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**TRAUMATISMO DENTÁRIO EM ADOLESCENTES DE
SANTA MARIA, RS**

Santa Maria, RS
2020

Letícia Donato Comim

TRAUMATISMO DENTÁRIO EM ADOLESCENTES DE SANTA MARIA, RS

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

Orientador: Prof^ª.Dr^ª. Luana Severo Alves

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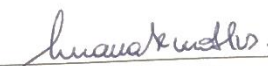
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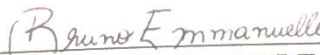
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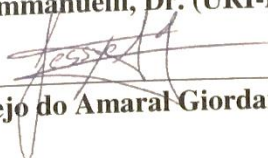
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RESUMO

TRAUMATISMO DENTÁRIO EM ADOLESCENTES DE SANTA MARIA, RS

AUTORA: Letícia Donato Comim
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A presente dissertação está composta por dois artigos científicos cujos objetivos foram avaliar a associação entre traumatismo dentário (TD) e qualidade de vida relacionada à saúde bucal (QVRSB) em adolescentes de 15 a 19 anos de idade de Santa Maria, Brasil (Artigo 1) e investigar a associação entre região da cidade e a prevalência e severidade de TD bem como a região que agrupava maior número de indicadores de risco ambiental como uma tentativa de explicar a associação encontrada (Artigo 2). Um estudo transversal de base populacional foi realizado em 2018 e incluiu uma amostra representativa composta por 1.197 adolescentes de 15 a 19 anos de idade. Um questionário estruturado foi enviado aos pais/responsáveis dos adolescentes contendo perguntas sobre características demográficas e socioeconômicas. O OHIP-14 (Oral Health Impact Profile) foi utilizado para avaliar QVRSB. O TD foi avaliado com base na classificação de O'Brien. Variáveis ambientais foram obtidas através de publicações oficiais do Instituto Brasileiro de Geografia e Estatística (IBGE). No Artigo 1, os desfechos foram os escores total e domínio-específicos do OHIP-14 e a variável preditora principal foi a experiência de TD, dicotomizada como presente (pelo menos um dente com índice $TD \geq 1$) ou ausente (todos os dentes com índice $TD = 0$). Os desfechos do Artigo 2 foram prevalência e severidade do TD e a variável preditora principal foi a região da cidade. Modelos de regressão de Poisson foram utilizados para avaliar as associações em estudo. A prevalência geral de TD foi de 17% ($n=203$), sendo trauma leve em 12% e trauma severo em 5%. Nos modelos ajustados, os adolescentes com TD apresentaram pior QVRSB do que aqueles sem TD (Razão de Taxas[RT]=1,10; Intervalo de Confiança[IC] 95%=1,05-1,16). Esse efeito negativo foi relacionado aos domínios de limitação psicológica (RT=1,16; IC95%=1,02-1,32), limitação social (RT=1,34; IC95%=1,13-1,59) e incapacidade (RT=1,35; IC95%=1,10-1,66). O Artigo 2 incluiu 1.146 adolescentes e observou uma prevalência de TD de 25,3% na região sul da cidade, contrastando com uma prevalência de 13,6% na região norte. Na análise de risco, morar na região sul conferiu maior probabilidade de ter TD do que aqueles que residiam na região norte (Razão de Prevalência[RP]=1,83; IC95%=1,24-2,70), mesmo após ajuste para fatores sociodemográficos e clínicos. Essa associação foi consistentemente encontrada na análise de severidade (trauma leve, RP=1,82; IC95%=1,09-3,05; trauma severo, RP=2,25; IC95%=1,02-4,93). Ao analisar o número de indicadores de risco ambientais nas diferentes regiões da cidade, a região sul apresentou a maior média/mediana do que todas as outras regiões. Apesar da baixa severidade, o TD esteve associado a uma pior QVRSB em adolescentes de 15 a 19 anos de idade de Santa Maria, RS, Brasil. Deste modo, mesmo o TD leve não deve ser negligenciado nesta população. Morar na região sul foi associado a uma maior prevalência e severidade de TD. Considerando que esta região agrupa o maior número de indicadores de risco ambientais, os achados deste estudo demonstram o papel do ambiente social na epidemiologia do TD.

Palavras-chave: Traumatismo dentário. Adolescente. Estudo transversal. Saúde Oral. Qualidade de vida. Característica da residência.

ABSTRACT

TRAUMATIC DENTAL INJURIES IN ADOLESCENTS FROM SANTA MARIA, RS

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The presente dissertation is composed of two manuscripts whose objectives were to assess the association between traumatic dental injuries (TDI) and oral health-related quality of life (OHRQoL) among 15-19-year-old adolescents from Santa Maria, Brazil (Article 1) and to investigate the association between city region and prevalence and severity of TDI as well as the region that clustered a higher number of environmental risk indicators as an attempt to explain the association found (Article 2). A population-based cross-sectional survey was carried out in 2018 and included a representative sample composed of 1,197 15-19-year-old adolescents. A structured questionnaire was sent to parents/legal guardians of the adolescents containing questions on demographic and socioeconomic characteristics. The OHIP-14 (Oral Health Impact Profile-14) was used to evaluate the OHRQoL. TDI was recorded based on the O'Brien classification. Environmental variables were obtained through official publications by the Brazilian Institute of Geography and Statistics (IBGE). In Article 1, the outcome were overall and domain-specific scores of OHIP-14 and the main predictor variable was TDI experience, dichotomized as present (at least one tooth with TDI index \geq 1), or absent (all teeth with TDI index=0). The outcomes of Article 2 were prevalence and severity of TDI and the main predictor variable was city region. Poisson regression models were used to assess the associations under investigation. The overall prevalence of TDI was 17% (n=203), being mild trauma 12% and severe trauma 5%. In the adjusted models, adolescents with TDI had a poorer OHRQoL than those without TDI (Rate Ratio[RR]=1.10; 95% Confidence Interval[CI]=1.05-1.16). This negative effect was related to the psychological disability domain (RR=1.16; 95%CI=1.02-1.32), to the social disability domain (RR=1.34; 95%CI=1.13-1.59), and to the handicap domain (RR=1.35; 95%CI=1.10-1.66). Article 2 included 1,146 adolescents and observed a prevalence of TDI of 25.3% in the southern region of the city, contrasting with a prevalence of 13.6% in the northern region. In the risk analysis, adolescents living in the southern region were more likely to have TDI than their counterparts living in the northern region (Prevalence Ratio[PR]=1.83, 95%CI=1.24-2.70). This association was consistently found in the severity analysis (mild trauma, PR=1.82, 95%CI=1.09-3.05; severe trauma, PR=2.25, 95%CI=1.02-4.93). Analyzing the number of environmental risk indicators in the different regions, the southern region presented a greater mean/median than all the other regions. Despite the low severity, TDI was associated with a poor OHRQoL in 15-19-year-old adolescents from Santa Maria, RS, Brazil. Therefore, even mild TDI should not be neglected in this population. To live in the southern region was associated with a greater prevalence and severity of TDI. Whereas this region clustered a greater number of environmental risk indicators, the findings of this survey show the role of the social environment in the epidemiology of TDI.

Keywords: Tooth Injuries. Adolescent. Cross-sectional study. Oral Health. Quality of life. Residence characteristics.

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1 INTRODUÇÃO E REVISÃO DE LITERATURA

A adolescência é a fase de crescimento biopsicossocial que vai da infância à idade adulta (ELIAS et al., 2001). É um período altamente formativo para a saúde futura, durante o qual padrões de comportamento e de estilo de vida estão sendo formados (VINGILIS et al., 2002), contribuindo para a definição das características das doenças na fase adulta (BEAGLEHOLE et al., 2011; VINER et al., 2012). Pode ser um período desafiador, devido às mudanças corporais e adaptações a novas estruturas psicológicas e ambientais, descobertas e construção da identidade. É o momento em que as pessoas tornam-se independentes, criam novos relacionamentos, voltam-se para os aspectos estéticos, desenvolvem habilidades sociais e aprendem comportamentos que durarão o resto de suas vidas (BEAGLEHOLE et al., 2011; ELIAS et al., 2001; SAWYER et al., 2012; VINER et al., 2012).

O Ministério da Saúde define a adolescência como o período da vida entre 10 e 19 anos e a juventude entre 15 e 24 anos. Há, portanto, uma interseção entre a segunda metade da adolescência e os primeiros anos da juventude (BRASIL, 2010). Considerando esta divisão etária, o Projeto de Saúde Bucal, SB Brasil, desenvolvido com o objetivo de coletar informações sobre a saúde bucal da população brasileira, classifica como “adolescentes” os indivíduos entre 15 e 19 anos de idade.

O TD geralmente é decorrente de quedas (PAIVA et al. 2015a), brigas, acidentes esportivos ou automobilísticos e de maus tratos (CASTRO; MELLO, 2013), ou ainda da colisão com objetos ou pessoas (SCHUCH et al. 2013). Entre crianças, está mais relacionado a quedas enquanto que em adolescentes e adultos jovens, assaltos, acidentes de trânsito e violência interpessoal são os fatores etiológicos mais comuns (REZENDE et al. 2007). Nesse grupo, as lesões bucais são frequentemente relacionadas ao álcool e ocorrem com maior frequência nas horas de lazer e nos finais de semana (ANDERSSON, 2013). As lesões orais traumáticas representam um problema de saúde pública e, de acordo com Glendor (2008), provavelmente haverá um aumento na prevalência de TD no futuro simplesmente porque mais indivíduos estarão em risco. Isso ocorre porque os habitantes de países com economias em crescimento podem comprar carros, bicicletas, utilitários esportivos, etc., mas ainda não adquiriram conhecimento suficiente sobre segurança. A crescente violência entre os indivíduos é outro fator alarmante. E, em alguns países onde a cárie dentária diminuiu, o TD pode ser considerado uma ameaça maior para os dentes anteriores (ANDERSSON, 2013).

