this site due to a failure of the coronal restoration (Vieira *et al.* 2012).

Different authors have investigated the influence of ET quality and coronal condition in the post-treatment periapical status with contradictory results. Several studies disclosed that ET quality is the most important factor for periapical health (Kirkevang & Wenzel 2003, Chala *et al.* 2011, Moreno *et al.* 2013). However, Ray & Trope (1995) revealed that the coronal restoration quality had a higher impact on the periapical condition than ET quality, justifying that even with an adequate ET, bacteria and their toxic products present in the crown may reach the root apex, stimulating an inflammatory response. The data presented by these authors challenged the rationale of endodontics and stimulated intense discussions in the scientific community (Sritharan 2002, Williams & Williams 2010). Currently, it is reasonable to say that endodontic and coronal conditions are equally important for periapical health (Gillen *et al.* 2011).

The majority of the aforementioned studies on the prevalence of AP and associated factors were conducted using convenience samples from universities, hospitals or private practices in urban areas of different countries. In Brazil approximately 15% of the population live in rural areas (IBGE 2010). Most of these places do not have specialized health services, mainly due to access difficulties, precarious transportation services and distance between properties (Saliba *et al.* 2010, Arruda *et al.* 2018), which could also be pointed as a reason for

the scarcity of endodontic studies involving the rural population (Gündüz *et al.* 2011; Marin 2018). These areas are likely to show poor values for social indicators, high prevalence of chronic diseases and consequently worse quality of life (Meit *et al.* 2014, Bortolotto *et al.* 2018).

Cross-sectional studies have inherent limitations but help to understand the current context of a specific population (Eriksen *et al.* 2002, Thampibul *et al.* 2018). When studying a representative sample, as Huumonen *et al.* (2017), data may provide relevant information about the life conditions of this population, the prevalence of diseases and the efficiency of health services (Eriksen *et al.* 2002). Then, the findings can be used as tools for planning, evaluating and monitoring oral health interventions. The aim of the present study was to evaluate the possible associations between AP and endodontic and coronal conditions of teeth, among other variables, in a representative sample of a southern Brazilian rural population.

## **Materials and Methods**

### ***Ethical considerations***

This cross-sectional study is part of an epidemiological survey carried out in the city of Rosário do Sul/RS – Brazil (Ferreira *et al.* 2019), previously approved by the Ethics Committee in Research of the Federal University of Santa Maria (CAAE: 37862414.5.0000.5346; ANEXO C). Individuals who agreed to participate signed an informed consent form. All participants received a written report detailing their oral health status and were referred for treatment whenever an oral pathology was observed.

### ***Subjects***

Detailed information about data collection can be found in Ferreira *et al.* (2019). Briefly, a representative sample of the individuals was obtained by a multistage probability sampling method. Of the eligible individuals (n = 1087), 688 agreed to participate in the study. Of these, 584 had valid radiographs exams and composed the sample of the present study. The eligibility criteria were: subjects aged 18 years and older, who had at least one of their natural teeth, submitted to clinical examination and periapical radiographic survey. The exclusion criteria were: edentulous subjects, without clinical evaluation and those with invalid radiographic

exams (incomplete images of dental or support structures and images presenting insufficient quality for evaluation) (Marin 2018) (Figure 1).

The socioeconomic and demographic profile of the individuals was evaluated through specific questionnaires, including information about gender, age, skin colour, education level and household income. The skin colour variable was dichotomized as “white” and “non-white” (IBGE 2010). The educational level was also categorized dichotomously as whether the subject had completed at least 8 years of formal education (which corresponds to primary school in Brazil). Household income records were based on the Brazilian monthly minimum wage (approximately USD 277).

### ***Radiographic examination***

Radiographic exams were performed in a mobile unit, consisting of a trailer equipped with a complete dental unit (dental chair, artificial light, compressor, dental x-ray machine and other basic amenities) following radioprotection and biosafety principles. An x-ray device (ProDental Equipamentos Odontológicos, São Paulo, SP, Brazil) operating at 70 kVp and 10 mA was used, with exposure times ranging from 0.5 s to 0.8 s. A periapical radiograph per dental group (incisors, canines, premolars and molars) was taken using an intraoral digital x-ray sensor (RVG 5100/#1; Carestream Dental, Atlanta, GA, USA), coupled to a radiographic positioner (XCP-DS; Dentsply Rinn, York, PA, USA). The Kodak Dental Imaging Software version 6 (Carestream Dental, Atlanta, GA, USA) was used to visualize the radiographic images on a computer with 20-inch screen, 1600 x 900-pixel resolution and 60 Hz (AOC, Manaus, AM, Brazil). The observers were free to apply any image enhancement function (sharpness, brightness, contrast, negative and colour changes) to obtain the best possible assessment, as described by Huuonen *et al.* (2017).

### ***Apical periodontitis***

Periapical status analysis was performed in a previous study (Marin 2018). The Periapical Index (PAI) was used as the classification method (Ørstavik *et al.* 1986) (Table 1). Teeth with PAI index 1 or 2 were considered healthy and those that obtained PAI index  $\geq 3$  were considered diseased (Kirkevang *et al.* 2001). The root with the worst score of all was used to represent the PAI index for multirouted teeth. Cases of root remnant were also classified.

Third molars were excluded from the analysis, as well as teeth that had no visible apical structure in the radiographic images even after applying enhancement filters.

### ***Endodontic treatment and coronal conditions***

For the evaluation of endodontic and coronal conditions of teeth, the digital radiographs were analysed in the same way, using the same tools mentioned in the AP assessment, in a dark room using a 20-inch monitor with 1600x900 resolution and 60 Hz frequency (AOC, Manaus, AM, Brazil). Such conditions were categorized according to the parameters described in Table 1, adapted from Kirkevang *et al.* (2001). Regarding ET quality, the “length of root filling” variable was assessed by measuring the distance from the root filling end to the radiographic apex by means of an inbuilt measurement tool in the Kodak Dental Imaging Software. For the evaluation of ET quality in multirrooted teeth, the score of the root with the “worst scenario” was selected. Both variables for ET quality (lateral sealing and length) were dichotomized in adequate or inadequate and then were grouped to help statistical analysis. Lateral sealing of root filling was considered adequate only when code 0 was registered. When codes 1, 2 and 3 were recorded, the lateral sealing was considered inadequate. Length of root filling was considered adequate for codes 0 and 2. All the other codes were registered as inadequate. Finally, ET was considered adequate when both lateral sealing and length of root filling were adequate. When one of these parameters were inadequate, ET was considered inadequate. The coronal condition was also dichotomized for statistical analysis. Codes 0, 1 and 5 were adequate, while 2, 3, 4, 6, 7 and 8 were inadequate (Table 1).

### ***Training and calibration of observers***

For radiographic examination, an experienced radiologist previously trained the examiners regarding the use of the intraoral digital x-ray sensor, positioners and software from complete periapical radiographs of three individuals (Ferreira *et al.* 2019).

For evaluations of AP, endodontic and coronal conditions, two observers were previously trained and calibrated by the same radiologist. One observer was responsible for the assessment of AP and the other for evaluating the endodontic and coronal conditions. From the database, 30 periapical radiographs were randomly selected ([www.randomizer.com](http://www.randomizer.com)) to perform the calibration. The intra and inter-examiner *Kappa* coefficients for AP were 0.70 and 0.80,

respectively (Marin 2018). For endodontic conditions, *Kappa* coefficients were as follows: 1.00 (intra) and 1.00 (inter) for presence of ET; 1.00 (intra) and 1.00 (inter) for presence of intracanal post; 0.68 (intra) and 0.83 (inter) for lateral sealing of root filling; 0.90 (intra) and 0.88 (inter) for length of root filling (adequate/inadequate). Intraclass correlation coefficients (ICC) were 0.94 (intra) and 0.96 (inter) for length measurement, i.e. the distance between the root filling end and the radiographic apex. Finally, *Kappa* coefficients for the coronal condition were 0.83 (intra) and 0.70 (inter) (SPSS Statistics v. 24; IBM SPSS Inc., Chicago, IL, USA).