Estatísticas da maioria dos países mostram que um terço de todas as crianças pré-escolares sofreram TD envolvendo a dentição decídua enquanto um quarto de todas as crianças

escolares e quase um terço dos adultos sofreram TD na dentição permanente (GLENDOR, 2008). Estima-se que 71-92% de todos os casos de TD ocorram antes dos 19 anos de idade (GLENDOR, 2008) e há estudos relatando uma redução desse número após a idade de 21 a 30 anos (SHULMAN; PETERSON, 2004). Além disso, Magno et al. (2019) concluíram, em uma revisão sistemática da literatura com meta-análise, que crianças que sofreram algum tipo de TD tiveram mais que o dobro da chance de sofrer outro episódio de TD do que crianças que não tinham experiência prévia de TD. De modo semelhante, um estudo longitudinal avaliando a incidência de TD na dentição permanente após 2 anos de acompanhamento mostrou uma incidência de 11,9% em participantes de 11 a 13 anos que já haviam sofrido algum tipo de TD e uma chance 4,85 vezes maior de sofrer novos episódios de TD (RAMOS-JORGE et al., 2008).

Em uma meta-análise que avaliou a prevalência e a incidência de TD, Petti, Glendor e Andersson (2018) encontraram uma prevalência global de 15,2%, em idades variando de 7 a 98 anos. Em relação às regiões da OMS, nenhuma diferença estatisticamente significativa foi encontrada. No entanto, em termos numéricos, a maior taxa de prevalência foi relatada na Região das Américas (19,1%) e a mais baixa na região do Pacífico Ocidental (9,9%).

Os levantamentos epidemiológicos de saúde bucal que incluem o diagnóstico de TD são escassos, tanto em países em desenvolvimento quanto em países desenvolvidos, se comparados a dados coletados sobre cárie e doença periodontal (CERQUEIRA-NETO, 2016). No Brasil, somente a partir de 2010 o levantamento epidemiológico nacional da condição de saúde bucal (SBBrasil, 2010) passou a incluir dados a respeito da prevalência de TD como uma medida específica (sinais de fratura coronária e avulsão), na faixa etária dos 12 anos de idade. Foi encontrada uma prevalência de 20,5% no Brasil, sendo a fratura de esmalte a mais frequente (16,5% ou 80% dos casos). Até então, embora casos de TD fossem codificados na aferição da condição dentária (código “T” do índice CPO), havia uma nítida perda de informação, principalmente nos casos em que havia uma lesão de cárie associada (a informação do TD era perdida, prevalecendo a informação de cárie dentária). Além disso, a informação era simplificada, podendo uma pequena fratura ser codificada do mesmo modo que lesões mais severas. Também não era possível saber quando o dente era perdido por trauma, pois o mesmo código era usado para perdas por outros motivos. Dessa forma, o TD passou a ser avaliado como uma medida específica a partir desse levantamento (BRASIL, 2012).

Vários sistemas de classificação diagnóstica são adotados e, conforme demonstrado no Quadro 1, os critérios mais utilizados em estudos populacionais são os critérios preconizados pela OMS (WHO, 1997), de Andreasen (ANDREASEN; ANDREASEN.,2001) e de O'Brien (O'BRIEN, 1994).

O sistema de classificação *The Children's Dental Health Survey criteria* - CDHS-UK (O'BRIEN, 1994) tem sido amplamente utilizado em pesquisas populacionais por ser considerado um índice adequado, de fácil e simples execução. Este critério foi utilizado na Pesquisa de Saúde Bucal da Criança no Reino Unido e identifica o tipo de tecido envolvido (esmalte, dentina ou polpa) em seis categorias. Inclui fraturas (de esmalte, esmalte e dentina e dentina com exposição pulpar), descoloração e perda do dente por TD. Não discrimina danos em tecidos moles, devido ao difícil diagnóstico em estudos populacionais. Quando identificados, são incluídos em uma única categoria (“outros”) (O'BRIEN, 1994).

O Quadro 1 apresenta estudos publicados de 2000 a 2020 reportando a prevalência de TD em dentes permanentes em diferentes populações. Como pode ser observado, há uma variabilidade nas faixas etárias estudadas, tamanho amostral e critérios de classificação. A maioria dos estudos foi realizada com escolares na faixa etária de 12 anos de idade, com prevalências variando de 9,7% (PIOSEVAN; ABELLA; ARDENGHI, 2011) a 58,6% (MARCENES; ZABOT; TRAEBERT, 2001), e o critério de classificação mais utilizado foi o de O'Brien (1994). No Brasil, Jorge et al. (2012) avaliaram 891 adolescentes na faixa etária de 15 a 19 anos, matriculados em escolas estaduais e particulares de Belo Horizonte-MG, e a prevalência de TD encontrada foi de 24,7%. Campos et al. (2016) também avaliaram a prevalência de TD em adolescentes entre 15 e 19 anos, porém apenas dentre aqueles cadastrados no Programa de Saúde da Família (PSF) de Santa Teresa-ES, e uma prevalência de 8,7% foi encontrada. No estado de São Paulo, Fonseca et al. (2019) encontraram uma prevalência de TD de 1,4% em adolescentes na mesma faixa etária. No estudo de Cortes, Marcenes e Sheiham (2001), realizado em Belo Horizonte, a prevalência de TD aumentou de 8% aos 9 anos para 13,6% aos 12 anos e para 16,1% aos 14 anos. Estes achados demonstram que a prevalência de TD foi maior em escolares com idades mais avançadas.

Quadro 1 – Prevalência de Traumatismo Dentário na dentição permanente.

Autores, ano	Local	Idade	N	Prevalência	Classificação
Hoyte et al. (2020)	Trinidad e Tobago	11 a 12	672	18,9%	Índice próprio
Zaleckiené et al. (2020)	Lituânia	11 a 13	757	52%	O'Brien
Fonseca et al. (2019)	São Paulo, SP	15-19	5.558	1,4%	OMS
Feldens et al. (2019)	Santo Ângelo, RS	11-14	775	11,9%	Andreasen
Freire-Maia et al. (2018)	Belo Horizonte, MG	8-10	1.201	14%	Andreasen
Damarasingh et al. (2018)	Inglaterra, Londres	15-16	618	8,7%	OMS
Tavares et al. (2018)	Rio de Janeiro	5-79	1.046	<9 anos - 28,6% 10-19anos - 46,2%	Andreasen
Vettore et al. (2017)	Brasil	12	5.027	21,6%	O'Brien - modificado
Campos et al. (2016)	Santa Teresa, ES	15-19	540	8,7%	O'Brien
Bilder et al. (2016)	Geórgia	12 e 15	823	10,5%	OMS
da Rosa et al. (2016)	Santa Maria, RS	12	1.134	25,2%	O'Brien
Paiva et al. (2015a)	Montes Claros, MG	12	605	34,9%	O'Brien
Paiva et al. (2015b)	Diamantina, MG	12	588	29,9%	Andreasen
Goettems et al. (2014)	Pelotas, RS	8-12	1.210	12,6%	O'Brien
Freire et al. (2014)	Goiânia, GO	12	2.075	17,3%	O'Brien – modificado
Oliveira-Filho et al. (2014)	Diamantina, MG	14-19	701	26,6%	Andreasen
Francisco et al. (2013)	Anápolis, GO	9-14	765	16,5%	O'Brien
Schuch et al. (2013)	Pelotas, RS	8-12	1.210	12,6%	O'Brien
Damé-Teixeira et al. (2013)	Porto Alegre, RS	12	1.528	34,8%	O'Brien
Jorge et al. (2012)	Belo Horizonte, MG	15-19	891	24,7%	Andreasen
Bendo et al. (2012)	Belo Horizonte, MG	11-14	1.612	17,1%	Andreasen
Piosevan et al. (2011)	Santa Maria, RS	12	792	9,7%	O'Brien
Taiwo et al (2011)	Nigéria	12	719	15,2%	OMS
Carvalho et al. (2010)	Curitiba, PR	12 e 15	1.581	37,1%	O'Brien
Traebert et al. (2010)	Palhoça, SC	12	405	22,5%	O'Brien
Soriano et al. (2007)	Recife, PE	12	1.046	10,5%	Andreasen
Traebert et al. (2003)	Florianópolis, SC	12	307	18,9%	O'Brien
Al-Majed et al. (2001)	Arábia Saudita	12-14	862	34%	Índice próprio
Marcenes et al. (2001)	Blumenau, SC	12	652	58,6%	O'Brien
Cortes et al. (2001)	Belo Horizonte, MG	9-14	3.702	79%	O'Brien

Fonte: Autora

O'Brien- *The Children's Dental Health Survey criteria* - CDHS-UK

Vários fatores têm sido descritos como indicadores de risco para a prevalência de TD. Dentre os fatores clínicos, os mais comumente relatados são o overjet aumentado e a ausência de cobertura labial (ALDRIGUI et al., 2014; MAGNO et al., 2019). Em um estudo realizado na Geórgia (BILDER et al., 2016), crianças com um overjet >5 mm foram mais propensas a apresentar TD em comparação com crianças com um overjet ≤5 mm. Resultados semelhantes foram encontrados em estudos realizados no Brasil. Silva-Oliveira et al. (2018) demonstraram que crianças com overjet >3mm tiveram 5,42 vezes mais chance de apresentar TD do que crianças com overjet ≤3 mm. Overjet aumentado também foi associado a TD nos estudos de Cortes, Marcenes e Sheiham (2001) e de Paiva et al. (2015a). Por outro lado, a associação entre cobertura labial e TD não está bem estabelecida na literatura. De acordo com Frujeri et al. (2014), estudantes com cobertura labial inadequada apresentaram 8,94 vezes mais chances de apresentarem TD em dentes permanentes do que aqueles com cobertura labial adequada e de acordo com Cortes, Marcenes e Sheiham (2001), crianças com cobertura labial adequada foram 44% menos propensas a apresentar TD quando comparadas àquelas com cobertura labial inadequada. Entretanto, em outros estudos, a cobertura labial não apresentou associação com TD (BILDER et al., 2016; PAIVA et al., 2015a).

Não há consenso na literatura sobre a associação entre indicadores socioeconômicos e a ocorrência de TD em dentes permanentes. Enquanto há estudos que encontraram associação significativa com níveis socioeconômicos mais altos (CAMPOS et al., 2016; CORTES; MARCENES; SHEIHAM, 2001); outros encontraram associação significativa com níveis socioeconômicos mais baixos (DAMÉ-TEIXEIRA et al., 2013; SORIANO et al., 2007); e, por fim, outros não encontraram associação significativa (BENDO et al., 2009; FREIRE-MAIA et al., 2018; JORGE et al., 2012).

Tem crescido o reconhecimento dos problemas bucais como potenciais causadores de impacto negativo no desempenho das atividades diárias e, conseqüentemente, na qualidade de vida dos indivíduos (BULGARELI et al., 2018). Em 2016, o FDI World Dental Federation elaborou uma nova definição para saúde bucal, reconheceu a sua natureza multifacetada e os atributos da saúde bucal, incluindo a capacidade de falar, sorrir, cheirar, mastigar, dentre outros, além de refletir os atributos fisiológicos, sociais e psicológicos essenciais à qualidade de vida (GLICK, 2016).

É sabido que indicadores clínicos não são capazes de captar efeitos como dor e interferências na mastigação e na autoestima, sendo que a inferência desses aspectos é realizada através de questionários que medem o impacto da saúde bucal na qualidade de vida dos indivíduos (GUERRA et al., 2014; LOCKER, D.; ALLEN, 2007). Qualidade de vida

relacionada à saúde bucal (QVRSB) é um constructo multidimensional que se refere ao bem-estar físico, psicológico e social dos pacientes (SISCHO; BRODER, 2011), referindo-se à extensão em que os distúrbios orais interferem nas funções diárias e no bem-estar do indivíduo (BAKER, 2007). O OHIP-14 é um dos instrumentos disponíveis para avaliação da QVRSB, e avalia a frequência de problemas associados à boca ou próteses em sete dimensões: limitação funcional, dor física, desconforto psicológico, limitação física, limitação psicológica, limitação social e incapacidade. Ao somar as respostas obtém-se um número que varia de 0 a 56 pontos (SLADE, 1997; BAKER, 2007). Quanto maior o escore obtido, maior o impacto da saúde bucal na qualidade de vida dos indivíduos.

Estudos prévios em diferentes faixas etárias avaliaram a associação de TD e QVRSB, como pode ser observado no Quadro 2, sendo a maioria dos estudos realizados com crianças. Além disso, revisões sistemáticas com meta-análise recentemente publicadas quantificaram o efeito do TD na QVRSB de crianças pré-escolares e escolares. Zaror et al. (2018) incluíram escolares de 1 a 15 anos de idade, divididos em dois grupos: pré-escolares (<6 anos de idade) e crianças em idade escolar (6 a 15 anos de idade). Os autores encontraram uma chance significativamente maior de indivíduos com TD relatarem qualquer impacto na QVRSB comparado aos sem TD em ambos os grupos. Lopez et al. (2019) realizaram uma revisão sistemática com o objetivo de avaliar o impacto de TD não complicados (fraturas de esmalte e dentina e descolorações de dentes) na QVRSB de crianças (1 a 6 anos) e adolescentes (8 a 14 anos). Concluíram que TD sem complicações não estavam associados com a QVRSB (LOPEZ et al., 2019). No que concerne à faixa etária de 15 a 19 anos, apenas um estudo avaliou essa associação, utilizando os dados do levantamento epidemiológico realizado no estado de São Paulo em 2015 (SBSP-15) (FONSECA et al., 2020). Os autores encontraram uma prevalência de TD de 1,4%, sem associação com QVRSB. Entretanto, nesse estudo, os dados sobre TD foram coletados durante o exame de cárie, sem discriminação do tipo de lesão traumática, e quando uma lesão de cárie estava presente, as informações sobre o TD foram perdidas. Considerando que a maioria dos TD envolve os dentes anteriores, o que pode levar a restrições alimentares, dificuldades na fala, mudanças na aparência física e desconforto psicológico, podendo interferir negativamente nas relações interpessoais do indivíduo devido ao comprometimento estético e afetar a QVRSB (CERQUEIRA-NETO, 2016; BILDER et al., 2016; FREIRE-MAIA et al., 2018) e considerando, ainda, a falta de evidências sobre esse assunto nessa faixa etária, torna-se necessário avaliar a associação entre TD e QVRSB em adolescentes de 15 a 19 anos de idade.

Quadro 2 - Estudos avaliando a associação entre Traumatismo Dentário (TD) na dentição permanente e Qualidade de Vida Relacionada à Saúde Bucal (QVRSB) em crianças e adolescentes.

Autores (ano); Local	Amostra; idade	Prevalência	Resultados
Fonseca et al. (2020); Estado de São Paulo, Brasil	5.558; 15-19	1,4%	Sem associação entre TD e QVRSB.
Feldens et al. (2019); Santo Ângelo, RS, Brasil	775; 11-14	11,9%. [Fratura de esmalte (FE):79,3%]	Adolescentes com FE tiveram pontuações mais altas de CPQ11-14 ¹ (total e nos domínios limitação funcional, bem-estar emocional e bem-estar social).
Martins et al. (2018); Belo Horizonte, MG, Brasil	1.204; 8- 10	10,3%	Sem associação entre TD e QVRSB.
Silva-Oliveira et al. (2018); Diamantina, MG, Brasil	588; 12	29,4%	O TD foi associado a um alto impacto na QVRSB (domínios bem-estar emocional e bem-estar social)
Soares et al. (2018); Florianópolis, Brasil	1.589; 8-10	10,6%	TD foi associado a pior QVRSB (domínio sintomas orais). FE não foi associada a QVRSB.
Bomfim et al (2017); Brasil	7.240; 12	23,9%	TD leve foi associado a QVRSB (sentimentos de vergonha em crianças) e TD severo (sentir envergonhado de sorrir e atrapalhar o estudo)
Pulache et al. (2016); Lima, Peru	473; 11-14	38,7%	TD e descoloração da coroa impactaram negativamente QVRSB (domínio bem-estar social)
Freire-Maia et al. (2015); Belo Horizonte, MG, Brasil	1.201; 8-10	2,8% (TD severo)	TD severo esteve associado a QVRSB (escore total e domínios bem-estar emocional e bem-estar social)
Rajab et al. (2019); Amã, Jordânia	1.652; 12	14,6%	Houve um impacto significativo de TD não tratado na QVRSB (escore total).
Damé-Teixeira et al. (2013); Porto Alegre, RS, Brasil	1.528; 12	34,8%	Associação entre TD com necessidade de tratamento e QVRSB (domínio limitação funcional)
Ramos-Jorge et al. (2013); Diamantina, MG, Brasil	668; 11-14	34,3%	TD não tratado causou impacto em 'comer e apreciar comida', 'sorrir e mostrar os dentes' e escore total

Fonte: Autora

¹ CPQ11-14: *Child Perceptions Questionnaires*.

Além da associação encontrada entre fatores individuais (sejam eles sociodemográficos, comportamentais ou clínicos) e TD, o ambiente social também pode estar associado ao TD. Estudos realizados com crianças e adolescentes sugerem que o ambiente social compartilhado no nível regional tem um efeito significativo sobre a saúde das pessoas que vivem lá, independentemente do seu nível de risco individual (KALF et al. 2001; SISSON et al. 2007). Evidências demonstram que as doenças não ocorrem isoladamente, mas como uma característica das pessoas e de seu ambiente (SISSON, 2007; SOLAR; IRWIN, 2010), que não apenas se refere à casa ou à escola, mas também ao contexto circundante, como por exemplo, o bairro ou a região (DIEZ-ROUX; MAIR, 2010). Bendo et al. (2012) mostraram que crianças com 12 anos de idade que vivem e estudam em áreas de maior vulnerabilidade social têm maior probabilidade de apresentar TD não tratado do que aquelas vivendo em áreas de menor vulnerabilidade social. Estudos utilizando dados do levantamento nacional de saúde bucal (SBBrasil 2010) investigaram a associação do TD com variáveis contextuais. Vettore et al. (2017) investigaram a associação entre desigualdade de renda brasileira (Coeficiente de Gini)

entre os anos de 2000 e 2010 e TD através de um modelo de análise multinível. Os autores mostraram que, para cada redução de 0,05 unidade no coeficiente de Gini, as chances de TD diminuíram 21% em crianças brasileiras com 12 anos de idade. Entretanto, outro estudo brasileiro não encontrou associação entre variáveis contextuais (Coeficiente de Gini e Índice de Desenvolvimento Humano) e TD (BOMFIM; HERRERA; DE-CARLI, 2017). Fonseca et al. (2019) utilizaram como variáveis contextuais tamanho da cidade e índice de desenvolvimento humano municipal (IDHM). Os autores constataram que cidades grandes foram consideradas fatores de risco para TD, mas IDHM não associou-se com TD.

Com o objetivo de construir indicadores epidemiológicos da experiência de TD em escolares de 12 anos da cidade de Curitiba – PR, Moysés et al. (2008) realizaram a análise descritiva da distribuição espacial de TD em crianças de 12 anos de idade e encontraram uma maior aglomeração de casos de TD associados ao maior número de áreas com condições precárias de vida. Carvalho et al. (2010) realizaram uma análise geográfica em escolares de 12 a 15 anos de idade mostrando a distribuição dos casos de TD conforme os distritos de saúde. Houve uma variação significativa na ocorrência de TD, considerando o local da residência. A maior prevalência de TD foi encontrada na região com a segunda menor renda, sugerindo que, devido às suas condições socioeconômicas desfavoráveis, essa região possa ter uma tendência crescente à prevalência de TD. Da mesma forma, em um estudo indiano foi encontrada maior prevalência de TD entre os adolescentes que viviam em áreas carentes do que entre aqueles vivendo em áreas residenciais em melhor situação (MATHUR et al, 2015).

Moysés et al. (2006) encontraram associação entre o nível de implementação de políticas públicas de saúde na cidade de Curitiba e a experiência de TD em escolares de 12 anos. Variáveis socioambientais foram coletadas e analisadas em três componentes principais, o ambiente físico, políticas sociais e coesão social em diferentes comunidades. A relação entre as pontuações dos componentes e o TD foi estatisticamente significativa e explicaram 42% da variância de TD. Para cada unidade de um componente do ambiente físico melhorado, houve uma redução de quase 4% no TD; para cada unidade crescente do componente das políticas sociais públicas, houve cerca de 2,6% menos TD; já o componente de coesão social não foi significativamente associado ao TD. Embora exista um debate sobre o tamanho dos efeitos ambientais em comparação com o dos atributos individuais (MOYSÉS et al., 2006), evidências crescentes têm demonstrado que as desigualdades em saúde têm uma dimensão espacial. Há uma compreensão crescente do papel que o lugar/ambiente desempenha nos níveis de exposição de indivíduos e famílias a riscos para a saúde, bem como em suas oportunidades de serem saudáveis (WILKINSON; MARMOT, 2003).