### ***Statistical analysis***

Statistical analyses were conducted by using the SPSS software (Statistical Package for the Social Sciences, version 24.0; IBM, Chicago, IL). Descriptive data were obtained as frequencies of the categories within each variable. Chi-square tests were used to identify associations between AP and individual-related factors (gender, age, skin colour, education and household income) or tooth-related factors (dental group, dental arch, tooth position, presence and quality of ET, presence of intracanal post and coronal condition). The significance level was set at 5%.

### **Results**

A total of 584 patients were evaluated. Their socioeconomic and demographic characteristics are described in Table 2. Male subjects comprised 50.51% of the sample. Their age ranged from 18 to 93 years, with an average of 47.23 ( $\pm$  15.39) years. The most prevalent age was 50 – 59 years (25.34%). Patients were predominantly white (68.49%), had  $\leq$  8 years of schooling (78.18%) and lived with a household income of  $>$  1 Brazilian minimum wage (62.76%).

The prevalence of AP in this sample was 60.45% ( $n = 353$ ). The number of lesions varied from 0 to 12 in the same subject, with a mean of 1.52 ( $\pm$  1.82) per individual. The prevalence of ET was 20.72% ( $n = 121$ ). The minimum and maximum numbers of treatment per patient were 0 and 8, respectively, with a mean of 0.36 ( $\pm$  0.81). There was a significant association between AP and gender ( $P = 0.048$ ), with men presenting a prevalence of 63.73%. Also, there was a significant association between AP and age ( $P < 0.001$ ) and ET and age ( $P = 0.016$ ). The prevalence of AP was higher in subjects between 50 – 59 years (71.62%) and those

between 40 – 49 years had more ET (30.16%). AP was associated with skin colour ( $P = 0.045$ ), education ( $P = 0.025$ ) and household income ( $P = 0.003$ ), while ET was associated with education ( $P < 0.001$ ) and household income ( $P < 0.001$ ) (Table 3).

In total, 10,396 teeth were evaluated. Of these, 281 (2,70%) were classified as root remnants. The mean number of teeth per individual was 17.80 ( $\pm 6.76$ , min 1, max 28). Of all, 868 teeth presented AP (8.35%) and 211 had ET (2.03%). There was a significant association between AP and dental group ( $P < 0.001$ ) or AP and tooth position ( $P < 0.001$ ), where posterior teeth were the most affected (9.50%). In relation to the dental arch, AP was more prevalent in upper teeth (11.33%) ( $P < 0.001$ ), as described in Table 4.

When considering the presence of ET ( $P < 0.001$ ), there was a significant association with AP, with 56.87% of the root-filled teeth presenting the pathology. The presence of intracanal post was visualized in 61 cases and three teeth had intracanal post without ET. When teeth with intracanal post were considered, the prevalence of AP was 73.77%, with a significant association between the two variables ( $P < 0.001$ ). Regarding coronal condition, 60.13% of the teeth presented a healthy crown. Of these, only 1.81% had AP. On the other hand, in teeth with inadequate radiopaque restoration (open margins) and unadapted prosthetic crowns the prevalence of AP was 23.59% and 53.33%, respectively. The association between AP and coronal condition was significant ( $P < 0.001$ ). When this variable was dichotomized into adequate and inadequate, the association between AP and coronal condition remain significant ( $P < 0.001$ ); the inadequate category had higher prevalence of AP (27.59%) (Table 4).

Table 5 shows the distribution of AP prevalence according to ET quality and coronal condition in endodontically treated teeth ( $n = 211$ ). Root filling quality was considered inadequate in 71.56% of these teeth, with inadequate lateral sealing and/or inadequate length. Most of the coronal restorations were also recorded as inadequate (59.72%). There was not a significant association between AP and ET quality ( $P = 0.513$ ). However, a significant association was detected between AP and coronal condition, with the highest prevalence in teeth with inadequate restoration (62.70%). Also, when ET quality and coronal condition were combined, the association with AP was significant ( $P = 0.025$ ). The category with inadequate ET and inadequate restoration had the highest prevalence (68.18 %) (Table 5).



## Discussion

The present study showed that AP is highly frequent in this Brazilian rural population (60.45%), suggesting a high caries experience (Mello & Antunes 2004) and the lack of access to specialized dental centres (Ahn *et al.* 2011). These results are similar to those of other studies performed in different geographic locations (Cleen *et al.* 1993, Weiger *et al.* 1997, Aleksejuniene *et al.* 2000, Dugas *et al.* 2003, Moor *et al.* 2000), but are more expressive than those observed in some studies conducted in Scandinavian countries (Eriksen *et al.* 1995; Huuonen *et al.* 2017), where better socioeconomic status is verified. Although, the findings of these investigations should be compared with caution due to variations in sampling procedures, selection of participants, examination methods and criteria for diagnosing endodontic/coronal conditions (Chala *et al.* 2011).

A significant association between AP and gender was found, with men presenting higher prevalence (63.73%) than women (55.71%). The results of this study are in agreement with other reports (Berlinck *et al.* 2015, Huuonen *et al.* 2017). Individuals aged between 50 – 59 years had higher prevalence of AP (71.62%), suggesting an increase in the prevalence with increasing patient age, as proposed for many authors (Kirkevang *et al.* 2001, Eriksen *et al.* 2002, Segura-Egea *et al.* 2004). For ET, subjects aged between 40 – 49 years showed higher prevalence of AP (30.16%), probably because individuals in this age range seek dental service more frequently.

The socioeconomic and demographic variables in the present study provide an overall picture of the patients of this rural population. In this study, AP was significantly associated with skin colour, education and household income, while ET was significantly associated with the last two variables. Although it is well-known that dental variables are more strongly associated with AP, it is pertinent to remember that socioeconomic variables indirectly affect the occurrence of AP and the possibility of treatment and maintenance of teeth (Berlinck *et al.* 2015). Individuals with less years of education and less household income have greater prevalence of caries (Costa *et al.* 2012), which is the main etiological factor of AP. Furthermore, race and income level disparities are well-documented and represent a persistent problem (Agency for Healthcare Research and Quality 2016). Adults living with low income are likely to receive less dental care than wealthier adults (Fos & Hutchison 2017), also many indicators of health, access to care and health care quality are worse in racial minorities than whites (CDC 2017).

Posterior teeth presented significantly higher prevalence of AP, as showed earlier (Kirkevang *et al.* 2001; Hommez *et al.* 2002; Huumonen *et al.* 2017). In this study, AP was predominant in the molar group and the maxilla was more affected than the mandible. This fact can be related to the complex anatomy of these teeth, which contributes to a higher risk of dental caries due to plaque accumulation, and to the spongy nature of the maxillary bone, which favours the faster development of a periapical lesion. Also, because of the position of these teeth in the arch, it becomes more difficult to perform an efficient dental hygiene (Fernandes *et al.* 2013; Huumonen *et al.* 2017).

The outcomes of the present study also show a significant association between AP and the presence of ET, with a greater prevalence of AP in endodontically treated teeth (56.87%), when compared to those without any endodontic intervention (7.23%). These values are similar to those obtained in previous studies (Siqueira *et al.* 2005, Pedro *et al.* 2016). Other investigation conducted in a rural population showed even higher prevalence of AP in root-filled teeth (67.9%) (Gündüz *et al.* 2011). However, it is important to mention that their study used a convenience sample in the rural area of Turkey, consisted only of men.

When analysing ET quality, technical variables were considered – homogeneity of filling material and length of root filling – as recommended previously (Ng *et al.* 2008, Kirkevang *et al.* 2001). Even so, it is important to remember that the radiographic image is not sufficient to evaluate how all intraoperative endodontic procedures were conducted, especially the disinfection of the root canal system (Kabak & Abbot 2005), which has major influence on the outcome of ET (Sjögren *et al.* 1997). ET quality was disappointing in this population, with only 28.44% of adequate root fillings. Previous studies have reported high frequencies of periradicular lesions in poorly filled root canals (Kirkevang *et al.* 2001, Segura-Egea *et al.* 2004, Kayahan *et al.* 2008, Moreno *et al.* 2013). The prevalence of AP in inadequate ET was 58.28%, but there was no significant association between these two variables.

Some studies have reported that an appropriate coronal seal is also important to improve endodontic success (Ray & Trope 1995, Hommez *et al.* 2002). The frank exposure of root fillings to microorganisms and their products present in saliva and oral cavity may lead to reinfection of the root canal system in less than 60 days (Torabinejad *et al.* 1990, Saunders & Saunders, 1994). Ray & Trope (1995) suggested that the coronal condition had a greater impact in the periapical status than ET quality. However, other studies have suggested that endodontic success rates depend equally on ET and coronal restoration qualities (Gillen *et al.* 2011). In this study, a significant association was found between the prevalence of AP and coronal condition

when all teeth were considered, showing that 27.59% of the teeth with inadequate coronal condition had AP, while only 2.78% of the teeth with an adequate condition were affected. These findings are also reported by Homme *et al.* (2002) and Moreno *et al.* (2013). When only root-filled were considered, the coronal condition was also significantly associated with AP, as reported by Segura-Egea *et al.* (2004), Chala *et al.* (2011), and Craveiro *et al.* (2015).

Furthermore, the results of the present research indicate that ET quality and coronal condition were statically associated with AP when these variables were combined. When both ET and coronal conditions were considered inadequate, the prevalence of AP was 68.18%, showing that the sum of the two inadequate dental conditions could favour the chance of developing a periapical lesion. AP was also influenced by the presence of an intracanal post. This is in agreement with other authors (Eckerbom *et al.* 1991, Saunders *et al.* 1997, Boucher *et al.* 2002).

Digital periapical radiographs were used in this study to detect AP. They have greater sensibility when compared with panoramic radiographs for screening this pathology (Muhammed & Manson-Hing 1982). It is well-known that cone beam computed tomography (CBCT) is the most accurate method for identifying AP when histopathological findings are used as gold-standard (Kanagasingam *et al.* 2016, Estrela *et al.* 2008). However, the space of the periodontal ligament of teeth with healthy pulp is sometimes increased when viewed by CBCT and this may lead to misinterpretations when CBCT is used as a diagnostic method for periapical changes (Pope *et al.* 2014). Moreover, because it is an expensive exam and expose the patient to a higher dose of radiation, this is not the first-choice method for epidemiological studies. In addition, in populations with difficult access, as the one evaluated here, it is not possible to use a CBCT machine.

Most epidemiological studies use just the radiographic method for evaluating AP, ET and coronal restoration quality, although it is clear that this 2-dimensional exam have limitations. For coronal restorations, clinical assessment could contribute, adding possible information on microleakage in occlusal margins, cracks, and perforations, that sometimes are not observed in radiographs (Craveiro *et al.* 2015). Clinical aspects related to ET, as pain symptoms, sinus tract, edema or exudation, were also not evaluated here. Few studies evaluated both clinical and radiographic conditions (Homme *et al.* 2002, Dugas *et al.* 2003, Craveiro *et al.* 2015) and they warn about some inconsistencies and poor agreement between clinical and radiographic assessments.

Cross-sectional studies have weak strength of causal inference but strong external

validity (Eriksen *et al.* 2002). Data are collected and analysed just once, at one given time point, so they are vulnerable to interpretation bias. For evaluation of AP, as carried out in this study, it is impossible to distinguish whether it is a case in healing process or the maintenance of a chronic injury. Only the patient's dental history or studies with a longitudinal design could provide this information (Huumonen *et al.* 2017).

To the best of authors' knowledge, this cross-section study is part of the first epidemiological survey (Ferreira *et al.* 2019) to assess oral health conditions in a representative sample of a Brazilian rural population. The investigation of these conditions in rural inhabitants is required especially due to the difficult access to medical and oral care of these populations (Skillman *et al.* 2010), since the improvement of oral health is strongly associated with better reach to health care services (Ahn *et al.* 2011). Also, this kind of research, with a representative population-based sample, is rare in endodontics (Eriksen *et al.* 2002; Huumonen *et al.* 2017). So, the data collected here reinforce the body of evidence on the prevalence of AP and associated factors, which can be useful in the planning and improvement of oral health policies.

## Conclusions

Findings from this Brazilian rural population agree with those from other countries and show a high prevalence of AP, especially in areas with low socioeconomic indicators. Here, the prevalence of AP was significantly associated with gender, age, skin colour, education level and household income, when the patient was considered as experimental unit. Additionally, AP was significantly associated with dental group, dental arch, tooth position, presence of ET, intracanal post and coronal condition, when the tooth was considered as experimental unit. The results also confirmed that the quality of ET and coronal condition combined impacted the periapical status. AP was predominant in teeth with inadequate ET and inadequate coronal condition.

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## Tables

**Table 1** Parameters, registrations and codes with relation to the endodontic and coronal conditions.

Parameters		Registrations and codes
Endodontic condition	Endodontic treatment	0 = absent 1 = present
	Lateral sealing of root filling (adequate = no voids)	0 = adequate ½ coronal e adequate ½ apical 1 = adequate ½ coronal e inadequate ½ apical 2 = inadequate ½ coronal e adequate ½ apical 3 = inadequate ½ coronal e inadequate ½ apical
	Length of root filling	0 = adequate ≤ 2 mm from radiographic apex 1 = inadequate > 2mm from radiographic apex 2 = <i>flush</i> , root filling ending at the radiographic apex 3 = overfilling, root filling material in the periapical area 4 = pulpotomy, material seen only in the pulp chamber
	Intracanal post	0 = absent 1 = present
Coronal condition		0 = healthy 1 = adequate radiopaque restoration 2 = inadequate radiopaque restoration (overhangs) 3 = inadequate radiopaque restoration (open margins) 4 = radiolucent restoration/caries/open cavity 5 = adapted prosthetic crown 6 = unadapted prosthetic crown 7 = root rest 8 = non carious lesions
	Periapical index (PAI) (Ørstavik <i>et al.</i> 1986)	1 = Normal periapical structures 2 = Small changes in bone structures 3 = Changes in bone structures with some mineral loss 4 = Periodontitis with well-defined radiolucent area 5 = Severe periodontitis with exacerbating features

Adapted from Kirkevang *et al.* 2001.