Embora evidências demonstrem o papel do contexto social na saúde bucal dos indivíduos (SOLAR; IRWIN, 2010, VETTORE; AQEELI, 2016), a associação entre fatores socioambientais e TD em adolescentes de 15 a 19 anos tem sido pouco investigada. A ocorrência de TD parece estar relacionada às características socioambientais das regiões; no entanto, nenhum estudo combinou características sociodemográficas e estruturais de vizinhança adotando a noção de agrupamento de indicadores/fatores de risco. Ademais, este tema ainda não foi investigado no município de Santa Maria, RS.

A realização de estudos populacionais abordando a prevalência e os fatores associados aos distúrbios orais são vitais para determinar a condição de saúde, as possíveis medidas preventivas e/ou educativas a serem tomadas bem como a necessidade de intervenção no sistema público de saúde (FREIRE-MAIA et al., 2018; WHO, 2013). Considerando o exposto e a escassez de estudos epidemiológicos abordando TD em adolescentes dos 15 aos 19 anos, em consonância com a faixa etária preconizada pelo Ministério da Saúde para avaliação da saúde bucal de adolescentes brasileiros, serão apresentados dois artigos científicos com os seguintes objetivos:

Artigo 1. Traumatic dental injury and oral health-related quality of life among 15-19-year-old adolescents from Santa Maria, Brazil: avaliar a associação entre TD e QVRSB entre adolescentes de 15 a 19 anos de idade;

Artigo 2: Association between city region and traumatic dental injuries among 15-19-year-old adolescents from Santa Maria, southern Brazil: investigar a associação entre região da cidade e a prevalência e severidade de TD bem como os fatores ambientais que poderiam explicar esta associação.

2 ARTIGO 1 - TRAUMATIC DENTAL INJURY AND ORAL HEALTH-RELATED QUALITY OF LIFE AMONG 15-19-YEAR-OLD ADOLESCENTS FROM SANTA MARIA, BRAZIL

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TITLE PAGE

Title: Traumatic dental injury and oral health-related quality of life among 15-19-year-old adolescents from Santa Maria, Brazil

Running title: Traumatic dental injury and quality of life in adolescents

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Conflict of interest statement

The authors declare no conflict of interest related to this study.

Authors' contribution

L. D. Comim: Acquisition of data, analysis and interpretation of data, drafting the manuscript, final approval.

A. Dalla Nora: Acquisition of data, analysis and interpretation of data, drafting the manuscript, final approval.

J. K. Knorst: Analysis and interpretation of data, drafting the manuscript, final approval.

D. N. O. Racki: Acquisition of data, drafting the manuscript, final approval.

J. E. A. Zenkner: Conception and design, drafting the manuscript, final approval.

L. S. Alves: Conception and design, analysis and interpretation of data, drafting the manuscript, final approval.

Traumatic dental injury and oral health-related quality of life among 15-19-year-old adolescents from Santa Maria, Brazil

ABSTRACT

Background/Aims: The literature is scarce on the association between traumatic dental injuries (TDI) and oral health-related quality of life (OHRQoL) among adolescents and there is no study assessing this relationship using clinical criteria for the assessment of TDI in this age group. The aim of this study was to assess the association between TDI and OHRQoL among 15-19-year-old adolescents from Santa Maria, Brazil. **Materials and Methods:** A population-based cross-sectional study was conducted including a representative sample of 1,197 15-19-year-old adolescents attending 31 public and private schools. The Oral Health Impact Profile-14 (OHIP-14) was used to evaluate the OHRQoL and clinical examinations were performed to diagnose TDI based on the O'Brien classification. Demographic information, socioeconomic status and clinical characteristics (caries experience, malocclusion and gingivitis) were also collected as adjusting variables. Multilevel Poisson regression models were used to assess the association between TDI and OHRQoL. Rate ratios (RR) and 95% confidence intervals (95% CI) were estimated. **Results:** The overall prevalence of TDI was 17%, mild trauma was 12% and severe trauma was 5%. In the adjusted models, adolescents with TDI had poorer OHRQoL than those without TDI (RR=1.10; 95%CI=1.05-1.16). This negative effect was related to the psychological disability domain (RR=1.16; 95%CI=1.02-1.32), to the social disability domain (RR=1.34; 95%CI=1.13-1.59) and to the handicap domain (RR=1.35; 95%CI=1.10-1.66). **Conclusions:** Despite its low severity, TDI negatively affected the OHRQoL of 15-19-year-old adolescents from Santa Maria, Brazil.

Keywords: Tooth Injuries. Adolescent. Quality of Life. Cross-Sectional Study. Epidemiology.

INTRODUCTION

Adolescence can be one of the most challenging periods in life due to constant changes and adaptations to new psychological and environmental structures, discoveries and identity construction.¹ It is the moment when individuals become independent, create new relationships, and turn to aesthetic aspects.^{2,3} This phase is a highly formative moment for future health, with the definition of lifestyle and health-related behaviors⁴ that will ultimately affect the pattern of diseases in adulthood.^{1,2} Along with childhood, adolescence is considered a high-risk period for dental injuries. A previous study showed that one billion living people have experienced traumatic dental injuries (TDI) with a global prevalence of TDI in permanent teeth of 15.2%.⁵ Statistics from most countries show that one quarter of all schoolchildren and almost one third of adults have suffered trauma to the permanent dentition.⁶ It is estimated that 71-92% of all TDI sustained in a lifetime occur before the age of 19 years⁶ and a decrease after the age of 24-30 years has been reported.⁷

The oral health-related quality of life (OHRQoL) is defined as a multidimensional construct that reflects the individual's subjective perception of their oral health.⁸ In this context, OHRQoL is an important outcome that has been included in the current concept of oral health.⁹ Two recent systematic reviews with meta-analysis assessed the impact of TDI on the OHRQoL of preschoolers and schoolchildren. While Zaror et al.¹⁰ concluded that TDI negatively affected the OHRQoL of preschoolers (<6 years) and schoolchildren (6 to 15 years), Lopez et al.¹¹ found that uncomplicated TDI (classified as enamel fractures, enamel and dentin fractures, and tooth discoloration) exerted no negative effect on the OHRQoL of children (1 to 6 years) and adolescents (8 to 14 years). Both reviews focused on individuals aged up to 15 years. There is only one study that has assessed the effect of TDI on the OHRQoL of 15-19-year-old adolescents, which is the age range advocated by the World Health Organization (WHO) for assessing adolescents in oral health surveys. Using secondary data from an oral health survey

conducted in the state of São Paulo, the authors found a prevalence of TDI of 1.4%, with no negative effect on the OHRQoL of the adolescents.¹² In that study, data on TDI was collected during caries examination, with no discrimination on the type of traumatic injury. In addition, when caries was present, the information on TDI was suppressed. To the best of the authors' knowledge, there is no study assessing TDI and OHRQoL using clinical criteria for the assessment of TDI in this age group.

Considering the lack of evidence on this issue, the aim of this study was to assess the association between TDI and OHRQoL among 15-19-year-old adolescents from Santa Maria, in southern Brazil. The hypothesis was that adolescents who presented TDI were more likely to report poorer OHRQoL.

MATERIALS AND METHODS

This study was performed according to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines.

This study was approved by the Research Ethics Committee at Federal University of Santa Maria (protocol number 2.178.299). All participants or their legal guardians signed a written informed consent form. Students received a report of their oral health status, and were referred to dental treatment when needed.

This cross-sectional study was carried out to assess the oral health status of 15-19-year-old adolescents attending public and private high schools from Santa Maria, a mid-sized city located in southern Brazil. All 37 high schools in the municipality were invited to participate in the study (26 public and 11 private). Adolescents born in the years 1999-2003 who were enrolled in the regular school year, and attending any school period (morning, afternoon, and night) were considered eligible for the study. A list of all eligible schoolchildren was compiled for each school, and those eligible were selected using a table of random numbers

(www.random.org). The number of enrolled students was proportional to the school size. Individuals using fixed orthodontic appliances or those presenting with special needs were not considered eligible.

Sample size calculation used the following parameters: a prevalence rate of 50% (worst case scenario), a 95% confidence interval (CI), a power of 80%, and a precision level of 3%. This way, it was estimated that 1,066 students would be required for the study. A non-participation rate of 50% was factored in, totaling 1,600 adolescents to be invited to participate.

Data collection was conducted from March to November 2018, and included the application of two questionnaires and a clinical examination. Firstly, the research team visited all classrooms to invite the selected students for a conversation about the objectives of the study. After the explanation, the students who agreed to participate received an Informed Consent form to be signed by their parents/legal guardians (students up to 18 years) or by themselves (students aged 18 or 19 years)

The Oral Health Impact Profile-14 (OHIP-14) was used to evaluate the OHRQoL. The OHIP-14 is one of the instruments that measure people's perception of the social impact of oral disorders on their well-being,¹³ that is, the dysfunction, discomfort and disability caused by these conditions.¹⁴ This instrument was originally developed with 49 questions¹⁵ and its short version composed of 14 questions was published later.¹³ It was translated and validated to Brazilian Portuguese.¹⁶ OHIP-14 assesses the frequency of problems associated with the mouth in seven dimensions: functional limitation, pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. The answers to each question are obtained by choosing one option on a Likert scale: never=0 point, rarely=1 point, sometimes=2 points, often=3 points and always=4 points. The sum of the answers provides a score ranging from 0 to 56 points.^{13,17} The higher the score, the poorer the OHRQoL. This questionnaire was self-completed by the adolescents in the school environment.

Another questionnaire containing questions on demographic and socioeconomic characteristics was sent to the parents/legal guardians of the selected adolescents, to be answered at home. The questionnaire was previously tested and adjusted to allow better comprehension.