**Table 2** Sample characteristics (n = 584).

Variable	N	%
<i>Gender</i>		
Female	289	49.49
Male	295	50.51
<i>Age</i>		
18 – 29	82	14.04
30 – 39	107	18.32
40 – 49	126	21.58
50 – 59	148	25.34
60 ≥	121	20.72
<i>Skin colour</i>		
White	400	68.49
Non-white	184	31.51
<i>Education</i>		
≤ 8 years	455	78.18
> 8 years	127	21.82
<i>Household income</i>		
≤ 1 BMW*	216	37.24
> 1 BMW*	364	62.76

For some variables, “n” does not add up to 584 due to missing data.

\*BMW: Brazilian minimal wage in 2016 (approximately USD 277 when data were gathered).

**Table 3** Prevalence of apical periodontitis (AP) and endodontic treatment (ET) according to individual-related factors (n = 584).

Variable	Prevalence of AP n (%)	P (Chi-square test)	Prevalence of ET n (%)	P (Chi-square test)
<i>Gender</i>		0.048		0.296
Female	163 (55.71)		65 (22.49)	
Male	190 (63.73)		56 (18.28)	
<i>Age</i>		< 0.001		0.016
18 – 29	33 (40.24)		12 (14.63)	
30 – 39	58 (54.21)		24 (22.43)	
40 – 49	79 (62.70)		38 (30.16)	
50 – 59	106 (71.62)		30 (20.27)	
60 ≥	73 (60.33)		17 (14.05)	
<i>Skin colour</i>		0.045		0.365
White	228 (57.00)		87 (21.75)	
Non-white	121 (65.76)		34 (18.48)	
<i>Education</i>		0.025		<0.001
≤ 8 years	283 (62.20)		74 (16.26)	
> 8 years	65 (51.18)		46 (36.22)	
<i>Household income</i>		0.003		<0.001
≤ 1 BMW*	146 (67.59)		27 (12.50)	
> 1 BMW*	201 (55.22)		93 (25.55)	

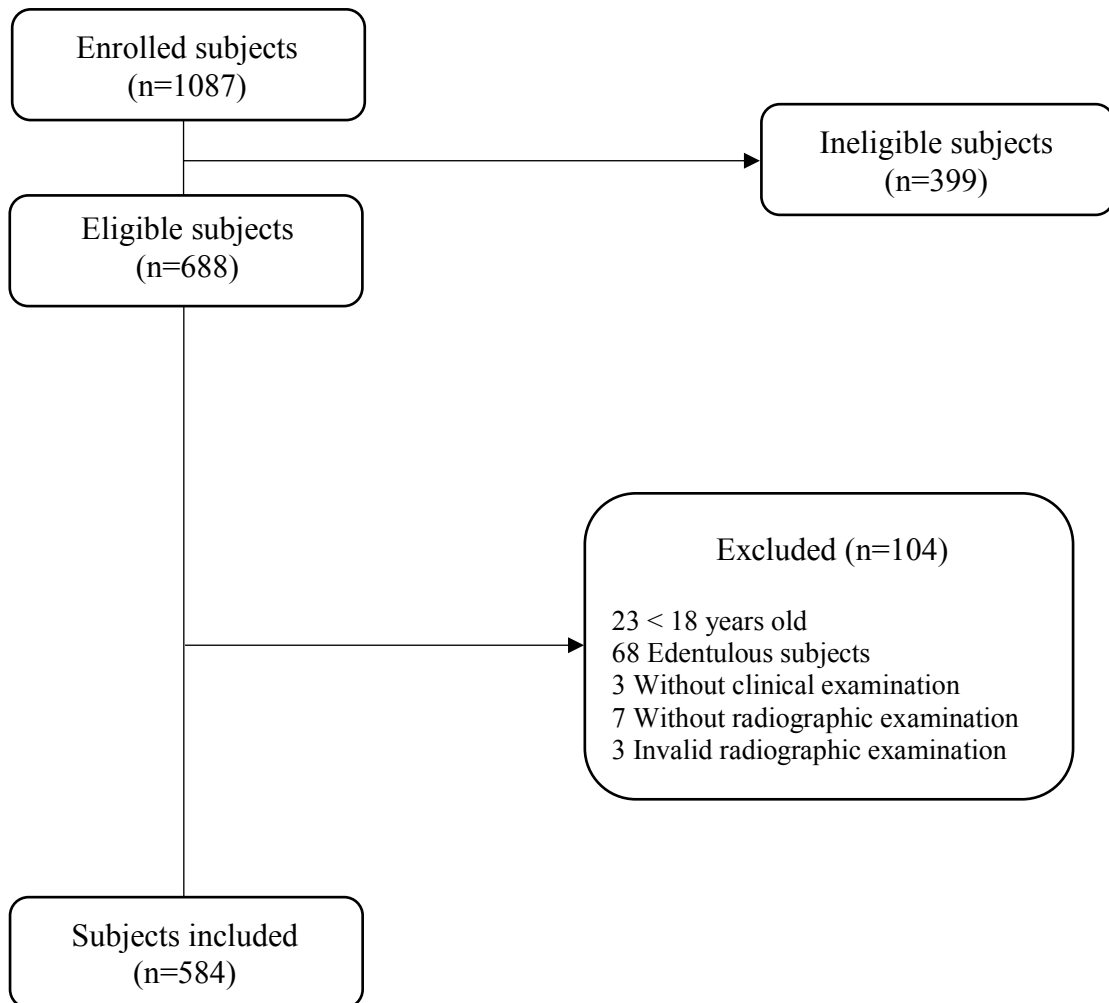
\*BMW: Brazilian minimal wage in 2016 (approximately USD 277 when data were gathered).

**Table 4** Prevalence of apical periodontitis as influenced by tooth-related factors (n = 10,396).

Variable	Total teeth n (%)	Prevalence of apical periodontitis n (%)	P (Chi-square test)
<i>Dental group</i>			< 0.001
Incisors	3,464 (33.32)	311 (8.98)	
Canine	1,839 (17.69)	73 (3.97)	
Premolar	3,317 (31.91)	281 (8.47)	
Molar	1,776 (17.08)	203 (11.43)	
<i>Dental arch</i>			< 0.001
Upper	4,915 (47.28)	557 (11.33)	
Lower	5,481 (52.72)	311 (5.67)	
<i>Tooth position</i>			< 0.001
Anterior	5,303 (51.01)	384 (7.24)	
Posterior	5,093 (48.99)	484 (9.50)	
<i>Endodontic treatment</i>			< 0.001
Present	211 (2.03)	120 (56.87)	
Absent	10,185 (97.97)	748 (7.34)	
<i>Intracanal post</i>			< 0.001
Present	61 (0.59)	45 (73.77)	
Absent	10,335 (99.41)	823 (7.96)	
<i>Coronal condition</i>			< 0.001
Healthy	6,251 (60.13)	113 (1.81)	
Adequate radiopaque restoration	1,799 (17.30)	110 (6.11)	
Inadequate radiopaque restoration (overhangs)	68 (0.65)	13 (19.12)	
Inadequate radiopaque restoration (open margins)	407 (3.91)	96 (23.59)	
Radiolucent restoration/caries/open cavity	1,035 (9.96)	231 (22.32)	
Adapted prosthetic crown	12 (0.12)	1 (8.33)	
Unadapted prosthetic crown	15 (0.14)	8 (53.33)	
Root remnant	281 (2.70)	263 (93.59)	
Non carious lesion	528 (5.08)	33 (6.25)	
<i>Coronal condition (dichotomized)</i>			< 0.001
Adequate	8,062 (77.55)	224 (2.78)	
Inadequate	2,334 (22.45)	644 (27.59)	

**Table 5** Prevalence of apical periodontitis as influenced by endodontic treatment quality and coronal condition (n = 211).

Variable	Total teeth n (%)	Prevalence of apical periodontitis n (%)	P (Chi-square test)
<i>Root canal filling (lateral seal of root filling - voids)</i>			0.602
Adequate	100 (47.39)	55 (55.00)	
Inadequate	111 (52.61)	65 (58.56)	
<i>Root canal filling (length of root filling)</i>			0.102
Adequate	121 (57.35)	63 (52.07)	
Inadequate	90 (42.65)	57 (63.33)	
<i>Root canal filling (lateral sealing + length)</i>			0.513
Adequate	60 (28.44)	32 (53.33)	
Inadequate	151 (71.56)	88 (58.28)	
<i>Coronal condition</i>			0.037
Adequate	85 (40.28)	41 (48.24)	
Inadequate	126 (59.72)	79 (62.70)	
<i>Coronal condition and root canal filling</i>			0.025
Adequate and adequate	22 (10.43)	13 (59.09)	
Adequate and inadequate	38 (18.01)	19 (50.00)	
Inadequate and adequate	63 (29.86)	28 (44.44)	
Inadequate and inadequate	88 (41.71)	60 (68.18)	

**Figures**

Adapted from Marin 2018.

**Figure 1** Flowchart (subjects included in the study).

### 3 CONCLUSÃO

Considerando a metodologia aplicada e as limitações do trabalho, conclui-se que:

- A prevalência de periodontite apical (PA) foi elevada, atingindo 60,45% dos indivíduos (n = 584) e 8,35% dos dentes avaliados (n = 10396);
- A prevalência de tratamento endodôntico (TE) foi moderada, abrangendo 20,72% dos indivíduos e 2,03% dos dentes;
- Dos dentes tratados endodonticamente, a maioria apresentou obturação do canal radicular inadequada (71,56%) e condição coronária inadequada (59,72%);
- Quando o indivíduo foi considerado como unidade experimental, houve associação significativa entre PA e gênero, idade, cor de pele, escolaridade e renda familiar;
- Quando o dente foi considerado como unidade de análise, houve associação significativa entre PA e grupo dentário, arcada dentária, posição dentária, presença de TE, de retentor intrarradicular e condição coronária.
- PA foi significativamente associada aos dentes que apresentavam obturação do canal inadequada e condição coronária inadequada.



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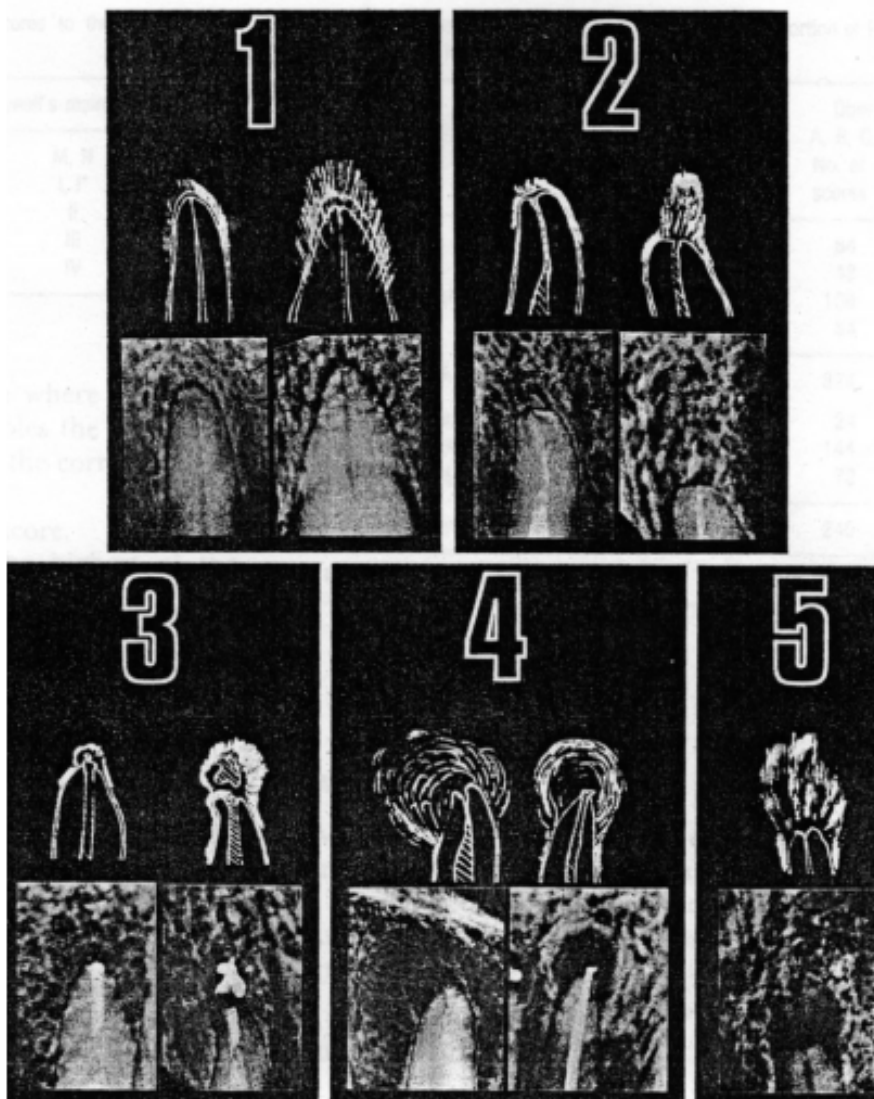
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## ANEXO A – ÍNDICE PAI (*PERIAPICAL INDEX*)



Índice Periapical proposto por Ørstavik, Kerekes e Eriksen (1986):

PAI 1 – Estrutura óssea periapical normal;

PAI 2 – Pequenas mudanças na estrutura óssea sem desmineralização;

PAI 3 – Mudanças na estrutura óssea com alguma perda mineral difusa;

PAI 4 – Lesão periapical com área radiolúcida bem definida;

PAI 5 – Lesão periapical severa com características exacerbadas.

## ANEXO B – NORMAS PARA PUBLICAÇÃO NO PERIÓDICO *INTERNATIONAL ENDODONTIC JOURNAL*

### INTERNATIONAL ENDODONTIC JOURNAL

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### 5.1. Format

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**Presentation:** Authors should pay special attention to the presentation of their research findings or clinical reports so that they may be communicated clearly. Technical jargon should be avoided as much as possible and clearly explained where its use is unavoidable. Abbreviations should also be kept to a minimum, particularly those that are not standard. The background and hypotheses underlying the study, as well as its main conclusions, should be clearly explained. Titles and abstracts especially should be written in language that will be readily intelligible to any scientist.

**Abbreviations:** International Endodontic Journal adheres to the conventions outlined in Units, Symbols and Abbreviations: A Guide for Medical and Scientific Editors and Authors. When non-standard terms appearing 3 or more times in the manuscript are to be abbreviated, they should be written out completely in the text when first used with the abbreviation in parenthesis.

## 5.2. Structure

All manuscripts submitted to *International Endodontic Journal* should include Title Page, Abstract, Main Text, References and Acknowledgements, Tables, Figures and Figure Legends as appropriate

**Title Page:** The title page should bear: (i) Title, which should be concise as well as descriptive; (ii) Initial(s) and last (family) name of each author; (iii) Name and address of department, hospital or institution to which work should be attributed; (iv) Running title (no more than 30 letters and spaces); (v) No more than six keywords (in alphabetical order); (vi) Name, full postal address, telephone, fax number and e-mail address of author responsible for correspondence.