Clinical examination was performed at the schools, with the students in a supine position under artificial light after tooth cleaning and drying, using a clinical mirror and a periodontal probe. TDI in the upper and lower permanent incisors and canines was recorded based on the O'Brien classification,¹⁸ as follows: 0 = no trauma; 1 = enamel fracture only; 2 = enamel–dentin fracture; 3 = enamel–dentin fracture with pulp exposure; 4 = signs of pulp involvement without signs of fracture; 5 = missing tooth due to TDI; or 6 = other TDI. In addition, gingivitis was assessed using the gingival bleeding index (GBI),¹⁹ dental caries experience was recorded using the decayed, missing, and filled teeth index (DMFT),²⁰ and malocclusion was assessed using the Dental Esthetic Index (DAI).²⁰

Clinical examinations were performed by two examiners who were trained and calibrated for the TDI, DMFT and DAI indexes. After theoretical training with photographs, study models and clinical examinations, the reproducibility was assessed prior to the beginning of the study by double examinations of 10 adolescents. Throughout the data collection, the calibration of the examiners was checked by double examinations of 10 students for every 200 students examined, totalling 5% of the sample. The minimal value of the intra-examiner kappa coefficient was 0.89 for TDI and 0.81 for DMFT while the minimal inter-examiner kappa value was 0.77 for TDI and 0.80 for DMFT. The minimal intraclass correlation coefficient for DAI measures was 0.89 (intra-examiner) and 0.87 (inter-examiner). Concerning GBI, clinical training was conducted under the supervision of an experienced periodontist, but no calibration was performed due to the temporary nature of the condition.

The outcome of this study was OHRQoL, measured as the overall and domain-specific scores of OHIP-14. The main predictor variable was TDI experience, dichotomized as present (at least one tooth with TDI index \geq 1), or absent (all teeth with TDI index=0). Severity was categorized into no TDI (all teeth with TDI index=0), mild TDI (at least one tooth with TDI index=1), or severe TDI (at least one tooth with TDI index \geq 2).

Skin color was dichotomized as a binary variable (non-white and white). Socioeconomic status (SES) used cutoff points proposed by the standard Brazilian economic classification²¹ and households were classified into low (\leq 16 points, corresponding to social classes D and E), mid-low (\geq 17 to \leq 22 points, corresponding to social class C2), mid-high (\geq 23 to \leq 28 points, corresponding to social class C1) or high (\geq 29 points, corresponding to social classes A, B1, and B2). Malocclusion was dichotomized into absent (DAI \leq 25) or present (DAI $>$ 25).²² Dental caries experience was dichotomized into absent (DMFT=0) or present (DMFT \geq 1) and gingivitis was dichotomized into absent ($<$ 10% of sites with bleeding on probing) or present (\geq 10% of sites with bleeding on probing).²³

Data analysis was performed using STATA software (Stata 11.1 for Windows; Stata Corporation, College Station, TX, USA), with all descriptive analyses using survey commands that took into account the survey design. A weight variable based on the probability of selection and population distribution according to gender and school type was used to adjust for the potential bias in the population estimates. Overall and domain-specific OHIP-14 mean scores and standard errors (SE) were reported. Multilevel Poisson regression models were used to assess the association between TDI and OHRQoL. The multilevel model considered adolescents as the first-level unit and school as the second-level unit. The multilevel model used the scheme of fixed effect with random intercept. Unadjusted and adjusted rate ratios (RR) and 95% confidence intervals (CI) were estimated and reported. Adjusted estimates were controlled

for gender, age, skin color, socioeconomic status, caries prevalence, and malocclusion, with all variables included and maintained in the adjusted models irrespective of their p-values.

RESULTS

As shown in Figure 1, a total of 1,197 out of 1,656 15-19-year-old adolescents were included in the study, representing a response rate of 72.3%. Six schools did not agree to participate, resulting in 31 included schools. Table 1 summarizes the frequency distribution of the sample by demographic, socioeconomic, and clinical characteristics. Participants were predominately girls (57.1%) and white (67.0%). The overall prevalence of TDI was 17.0% (n=203), with mild trauma (enamel fracture only) being the most prevalent type (12%, n=143). Only 5% of the adolescents had severe trauma (n=60). The prevalence of dental caries, malocclusion and gingivitis were 46.5%, 75.5% and 13.9%, respectively.

OHIP-14 scores ranged from 0 to 49, with a mean (SE) of 8.25 (0.25) in the whole sample. Table 2 describes the overall and domain-specific OHIP-14 scores according to TDI prevalence.

The association between TDI and OHRQoL is shown in Table 3. Unadjusted results revealed associations between TDI and the overall OHIP-14 score as well as the psychological disability, social disability, and handicap domains ($p < 0.05$). After adjustment for gender, age, skin color, socioeconomic status, caries prevalence, malocclusion, and gingivitis, these associations remained statistically significant. Compared with adolescents without TDI experience, adolescents with TDI had a poorer OHRQoL related to the psychological disability domain (RR=1.16; 95%CI=1.02-1.32), the social disability domain (RR=1.34; 95%CI=1.13-1.59), and the handicap domain (RR=1.35; 95%CI=1.10-1.66). Concerning the overall OHIP-14, individuals with TDI had an OHIP-14 score that was 10% higher than adolescents without

TDI (RR=1.10; 95%CI=1.05-1.16), showing that the presence of a fractured anterior tooth negatively affects the OHRQoL of adolescents.

DISCUSSION

The present study investigated the association between TDI and OHRQoL in a representative sample of 15-19-year-old adolescents from South Brazil. The results confirm the hypothesis that adolescents with TDI had a poorer OHRQoL than adolescents without TDI, irrespective of other clinical conditions, socioeconomic status and demographic characteristics. The negative effect was related to the psychological disability, social disability, and handicap domains. To best of the authors' knowledge, this is the first study that involves evaluation of TDI and OHRQoL in 15-19-year-old adolescents using appropriate clinical assessment and classification TDI criteria.

The presence of a missing, discolored or damaged tooth due to TDI may cause functional problems such as eating and chewing as well as psychological/social problems with smiling and communication with other people. In this study, adolescents with TDI “have found it difficult to relax” or “have been a bit embarrassed” (psychological disability), “have been a bit irritable with other people” or “have had difficulty doing usual jobs” (social disability), “felt that life in general was less satisfying” or “have been totally unable to function” (handicap) due to problems with their teeth or mouth. These findings make it evident that the negative effect of TDI among adolescents was related to problems with interpersonal relationships, which is a conceivable finding considering the age group. Adolescence is characterized by intense social nets (that demand acceptance in social groups), developing interest in sex and sexuality and, in many cases, the beginning of professional activities.^{2,3} In this period, drastic emotional readjustment occurs and aesthetics become a means of inclusion.⁴ In this context, social and psychological domains tend to be more affected among adolescents due to the aesthetic

impairment imposed by TDI. These findings corroborate a previous case-control study by Thelen et al.²⁴ in which 16-19-year-old Albanian adolescents with TDI with unmet treatment need were at greater risk of suffering impacts on OHRQoL than control adolescents, without TDI (OR=3.9; 95% CI=1.6–9.1; $p<0.05$). This negative effect was related to “smiling and showing teeth without embarrassment” (OR=10.9; 95% CI = 4.5–26.6; $p<0.001$) and to “enjoying contact with people” (OR=6.1; 95% CI = 3.1–12.1; $p<0.001$).

In addition, the presence of TDI was associated with higher overall OHIP-14 scores, corroborating studies included in a previous systematic review.¹⁰ Most TDI involve the anterior teeth, which can lead to dietary restrictions, pain, change in physical appearance and psychological discomfort,²⁵ affecting an individual’s interpersonal relationship due to aesthetic impairment and,^{26,27} reflecting the OHRQoL. In this sense, despite the participation of each domain, the adolescent's OHRQoL was affected by TDI. This finding can be explained by the OHRQoL questionnaire presenting a multidimensional structure and construct, as demonstrated by the previous literature.^{13,15,28}

Comparing the present findings with previous studies carried out in different age groups, it is possible to detect another trend among younger individuals. Among 8-10-year-old children, TDI had no effect on the OHRQoL²⁹ or negatively affected the OHRQoL only when enamel and dentin were involved, with no association with mild TDI (enamel fracture).^{30,31} A possible explanation for these findings may be that younger children are less concerned with aesthetics. In studies carried out with older children (12-14-year-olds), the association between TDI and OHRQoL is clearer, mainly affecting social and emotional well-being domains and the functional aspects.³²⁻³⁵ It reinforces the notion that the older the child, the greater the concern with aesthetic aspects.

Few studies have assessed the prevalence of TDI among 15-19-year-old adolescents, with prevalence rates ranging from 8.7%^{36,37} to 26.6%,³⁸ which is similar to the prevalence of

17% found in the present investigation. The recent cross-sectional study trying to associate TDI and OHRQoL by da Fonseca et al.¹² found a prevalence of TDI of 1.4%,¹² which differs from the literature. Possible explanations for this finding may be the lack of a proper diagnostic criterion for TDI (it was determined as part of the caries examination and in cases where there was caries and TDI, only the former was registered) as well as the possible low sensitivity of the examination (with no tooth cleaning and drying, under natural light). Comparing the prevalence rate in the current study with a previous study of 12-years-old children conducted in the city of Santa Maria,³⁹ the authors found a lower prevalence (9.7%). This is a conceivable finding considering the greater time at risk and because adolescents are more exposed to risk factors for TDI such as traffic accidents, assaults, interpersonal violence, sports and use of bicycles for transportation.⁴⁰

The current sample was composed of 1,197 adolescents, attending public and private schools at any school period (morning, afternoon or night), being representative of the whole population and providing high external validity for the study. Although six schools did not agree to participate, they were distributed proportionally according to school type and spread evenly throughout city regions. In addition, the use of a validated questionnaire to assess OHRQoL and the high inter- and intra-examiner reliability provides methodological consistency and high internal validity. Potential confounding variables (gender, age, skin color, socioeconomic status, caries prevalence, malocclusion, and gingivitis) were also collected and included in the adjusted models to control the estimates. The lack of data on the effect of TDI severity on OHRQoL could be seen as a limitation of this study. However, the low prevalence of TDI found in this population has prevented the authors from further exploring this subject due to issues related to statistical power. Whereas the associations between mild TDI and OHRQoL were very similar to the ones found for the overall TDI prevalence, most associations between severe TDI and OHRQoL were not significant in the adjusted model (data not shown). In addition, this

study followed a cross-sectional design,⁴¹ which can be considered as another limitation, as it avoids providing any cause-effect relationships.

There is a growing recognition that traditional clinical health measures need to be complemented by questionnaires that measure health impacts on the quality of life since clinical indicators cannot capture effects such as pain and interference with chewing and self-esteem.^{14,42} According to the present findings, despite the low severity of TDI (enamel fracture was the most prevalent TDI), it caused a significant negative effect on OHRQoL. Therefore, even mild TDI should not be neglected among adolescents and the patient should be seen "as a whole", with a patient-centered biopsychosocial approach, emphasizing the notion that oral health belongs to general health.