**Abstract for Original Scientific Articles** should be no more than 350 words giving details of what was done using the following structure:

- **Aim:** Give a clear statement of the main aim of the study and the main hypothesis tested, if any.
- **Methodology:** Describe the methods adopted including, as appropriate, the design of the study, the setting, entry requirements for subjects, use of materials, outcome measures and statistical tests.
- **Results:** Give the main results of the study, including the outcome of any statistical analysis.
- **Conclusions:** State the primary conclusions of the study and their implications. Suggest areas for further research, if appropriate.

**Abstract for Systematic Review Articles** should be no more than 350 words giving details of what was done using the following structure where applicable:

- **Background:** Provide a brief introduction of the subject and why it is important.
- **Aim:** Give a clear statement of the main aim of the study and the main hypothesis tested, if any.
- **Data sources:** Describe the databases searched.
- **Study eligibility criteria, participants, and interventions:** Briefly describe the methods adopted including exclusion/inclusion criteria.
- **Study appraisal and synthesis methods:** Describe bias, study type and quality
- **Results:** Give the main results of the review, including the outcome of any statistical meta-analysis.
- **Limitations:** Highlight problems with the current review and research area
- **Conclusions and implications of key findings:** State the primary conclusions of the study and their implications. Suggest areas for further research, if appropriate.

### **Abstract for Review Articles (narrative)**

The Abstract should be unstructured and no more than 350 words.

**Abstract for Case Reports** should be no more than 350 words using the following structure:

- **Aim:** Give a clear statement of the main aim of the report and the clinical problem which is addressed.
- **Summary:** Describe the methods adopted including, as appropriate, the design of the study, the setting, entry requirements for subjects, use of materials, outcome measures and analysis if any.
- **Key learning points:** Provide up to 5 short, bullet-pointed statements to highlight the key messages of the report. All points must be fully justified by material presented in the report.

**Abstract for Clinical Articles** should be no more than 350 words using the following structure:

- **Aim:** Give a clear statement of the main aim of the report and the clinical problem which is addressed.
- **Methodology:** Describe the methods adopted.
- **Results:** Give the main results of the study.
- **Conclusions:** State the primary conclusions of the study.

**Main Text of Original Scientific Article** should include Introduction, Materials and Methods, Results, Discussion and Conclusion

**Introduction:** should be focused, outlining the historical or logical origins of the study and gaps in knowledge. Exhaustive literature reviews are not appropriate. It should close with the explicit statement of the specific aims of the investigation, or hypothesis to be tested.

**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.

*(i) Clinical Trials* should be reported using the CONSORT guidelines available at [www.consort-statement.org](http://www.consort-statement.org). A [CONSORT checklist](#) and flow diagram (as a Figure) should also be included in the submission material.

*(ii) Experimental Subjects:* experimentation involving human subjects will only be published if such research has been conducted in full accordance with ethical principles, including the World Medical Association [Declaration of Helsinki](#) (version 2008) and the additional requirements, if any, of the country where the research has been carried out. Manuscripts must be accompanied by a statement that the experiments were undertaken with the understanding and written consent of each subject and according to the above mentioned principles. A statement regarding the fact that the study has been independently reviewed and approved by an ethical board should also be included. Editors reserve the right to reject papers if there are doubts as to whether appropriate procedures have been used.

When experimental animals are used the methods section must clearly indicate that adequate measures were taken to minimize pain or discomfort. Experiments should be carried out in accordance with the Guidelines laid down by the National Institute of Health (NIH) in the USA regarding the care and use of animals for experimental procedures or with the European Communities Council Directive of 24 November 1986 (86/609/EEC) and in accordance with local laws and regulations.

All studies using human or animal subjects should include an explicit statement in the Material and Methods section identifying the review and ethics committee approval for each study, if applicable. Editors reserve the right to reject papers if there is doubt as to whether appropriate procedures have been used.

*(iii) Suppliers:* Suppliers of materials should be named and their location (Company, town/city, state, country) included.



**Results:** should present the observations with minimal reference to earlier literature or to possible interpretations. Data should not be duplicated in Tables and Figures.

**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 progress with a review of the methodology before discussing the results in light of previous work in the field. The Discussion 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.

**Conclusion:** should contain a summary of the findings.

**Main Text of Review Articles** should be divided into Introduction, Review and Conclusions. The Introduction section should be focused to place the subject matter in context and to justify the need for the review. The Review section should be divided into logical sub-sections in order to improve readability and enhance understanding. Search strategies must be described and the use of state-of-the-art evidence-based systematic approaches is expected. The use of tabulated and illustrative material is encouraged. The Conclusion section should reach clear conclusions and/or recommendations on the basis of the evidence presented.

**Main Text of Clinical Reports and Clinical Articles** should be divided into Introduction, Report, Discussion and Conclusion,. They should be well illustrated with clinical images, radiographs, diagrams and, where appropriate, supporting tables and graphs. However, all illustrations must be of the highest quality

**Acknowledgements:** *International Endodontic Journal* requires that all sources of institutional, private and corporate financial support for the work within the manuscript must be fully acknowledged, and any potential conflicts of interest noted. Grant or contribution numbers may be acknowledged, and principal grant holders should be listed. Acknowledgments should be brief and should not include thanks to anonymous referees and editors. See also above under Ethical Guidelines.

### 5.3. 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.

We recommend the use of a tool such as [EndNote](#) or [Reference Manager](#) for reference management and formatting. The EndNote reference style can be obtained upon request to the editorial office ([iejeditor@cardiff.ac.uk](mailto:iejeditor@cardiff.ac.uk)). Reference Manager reference styles can be searched for here: [www.refman.com/support/rmstyles.asp](http://www.refman.com/support/rmstyles.asp)

**In the text:** single or double authors should be acknowledged together with the year of publication, e.g. (Pitt Ford & Roberts 1990). If more than two authors the first author followed by *et al.* is sufficient, e.g. (Tobias *et al.* 1991). If more than 1 paper is cited the references should be in year order and separated by "," e.g. (Pitt Ford & Roberts 1990, Tobias *et al.* 1991).

**Reference list:** All references should be brought together at the end of the paper in alphabetical order and should be in the following form.

- (i) Names and initials of up to six authors. When there are seven or more, list the first three and add *et al.*
- (ii) Year of publication in parentheses
- (iii) Full title of paper followed by a full stop (.)
- (iv) Title of journal in full (in italics)
- (v) Volume number (bold) followed by a comma (,)
- (vi) First and last pages

Examples of correct forms of reference follow:

**Standard journal article**

Bergenholtz G, Nagaoka S, Jontell M (1991) Class II antigen-expressing cells in experimentally induced pulpitis. *International Endodontic Journal* **24**, 8-14.

**Corporate author**

British Endodontic Society (1983) Guidelines for root canal treatment. *International Endodontic Journal* **16**, 192-5.

**Journal supplement**

Frumin AM, Nussbaum J, Esposito M (1979) Functional asplenia: demonstration of splenic activity by bone marrow scan (Abstract). *Blood* **54** (Suppl. 1), 26a.

**Books and other monographs**

**Personal author(s)**

Gutmann J, Harrison JW (1991) *Surgical Endodontics*, 1st edn Boston, MA, USA: Blackwell Scientific Publications.

**Chapter in a book**

Wesselink P (1990) Conventional root-canal therapy III: root filling. In: Harty FJ, ed. *Endodontics in Clinical Practice*, 3rd edn; pp. 186-223. London, UK: Butterworth.

**Published proceedings paper**

DuPont B (1974) Bone marrow transplantation in severe combined immunodeficiency with an unrelated MLC compatible donor. In: White HJ, Smith R, eds. Proceedings of the Third Annual Meeting of the International Society for Experimental Rematology; pp. 44-46. Houston, TX, USA: International Society for Experimental Hematology.

**Agency publication**

Ranofsky AL (1978) Surgical Operations in Short-Stay Hospitals: United States-1975. DHEW publication no. (PHS) 78-1785 (Vital and Health Statistics; Series 13; no. 34.) Hyattsville, MD, USA: National Centre for Health Statistics.8

**Dissertation or thesis**

Saunders EM (1988) In vitro and in vivo investigations into root-canal obturation using thermally softened gutta-percha techniques (PhD Thesis). Dundee, UK: University of Dundee.

**URLs**

Full reference details must be given along with the URL, i.e. authorship, year, title of document/report and URL. If this information is not available, the reference should be removed and only the web address cited in the text.

Smith A (1999) Select committee report into social care in the community [WWW document]. URL <http://www.dhss.gov.uk/reports/report015285.html> [accessed on 7 November 2003]

#### **5.4. Tables, Figures and Figure Legends**

**Tables:** Tables should be double-spaced with no vertical rulings, with a single bold ruling beneath the column titles. Units of measurements must be included in the column title.



**Figures:** All figures should be planned to fit within either 1 column width (8.0 cm), 1.5 column widths (13.0 cm) or 2 column widths (17.0 cm), and must be suitable for photocopy reproduction from the printed version of the manuscript. Lettering on figures should be in a clear, sans serif typeface (e.g. Helvetica); if possible, the same typeface should be used for all figures in a paper. After reduction for publication, upper-case text and numbers should be at least 1.5-2.0 mm high (10 point Helvetica). After reduction, symbols should be at least 2.0-3.0 mm high (10 point). All half-tone photographs should be submitted at final reproduction size. In general, multi-part figures should be arranged as they would appear in the final version. Reduction to the scale that will be used on the page is not necessary, but any special requirements (such as the separation distance of stereo pairs) should be clearly specified. Unnecessary figures and parts (panels) of figures should be avoided: data presented in small tables or histograms, for instance, can generally be stated briefly in the text instead. Figures should not contain more than one panel unless the parts are logically connected; each panel of a multipart figure should be sized so that the whole figure can be reduced by the same amount and reproduced on the printed page at the smallest size at which essential details are visible.

Figures should be on a white background, and should avoid excessive boxing, unnecessary colour, shading and/or decorative effects (e.g. 3-dimensional skyscraper histograms) and highly pixelated computer drawings. The vertical axis of histograms should not be truncated to exaggerate small differences. The line spacing should be wide enough to remain clear on reduction to the minimum acceptable printed size.

Figures divided into parts should be labelled with a lower-case, boldface, roman letter, a, b, and so on, in the same typesize as used elsewhere in the figure. Lettering in figures should be in lower-case type, with the first letter capitalized. Units should have a single space between the number and the unit, and follow SI nomenclature or the nomenclature common to a particular field. Thousands should be separated by a thin space (1 000). Unusual units or abbreviations should be spelled out in full or defined in the legend. Scale bars should be used rather than magnification factors, with the length of the bar defined in the legend rather than on the bar itself. In general, visual cues (on the figures themselves) are preferred to verbal explanations in the legend (e.g. broken line, open red triangles etc.)

**Figure legends:** Figure legends should begin with a brief title for the whole figure and continue with a short description of each panel and the symbols used; they should not contain any details of methods.

**Permissions:** If all or part of previously published illustrations are to be used, permission must be obtained from the copyright holder concerned. This is the responsibility of the authors before submission.

**Preparation of Electronic Figures for Publication:** Although low quality images are adequate for review purposes, print publication requires high quality images to prevent the final product being blurred or fuzzy. Submit EPS (lineart) or TIFF (halftone/photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Do not use pixel-oriented programmes. Scans (TIFF only) should have a resolution of 300 dpi (halftone) or 600 to 1200 dpi (line drawings) in relation to the reproduction size (see below). EPS files should be saved with fonts embedded (and with a TIFF preview if possible). For scanned images, the scanning resolution (at final image size) should be as follows to ensure good reproduction: lineart: >600 dpi; half-tones (including gel photographs): >300 dpi; figures containing both halftone and line images: >600 dpi.

Further information can be obtained at Wiley Blackwell's guidelines for figures:

<http://authorservices.wiley.com/bauthor/illustration.asp>.

Check your electronic artwork before submitting it:

<http://authorservices.wiley.com/bauthor/eachecklist.asp>.

### 5.5. Supporting Information

Publication in electronic formats has created opportunities for adding details or whole sections in the electronic version only. Authors need to work closely with the editors in developing or using such new publication formats.

Supporting information, such as data sets or additional figures or tables, that will not be published in the print edition of the journal, but which will be viewable via the online edition, can be submitted. It should be clearly stated at the time of submission that the supporting information is intended to be made available through the online edition. If the size or format of the supporting information is such that it cannot be accommodated on the journal's website, the author agrees to make the supporting information available free of charge on a permanent Web site, to which links will be set up from the journal's website. The author must advise Wiley Blackwell if the URL of the website where the supporting information is located changes. The content of the supporting information must not be altered after the paper has been accepted for publication.

The availability of supporting information should be indicated in the main manuscript by a paragraph, to appear after the References, headed 'Supporting Information' and providing titles of figures, tables, etc. In order to protect reviewer anonymity, material posted on the authors Web site cannot be reviewed. The supporting information is an integral part of the article and will be reviewed accordingly.

**Preparation of Supporting Information:** Although provision of content through the web in any format is straightforward, supporting information is best provided either in web-ready form or in a form that can be conveniently converted into one of the standard web publishing formats:

- Simple word-processing files (.doc or .rtf) for text.
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- GIF or JPEG for still graphics. Graphics supplied as EPS or TIFF are also acceptable.
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Subsequent requests for changes are generally unacceptable, as for printed papers. A charge may be levied for this service.

**Video Imaging:** For the on-line version of the Journal the submission of illustrative video is encouraged. Authors proposing the use such media should consult with the Editor during manuscript preparation.

## 6. AFTER ACCEPTANCE

Upon acceptance of a paper for publication, the manuscript will be forwarded to the Production Editor who is responsible for the production of the journal.

### 6.1. Figures

Hard copies of all figures and tables are required when the manuscript is ready for publication. These will be requested by the Editor when required. Each Figure copy should be marked on the reverse with the figure number and the corresponding author's name.

## 6.2 Proof Corrections

The corresponding author will receive an email alert containing a link to a web site. A working email address must therefore be provided for the corresponding author. The proof can be downloaded as a PDF (portable document format) file from this site. Acrobat Reader will be required in order to read this file. This software can be downloaded (free of charge) from the following Web site:

[www.adobe.com/products/acrobat/readstep2.html](http://www.adobe.com/products/acrobat/readstep2.html). This will enable the file to be opened, read on screen, and printed out in order for any corrections to be added. Further instructions will be sent with the proof. Hard copy proofs will be posted if no e-mail address is available; in your absence, please arrange for a colleague to access your e-mail to retrieve the proofs. Proofs must be returned to the Production Editor within three days of receipt. As changes to proofs are costly, we ask that you only correct typesetting errors. Excessive changes made by the author in the proofs, excluding typesetting errors, will be charged separately. Other than in exceptional circumstances, all illustrations are retained by the publisher. Please note that the author is responsible for all statements made in his work, including changes made by the copy editor.