CONCLUSION

In conclusion, this population-based study showed that TDI negatively affected the OHRQoL of 15-19-year-old adolescents from Santa Maria, in southern Brazil, despite the low severity of most cases.

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TABLES

Table 1. Frequency distribution of the sample among South Brazilian adolescents (n=1,197).

Variable	n (%)
Gender	
Boys	513 (42.9)
Girls	684 (57.1)
Age	
15	273 (23.0)
16	379 (31.7)
17	367 (30.7)
18-19	175 (14.6)
Skin color[†]	
Non-white	384 (33.0)
White	779 (67.0)
Socioeconomic status[†]	
Low	201 (17.4)
Mid-low	320 (27.6)
Mid-high	302 (26.1)
High	335 (28.9)
TDI index	
No TDI	994 (83.0)
Mild TDI	143 (12.0)
Severe TDI	60 (5.0)
Caries experience	
Absent (DMFT=0)	641 (53.5)
Present (DMFT \geq 1)	556 (46.5)
Malocclusion	
Absent (DAI \leq 25)	293 (24.5)
Present (DAI >25)	904 (75.5)
Gingivitis	
Absent (<10% bleeding sites)	1,031 (86.1)
Present (\geq 10% bleeding sites)	166 (13.9)
TOTAL	1,197 (100)

TDI = traumatic dental injuries.

DMFT = decayed, missing, and filled teeth index.

DAI = Dental aesthetic index.

[†] Missing data.

Table 2. Overall and domain-specific OHIP-14 scores according to TDI prevalence. Mean and standard errors.

	TDI=0		TDI≥1	
	Mean	SE	Mean	SE
Functional limitation	0.63	0.04	0.75	0.08
Physical pain	2.03	0.06	1.98	0.12
Psychological discomfort	2.35	0.07	2.41	0.15
Physical disability	0.79	0.04	0.89	0.11
Psychological disability	1.26	0.06	1.58	0.11
Social disability	0.60	0.04	0.85	0.10
Handicap	0.41	0.04	0.64	0.09
Overall OHIP-14	8.07	0.29	9.10	0.54

Estimates were calculated taking into account the survey design.

TDI = traumatic dental injuries.

Table 3. Association between TDI prevalence and overall and domain-specific OHIP-14 scores in Brazilian adolescents. Multilevel Poisson regression models (unadjusted and adjusted).

	Unadjusted			Adjusted [†]		
	RR	(95% CI)	P	RR	(95%CI)	P
Functional limitation						
TDI=0	1.00			1.00		
TDI ≥1	1.18	(0.99 – 1.41)	0.07	1.14	(0.95 – 1.37)	0.16
Physical pain						
TDI=0	1.00			1.00		
TDI ≥1	0.98	(0.88 – 1.09)	0.73	0.99	(0.89 – 1.10)	0.87
Psychological discomfort						
TDI=0	1.00			1.00		
TDI ≥1	1.04	(0.95 – 1.15)	0.38	1.04	(0.94 – 1.15)	0.49
Physical disability						
TDI=0	1.00			1.00		
TDI ≥1	1.12	(0.95 – 1.32)	0.18	1.08	(0.91 – 1.28)	0.37
Psychological disability						
TDI=0	1.00			1.00		
TDI ≥1	1.24	(1.10 – 1.40)	0.001	1.16	(1.02 – 1.32)	0.02
Social disability						
TDI=0	1.00			1.00		
TDI ≥1	1.40	(1.19 -1.66)	<0.001	1.34	(1.13 – 1.59)	0.001
Handicap						
TDI=0	1.00			1.00		
TDI ≥1	1.48	(1.21 – 1.81)	<0.001	1.35	(1.10 – 1.66)	0.01
Overall OHIP-14						
TDI=0	1.00			1.00		
TDI ≥1	1.13	(1.07 – 1.18)	<0.001	1.10	(1.05 - 1.16)	<0.001

RR = Rate ratio; CI = Confidence interval.

TDI = traumatic dental injuries.

[†]Estimates are adjusted for gender, age, skin color, socioeconomic status, caries prevalence, malocclusion, and gingivitis.

* Boldface indicates statistically significant p-values (p<0.05).

FIGURE

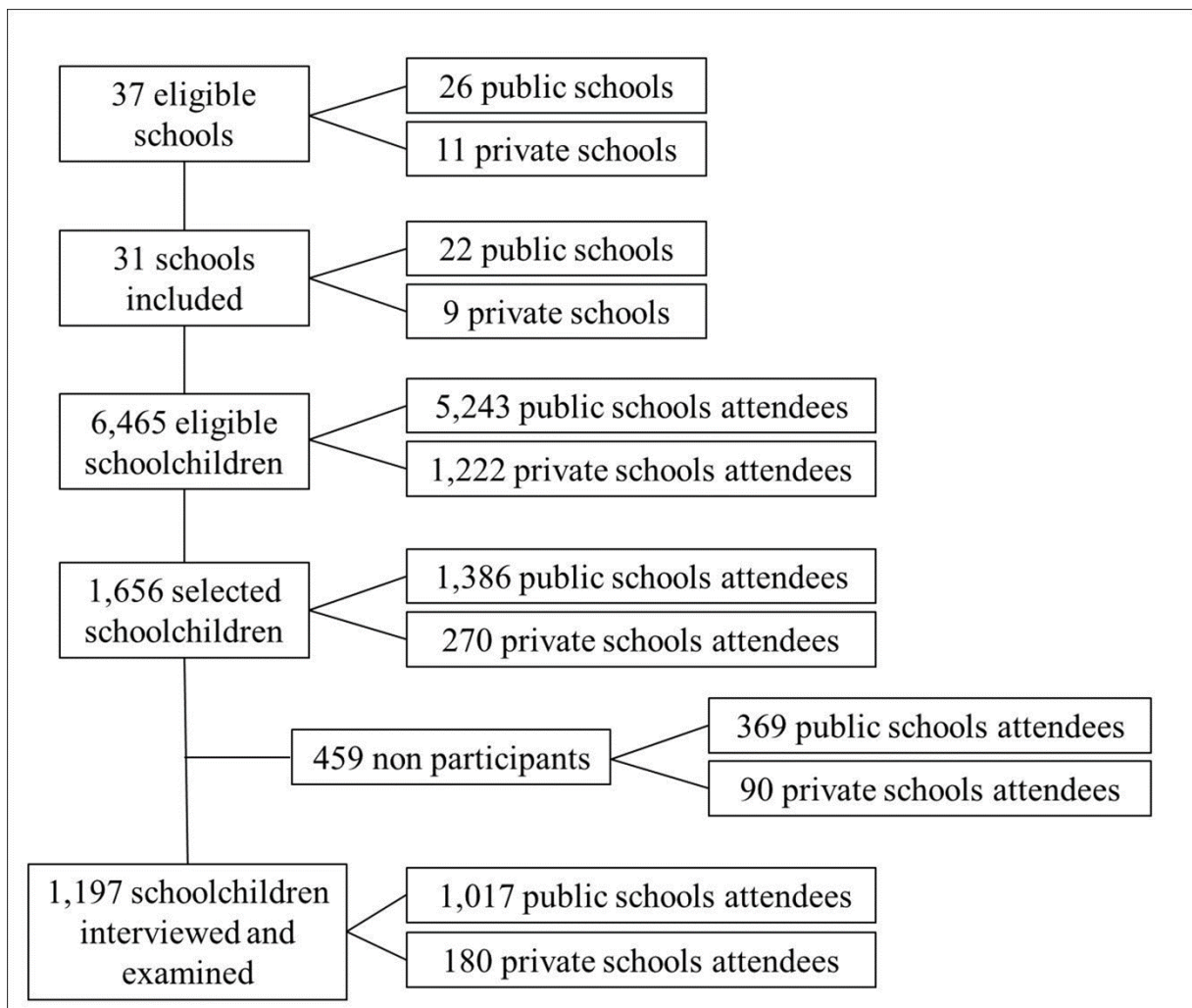


Figure 1. Study flowchart.

3 ARTIGO 2 – ASSOCIATION BETWEEN CITY REGION AND TRAUMATIC DENTAL INJURIES AMONG 15-19-YEAR-OLD ADOLESCENTS FROM SANTA MARIA, SOUTHERN BRAZIL

Este artigo será submetido para o periódico *Brazilian Oral Research*, ISSN: 1517-7491, Fator de impacto: 1,223; Qualis CAPES A2. As normas para a publicação estão listadas no Anexo C.

Community Dental Health**ASSOCIATION BETWEEN CITY REGION AND TRAUMATIC DENTAL INJURIES AMONG 15-19-YEAR-OLD ADOLESCENTS FROM SANTA MARIA, SOUTHERN BRAZIL**

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ASSOCIATION BETWEEN CITY REGION AND TRAUMATIC DENTAL INJURIES AMONG 15-19-YEAR-OLD ADOLESCENTS FROM SANTA MARIA, SOUTHERN BRAZIL

ABSTRACT

This study investigated (1) the association between city region and TDI among 15-19-year-old South Brazilian adolescents and (2) the region that clustered a higher number of environmental risk indicators as an attempt to explain the association found. A population-based cross-sectional survey was conducted in 2018 including a representative sample of 1,146 15-19-year-old adolescents from Santa Maria, southern Brazil. A questionnaire on socio-demographic information was sent to the parents/legal guardians of the selected adolescents. TDI in the upper and lower permanent incisors and canines was recorded based on the O'Brien classification. Environmental variables (socio-demographic and structural characteristics of the neighborhoods) were obtained through official publications. Poisson regression models were used, prevalence ratios (PR) and their 95% confidence interval (CI) were estimated. The overall prevalence of TDI was 17.3%, being mild trauma in 12.7% and severe trauma in 5.8%. Adolescents living in the southern region had a prevalence of TDI of 25.3%, contrasting with a prevalence of 13.6% in the northern region. After adjustment for important cofactors, adolescents living in the southern region were more likely to have TDI than their counterparts living in the northern region (PR=1.83, 95%CI=1.24-2.70, p=0.003). This association was consistently found in the severity analysis. Analyzing the number of environmental risk indicators in the different regions, the southern region presented a greater mean and median than all the other regions. In conclusion, living in the southern region was associated with a greater prevalence and severity of TDI among 15-19-year-old adolescents from Santa Maria, southern Brazil. Our findings show the role of the environment in the epidemiology of TDI.