## 6.3 Early Online Publication Prior to Print

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### 7. Guidelines for reporting of DNA microarray data

The *International Endodontic Journal* gives authors notice that, with effect from 1st January 2011, submission to the *International Endodontic Journal* requires the reporting of microarray data to conform to the MIAME guidelines. After this date, submissions will be assessed according to MIAME standards. The complete current guidelines are available at [http://www.mged.org/Workgroups/MIAME/miame\\_2.0.html](http://www.mged.org/Workgroups/MIAME/miame_2.0.html). Also, manuscripts will be published only after the complete data has been submitted into the public repositories, such as GEO (<http://www.ncbi.nlm.nih.gov/geo/>) or ArrayExpress ([http://www.ebi.ac.uk/microarray/submissions\\_overview.html](http://www.ebi.ac.uk/microarray/submissions_overview.html)), in MIAME compliant format, with the data accession number (the identification number of the data set in the database) quoted in the manuscript. Both databases are committed to keeping the data private until the associated manuscript is published, if requested.

Prospective authors are also encouraged to search for previously published microarray data with relevance to their own data, and to report whether such data exists. Furthermore, they are encouraged to use the previously published data for qualitative and/or quantitative comparison with their own data, whenever suitable. To fully acknowledge the original work, an appropriate reference should be given not only to the database in question, but also to the original article in which the data was first published. This open approach will increase the availability and use of these large-scale data sets and improve the reporting and interpretation of the findings, and in increasing the comprehensive understanding of the physiology and pathology of endodontically related tissues and diseases, result eventually in better patient care.

## ANEXO C – PARECER DO COMITÊ DE ÉTICA EM PESQUISA



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### PARECER CONSUBSTANCIADO DO CEP

#### DADOS DO PROJETO DE PESQUISA

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

**Pesquisador:** CARLOS HEITOR CUNHA MOREIRA

**Área Temática:**

**Versão:** 2

**CAAE:** 37862414.5.0000.5346

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

**Patrocinador Principal:** Financiamento Próprio

#### DADOS DO PARECER

**Número do Parecer:** 979.743

**Data da Relatoria:** 10/03/2015

#### Apresentação do Projeto:

Doenças periodontais compreendem condições infecciosas e inflamatórias resultantes da interação entre biofilme bacteriano e resposta do hospedeiro. Essa relação é modulada por uma variedade de fatores, dentre eles, diabetes e fumo, capazes de alterar o início e a progressão dessas afecções. A doença periodontal também pode acarretar alterações sistêmicas, como na doença cardiovascular e no controle da glicemia, e comprometimento funcional e estético. O entendimento de uma pequena quantidade de fatores de risco pode ter potencial impacto no encargo de muitas doenças, com custo reduzido e maior eficiência e efetividade que abordagens específicas para cada condição isolada. Assim, esse projeto objetiva avaliar condições bucais, parâmetros inflamatórios e microbiológicos associados, indicadores e fatores de risco às doenças periodontais, impacto desses parâmetros na qualidade de vida, além de questões relacionadas à saúde geral, como obesidade, diabetes e hipertensão, na zona rural de Rosário do Sul - RS.

Realizaremos um censo das crianças de 10 a 14 anos, para avaliação de cárie e fluorose. E uma amostra representativa dos indivíduos, maiores de 15 anos, residentes na área rural desse município (N= 828) receberá exame bucal completo (periodonto, dentes, mucosas, saliva e análise microbiológica de biofilme), avaliações antropométricas (pressão arterial, peso, altura,

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Continuação do Parecer: 979.743

circunferência da cintura) e exames sanguíneos (hemograma completo, hemoglobina glicada, proteína C-reativa ultrasensível e creatinina plasmática).

Adicionalmente, os moradores que aceitarem participar do estudo, mediante a assinatura de termo de consentimento livre e esclarecido, responderão a questionários sobre qualidade de vida, características médicas e sociodemográficas e hábitos de higiene bucal.

Esperamos que, através do conhecimento gerado após a análise dos resultados desse projeto, medidas de controle e/ou erradicação dos problemas encontrados possam ser adotadas, visando melhorias na saúde dos indivíduos dessa área. Caso essas estratégias sejam implementadas, avaliações posteriores poderão ser realizadas a fim de verificar a efetividade das mesmas. Além disso, com a obtenção de resultados positivos/benéficos, há a possibilidade de extensão para outras populações, na tentativa de melhorar as condições globais de saúde.

**Objetivo da Pesquisa:**

Objetivo geral: realizar um levantamento epidemiológico em uma amostra representativa da população rural de Rosário do Sul/ RS.

**Objetivos específicos**

- Avaliar a condição periodontal (prevalência, extensão e gravidade de doença) dessa população;
- Buscar associações entre condição periodontal e parâmetros inflamatórios e microbiológicos;
- Avaliar a presença de fatores de risco (fumo e diabetes) para as doenças periodontais;
- Verificar possíveis indicadores de risco para doença periodontal;
- Investigar o impacto da utilização de protocolos de exame parciais em comparação com exames de toda a boca em prevalência, gravidade e extensão de doença periodontal;
- Avaliar prevalência, extensão e gravidade de recessão gengival (RG);
- Avaliar a associação de potenciais indicadores de risco com a ocorrência de RG;
- Avaliar prevalência, extensão e gravidade de abrasão gengival (AG);
- Avaliar a associação de potenciais indicadores de risco com a ocorrência de AG;
- Verificar a associação entre AG e RG, identificando se o aumento na prevalência de AG pode gerar aumento na prevalência de RG;
- Verificar a associação entre fatores demográficos (sexo, renda, idade e raça), comportamentais (fumo, presença de cálculo...) e as condições de abrasão e recessão gengivais encontradas;

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Continuação do Parecer: 979.743

- Avaliar o impacto da periodontite como condição clínica preditora de uma pior qualidade de vida relacionada à saúde bucal (OHRQoL);
- Investigar as condições clínicas associadas a uma pior OHRQoL;
- Avaliar a correlação entre dois instrumentos sócio-dentais, OHIP-14 e GOHAI, para avaliação da OHRQoL;
- Avaliar o efeito da avaliação periodontal em boca reduzida realizada por meio de diferentes protocolos parciais nas medidas de associação com a OHRQoL.
- Avaliar a condição cariológica das crianças e jovens com idades compreendidas entre 10 e 14 anos;
- Buscar associação entre a presença de lesões cáries ativas e o grau eruptivo dos segundos molares permanentes;
- Avaliar os indicadores de risco para cárie dentária;
- Avaliar a presença de fluorose dentária.

**Avaliação dos Riscos e Benefícios:**

Previstos de modo suficiente.

**Comentários e Considerações sobre a Pesquisa:**

.

**Considerações sobre os Termos de apresentação obrigatória:**

Apresentados de modo suficiente.

**Recomendações:**

Veja no site do CEP - <http://w3.ufsm.br/nucleodecomites/index.php/cep> - na aba "orientações gerais", modelos e orientações para apresentação dos documentos. Acompanhe as orientações disponíveis, evite pendências e agilize a tramitação do seu projeto.

**Conclusões ou Pendências e Lista de Inadequações:**

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DE PÓS-GRADUAÇÃO E



Continuação do Parecer: 979.743

**Situação do Parecer:**

Aprovado

**Necessita Apreciação da CONEP:**

Não

**Considerações Finais a critério do CEP:**

SANTA MARIA, 10 de Março de 2015

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Assinado por:  
CLAUDEMIR DE QUADROS  
(Coordenador)

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