KEYWORDS

Tooth Injuries; Residence characteristics; Socioeconomic factors; Cross-Sectional Study; Epidemiology.

INTRODUCTION

Traumatic dental injury (TDI) is considered a public health concern due to its high prevalence and repercussion on economical, physical, social, and emotional well-being.^{1,2,3} It is estimated that one-quarter of adolescents and adults experienced TDI at least once during their life course.⁴ Previous literature have already discussed the association between individual factors and TDI, such as sex, overjet, lip coverage, obesity, and SES.^{5,6} However, the role of environmental factors has been scarcely investigated.

Brazilian population-based studies using secondary data from a national oral health survey did not find association between the municipal human development index and TDI prevalence among 12-year-old schoolchildren⁷ (national data) as well as among 15-19-year-old adolescents (data from the São Paulo state only).³ In the same way, no association was found between the Gini coefficient and TDI among Brazilian 12-year-old,⁷ which was not corroborated by a study that revealed an inverse association between contextual income inequality and TDI, with an improvement in the Gini coefficient leading to a decrease in TDI prevalence.⁸ In addition, a greater concentration of cases of TDI as well as untreated TDI were found in Brazilian schoolchildren who lived in areas of substandard living conditions and high social vulnerability.^{9,10} Similarly, Indian adolescents residing in urban slums had higher odds of having TDI than their pairs from middle socioeconomic class.¹¹ Despite these findings, no study has combined socio-demographic and structural characteristics of neighborhoods/regions to assess its relationship with TDI.

Knowing the repercussion of environmental variables on TDI prevalence could help to define preventive public health strategies where they are more need. It is well known that the shared social environment at the regional level has a significant effect on the residents' health, regardless of their level of individual risk.^{12,13} In addition, it is known that diseases do not occur in isolation, but as a characteristic of people and their surrounding context as the neighborhood or the residing region.^{13,14,15} In this context, the primary aim of this population-based study was to investigate the association between city region and TDI among 15-19-year-old adolescents from Santa Maria, southern Brazil. As a secondary aim, we investigated the region that clustered a higher number of environmental risk indicators as an attempt to explain the association found. We hypothesized that individuals who lived in regions clustering a higher number of environmental risk indicators were more likely to have TDI.

MATERIALS AND METHODS

Study design and sample

This cross-sectional study was carried out to assess the oral health status of 15-19-year-old adolescents attending public and private high schools from Santa Maria, a mid-sized city located in southern Brazil, with an estimated population of 261,031 inhabitants in 2010. Approximately 95% of the whole population live in the urban area, which is divided into 8 administrative regions and 41 neighborhoods.

Adolescents enrolled in all 37 urban high schools (26 public and 11 private) attending any school period (morning, afternoon or night) were considered eligible for the study. A list of all eligible schoolchildren was compiled for each school, and those eligible were selected using a table of random numbers (<http://www.random.org>). The number of enrolled students was proportional to the school size. Individuals using fixed orthodontic appliances or with special needs were not considered eligible.

A total of 1,066 students were considered necessary for the study considering a prevalence rate of 50% (worst case scenario), a 95% confidence interval (CI), a power of 80%, and a precision level of 3%. After adding a non-participation rate of 50%, a total of 1,600 adolescents should be invited to participate.

Data collection

Data collection was conducted from March to November 2018, and included a questionnaire and a clinical oral examination. The study protocol was approved by the Research Ethics Committee of the Federal University of Santa Maria (protocol number 2.178.299). All participants or their legal guardians signed a written informed consent form. Students received a report of their oral health status, and were referred to dental treatment when needed.

A self-administered questionnaire containing questions on socio-demographic information was sent to the parents/legal guardians of the selected adolescents. Clinical examinations were conducted at the schools, with the students in a supine position, under artificial light, after tooth cleaning and drying, using a clinical mirror and a periodontal probe. TDI in the upper and lower permanent incisors and canines was recorded based on the O'Brien classification:¹⁶ (0) no trauma; (1) enamel fracture only; (2) enamel–dentin fracture; (3) enamel–dentin fracture with pulp exposure; (4) signs of pulp involvement without signs of fracture; (5) missing tooth due to TDI; or (6) other TDI. Overjet was measured as the distance, in millimeters (mm), between the buccal surface of the more prominent upper central incisor and the corresponding lower incisor. The presence of anterior open bite was defined as the lack

of vertical overlap between upper and lower incisors in the occlusal position, recorded as the distance measured in millimeters.¹⁷ Lip coverage was visually assessed and considered adequate if the lips completely formed an anterior seal when the mandible was in a physiological rest position.¹⁸

Based on the home address provided by each adolescent in the questionnaire, the neighborhood where he/she lived was defined according to official sources¹⁹ and classified according to the city regions (North, Northeast, South, East, West, Center, East-Center, or West-Center). Socio-demographic and structural characteristics of the neighborhoods were recorded, as follows: mean income, percentage of literate inhabitants, percentage of white skin color inhabitants, mean household crowding, percentage of residences with piped water, percentage of paved streets, percentage of residences with sewerage system, and percentage of streets with public illumination. These data were obtained through official publications of the Brazilian Institute of Geography and Statistics (IBGE).²⁰

Reproducibility

Clinical examinations were performed by two examiners who were trained and calibrated for TDI index. Examiners' reproducibility was assessed before the beginning of the study and over the data collection in 5% of the sample. The minimal intra-examiner kappa coefficient was 0.89 while the minimal inter-examiner kappa value was 0.77.

Statistical analysis

The outcomes of this study were TDI prevalence and severity. TDI prevalence was defined as present (at least one tooth with TDI index ≥ 1), or absent (all teeth with TDI index=0). TDI severity was categorized into no TDI (all teeth with TDI index=0), mild TDI (at least one tooth with TDI index=1), or severe TDI (at least one tooth with TDI index ≥ 2).

The 8 city regions were combined in 5 regions based on their geographical proximity (North, South, East, West, and Center) and considered the main predictor variable (environmental). The northern region was defined as the reference category because it presented the lowest TDI prevalence. Individual variables (socio-demographics and clinical status) were considered adjusting variables due to their well-known relationship with TDI. Sociodemographic variables were age, sex and socioeconomic status (SES), collected by the standard Brazilian economic classification.²¹ According to the proposed cutoffs, households were classified into low (≤ 16 points, corresponding to social classes D and E), mid-low (≥ 17 to ≤ 22 points, corresponding to social class C2), mid-high (≥ 23 to ≤ 28 points, corresponding

to social class C1) or high (≥ 29 points, corresponding to social classes A, B1, and B2) SES. Clinical variables were overjet (dichotomized into ≤ 3 mm or > 3 mm),²² anterior open bite and lip coverage, dichotomized into absent or present.

Data analysis was performed using STATA software (Stata 11.1 for Windows; Stata Corporation, College Station, TX, USA). A weight variable based on the probability of selection and population distribution according to gender and school type was used to adjust for the potential bias in the population estimates ("svy" command for complex sample data). The association between environmental and individual variables and the outcomes (TDI prevalence and severity) was assessed using Poisson regression models. The prevalence ratios (PR) and their respective 95% confidence intervals (CI) were estimated. Variables presenting a p-value > 0.20 in the unadjusted analysis were included in the adjusted models. The chosen level of significance was 5%.

In order to try to explain the found relationship between city region and TDI outcomes, the clustering of neighborhood risk indicators was analyzed. Firstly, the 8 neighborhood socio-demographic and structural factors were dichotomized by the median. For each factor, a neighborhood risk indicator was considered present in neighborhoods located in the category indicating a more deprived condition (below the median for all characteristics, except for household crowding). Then, the number of neighborhood risk indicators were summed (ranging from 0 to 8) and classified as 0-4 or 5-8. The number of neighborhood risk indicators were compared among city regions using the Wald test (means) and the Dunn test (medians).

RESULTS

A total of 1,197 15-19-year-old adolescents were included in the study (response rate of 72.3%); however, 51 were excluded from de analysis due to incomplete address or because they lived in rural districts or in nearby cities, totaling 1,146 students (Figure 1). Six schools did not agree to participate, resulting in 31 included schools.

Table 1 shows the sample distribution, TDI prevalence and its unadjusted association with environmental and individual variables. The overall prevalence of TDI in this population was 17.3% (95%CI=15.1-19.5), being mild trauma in 12.7% (95%CI=10.8-14.7) and severe trauma in 5.8% (95%CI=4.8-6.9). The preliminary analysis showed a significantly higher TDI prevalence among adolescents living in the southern region than among those living in the northern region. In the unadjusted analysis, adolescents living in the southern region were 86% more likely to have TDI than those living in the northern region (PR=1.86, 95%CI=1.20-2.88, p=0.007). In addition, a low SES and an overjet >3 mm also afforded an increased risk for TDI.

The adjusted association between environmental and individual variables with TDI prevalence and severity is shown in Table 2. After adjustment for important cofactors, city region remained significantly associated with TDI prevalence, with adolescents living in the southern region being more likely to have TDI than their counterparts living in the northern region (PR=1.83, 95%CI=1.24-2.70, p=0.003). This significant association was consistently found in the severity analysis (mild trauma, PR=1.82, 95%CI=1.09-3.05, p=0.02; severe trauma, PR=2.25, 95%CI=1.02-4.93, p=0.04). Regarding individual variables, sex, SES, and overjet showed significant associations with TDI in this population.

Table 3 shows the sample distribution according to the number of neighborhood risk indicators by city region. In general, 61% of this adolescent population lived in neighborhoods clustering up to 4 neighborhood risk indicators, with this percentage reaching 100% of residents of the city center. 77% of the individuals who lived in the southern region clustered 5-8 risk indicators in their neighborhoods. Among the other city regions, this percentage ranged from 0% (Center) to 45% (West). Comparing the number of neighborhood risk indicators observed among adolescents living in the different regions, the southern region had the greater mean/median than all the other regions. Figure 2 shows a city map illustrating TDI prevalence in the different city regions. Neighborhood risk indicators are presented according to the color gradient.

DISCUSSION

This study evaluated the association between city region and TDI prevalence and severity in a representative sample of students aged 15-19 years old from a medium-sized city located in southern Brazil. Our findings demonstrated that: (1) adolescents living in the southern region had a higher prevalence of TDI, and (2) this region clustered a higher number of neighborhood risk indicators than other regions. Such association is in accordance with the conceptual hypothesis and was also found when mild and severe TDI were distinguished. To the best of our knowledge, this is the first study combining sociodemographic and structural variables of the neighborhoods by adopting the notion of clustering of environmental risk factors/indicators.

The findings of the present study supported the hypothesis that individuals living in areas of greater environmental risk were more likely to have TDI than those living in regions of lower risk. This association remained statistically significant after adjusting for well-known risk indicators for TDI, highlighting the independent importance of environmental and individual factors in the occurrence of TDI.

Our results are in accordance with an Indian study in which a higher prevalence of TDI was found among adolescents living in deprived areas than among those living in better-off residential areas.¹¹ In the same way, the physical environment, public social policies, and social cohesion explained 42% of TDI variance between deprived areas from a Brazilian city.²³ This higher prevalence of TDI in deprived city regions could be related to inequalities in health. The role of income inequality over a ten-year period and TDI was verified in a Brazilian study. Children living in cities that experienced a decrease in income inequality were less likely to have TDI, thus showing the influence of city-level contextual inequality on TDI.⁸ Furthermore, Marcenes and Murray²⁴ found that the prevalence of TDI in a very deprived area of London was higher than the overall figure for England. In addition, overcrowded households tended to increase the likelihood of experiencing TDI.

In the present study, adolescents living in the southern region were 83% more likely to have TDI than their counterparts living in the northeast region. When only severe cases of TDI were considered, residents of the southern region had a 2-fold increased risk. A possible explanation of this greater risk could be related to the environmental conditions of the southern region. Of the 8 sociodemographic and structural variables of the neighborhoods assessed, the southern region had the highest number of characteristics in the worst category than all other regions (mean 5.3, median 6). This result suggests the role of social and environmental contexts on individual health conditions.^{14,25,26} In this sense, the place of residence where adolescents live influences their lifestyles and their level of exposure to health risk factors as dangerous roads, dwelling conditions, unprotected industrial and building sites.^{26,27,28} In the present study, the combination of poor sociodemographic characteristics with poor structure may have led adolescents more prone to TDI than their counterparts. Although we have found a greater TDI prevalence/severity in the region clustering the greater number of environmental risk indicators (South), the region clustering the lower number (Center) had not the lowest TDI experience. This lack of a gradient was also found in another study conducted with Brazilian adolescents.²⁸ Thus, it is possible to speculate that other determinant variables, not included in this study, could help to explain the relationship found between city region and TDI.

There is no consensus in the literature regarding the association between individual SES and TDI.^{6,22} Our analysis revealed that adolescents of low SES had 74% greater prevalence of TDI than those of high SES. In the severity analysis, this estimated risk was slightly higher (79% for mild TDI and 2-fold for severe TDI). Individuals living in conditions of socioeconomic disadvantage tend to be more exposed to high violence indexes and unsafe urban environments, being less achieved by information regarding preventive strategies.^{5,29} It has

been shown that adolescents from less affluent families tend to make in unsafe environments, without professional supervision and nonuse of safety equipment for sports,²⁵ thus being more likely to TDI. It is important to emphasize that the effects of individual and environmental SES were independently detected in the adjusted model. Being a girl afforded a 48% lower risk for severe TDI, which is in agreement with most studies investigating predisposing factors.^{5,6,30,31,32} Moreover, overjet >3mm showed a significant association with TDI prevalence, confirming the results of the meta-analysis by Nguyen et al.³⁰

In this study, we examined a sample selected at random composed of 1,146 students attending public and private schools at any school period (morning, afternoon and evening), in addition to including participants of all 41 neighborhoods. Although six schools did not agree to participate, they were distributed proportionally according to school type and spread evenly throughout city regions. Therefore, selection bias was prevented and a representative sample of the population was achieved, providing high external validity for the study. This study followed a cross-sectional design, which can be considered a limitation, as inferences of causality cannot be drawn. Another possible limitation is the lack of radiographic examination, which may have led to the underestimation of TDI.

In conclusion, this population-based cross-sectional study showed that living in the southern region was associated with a greater prevalence and severity of TDI among 15-19-year-old adolescents from Santa Maria, southern Brazil. Since this region clustered a greater number of neighborhood risk indicators, our findings show the role of the environment in the epidemiology of TDI.

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TABLES

Table 1. Sample distribution, TDI prevalence and its unadjusted association with environmental and individual variables.

	n (%)	Prevalence (95% CI)	Unadjusted analysis	
			PR (95% CI)	p
Environmental variable				
City region				
North	294 (25.6)	13.6 (10.6-16.5) ^a	1.00	
South	122 (10.6)	25.3 (14.9-35.7) ^b	1.86 (1.20-2.88)	0.007
East	187 (16.3)	17.2 (13.2-21.2) ^{ab}	1.27 (0.88-1.82)	0.19
West	370 (32.3)	17.0 (13.5-20.5) ^{ab}	1.25 (0.94-1.66)	0.12
Center	173 (15.1)	18.6 (13.4-23.9) ^{ab}	1.37 (0.89-2.11)	0.14
Individual variables				
<i>Socio-demographics</i>				
Sex				
Boys	485 (42.3)	19.4 (15.7-23.0) ^a	1.00	
Girls	661 (57.7)	15.4 (11.9-18.9) ^a	0.79 (0.55-1.11)	0.17
Age				
15	265 (23.1)	17.5 (13.7-21.4) ^a	1.00	
16	366 (32.0)	15.0 (9.5-20.4) ^a	0.84 (0.55-1.29)	0.41
17	358 (31.2)	18.0 (14.6-21.3) ^a	1.04 (0.79-1.37)	0.77
18-19	157 (13.7)	20.4 (15.2-25.7) ^a	1.23 (0.82-1.83)	0.31
Socioeconomic status [†]				
High	330 (29.8)	14.3 (10.4-18.1) ^a	1.00	
Mid-high	294 (26.5)	17.9 (13.5-22.2) ^{ab}	1.25 (0.88-1.79)	0.20
Mid-low	305 (27.6)	18.1 (13.0-23.0) ^{ab}	1.27 (0.84-1.92)	0.25
Low	119 (16.1)	23.0 (17.0-29.0) ^b	1.61 (1.13-2.30)	0.01
<i>Clinical status</i>				
Overjet [†]				
≤ 3 mm	890 (79.4)	16.0 (13.5-18.6) ^a	1.00	
> 3 mm	231 (29.6)	22.0 (17.0-27.0) ^b	1.37 (1.06-1.78)	0.02
Anterior open bite				
No	1097 (95.7)	17.0 (14.8-19.2) ^a	1.00	
Yes	49 (4.3)	2.4 (1.42-3.40) ^a	1.42 (0.91-2.20)	0.12
Lip coverage [†]				
No	1028 (82.9)	16.9 (14.9-19.0) ^a	1.00	
Yes	196 (17.1)	19.3 (12.5-26.1) ^a	1.14 (0.82-1.59)	0.42
Total	1146 (100)	17.3 (15.1-19.5)		

TDI = traumatic dental injuries; PR = Prevalence Ratio; CI = Confidence interval.

[†]Missing data.

Unadjusted Poisson regression analysis

Different letters indicate statistically significant difference between categories (p<0.05, adjusted Wald test)

Table 2. Adjusted association between environmental and individual variables with TDI prevalence and severity.

	Overall TDI prevalence		Mild TDI		Severe TDI	
	PR (95%CI)	p*	PR (95%CI)	p	PR (95%CI)	P
Environmental variable						
City region						
North	1.00		1.00		1.00	
South	1.83 (1.24-2.71)	0.003	1.82 (1.09-3.05)	0.02	2.25 (1.02-4.93)	0.04
East	1.36 (0.89-2.07)	0.15	1.24 (0.82-1.87)	0.30	1.73 (0.70-4.29)	0.23
West	1.23 (0.91-1.66)	0.17	1.27 (0.87-1.86)	0.20	1.06 (0.41-2.73)	0.90
Center	1.56 (0.97-2.50)	0.06	1.55 (0.94-2.54)	0.08	1.85 (0.66-5.23)	0.23
Individual variables						
<i>Socio-demographics</i>						
Sex						
Boys	1.00		1.00		1.00	
Girls	0.74 (0.52-1.05)	0.09	0.80 (0.51-1.27)	0.34	0.52 (0.34-0.82)	0.006
Socioeconomic status						
High	1.00		1.00		1.00	
Mid-high	1.27 (0.88-1.82)	0.19	1.38 (0.88-2.16)	0.15	1.11 (0.53-2.31)	0.77
Mid-low	1.37 (0.86-2.18)	0.17	1.43 (0.84-2.44)	0.17	1.38 (0.70-2.70)	0.34
Low	1.74 (1.19-2.56)	0.006	1.79 (1.07-2.99)	0.03	2.00 (1.15-3.51)	0.02
<i>Clinical status</i>						
Overjet						
≤ 3 mm	1.00		1.00		1.00	
> 3 mm	1.33 (1.01-1.74)	0.04	1.36 (0.95-1.94)	0.09	1.34 (0.82-2.17)	0.23
Anterior open bite						
No	1.00		1.00		1.00	
Yes	1.34 (0.90-2.00)	0.14	1.55 (0.95-2.53)	0.08	0.99 (0.21-4.60)	0.99

PR = Prevalence ratio; CI = Confidence interval.

Table 3. Sample distribution according to the number of neighborhood risk indicators by city region.

Number of neighborhood risk indicators	North	South	East	West	Center	TOTAL
0-4	176 (60%)	28 (23%)	123 (66%)	203 (55%)	173 (100%)	703 (61%)
5-8	118 (40%)	94 (77%)	64 (34%)	167 (45%)	0 (0%)	443 (39%)
Mean (sd)	3.8 (2.2) ^a	5.3 (1.9) ^b	4.7 (1.9) ^c	4.5 (2.0) ^c	0.9 (0.9) ^d	3.9 (2.3)
Median (P25-P75)	4 (3-5) ^a	6 (5-6) ^b	4 (3-7) ^c	4 (3-6) ^c	1 (0-1) ^d	4 (2-6)

*Neighborhood risk indicators assessed: income, % literate inhabitants, % white skin color inhabitants, household crowding, % piped water, % paved street, % sewerage system, and % public illumination. A neighborhood risk indicator was considered present in neighborhoods located in the worst category (below the median for all characteristics, except for household crowding).

Different letters indicate statistically significant differences between categories ($p < 0.05$, Wald test for means and Dunn test for medians).

FIGURES

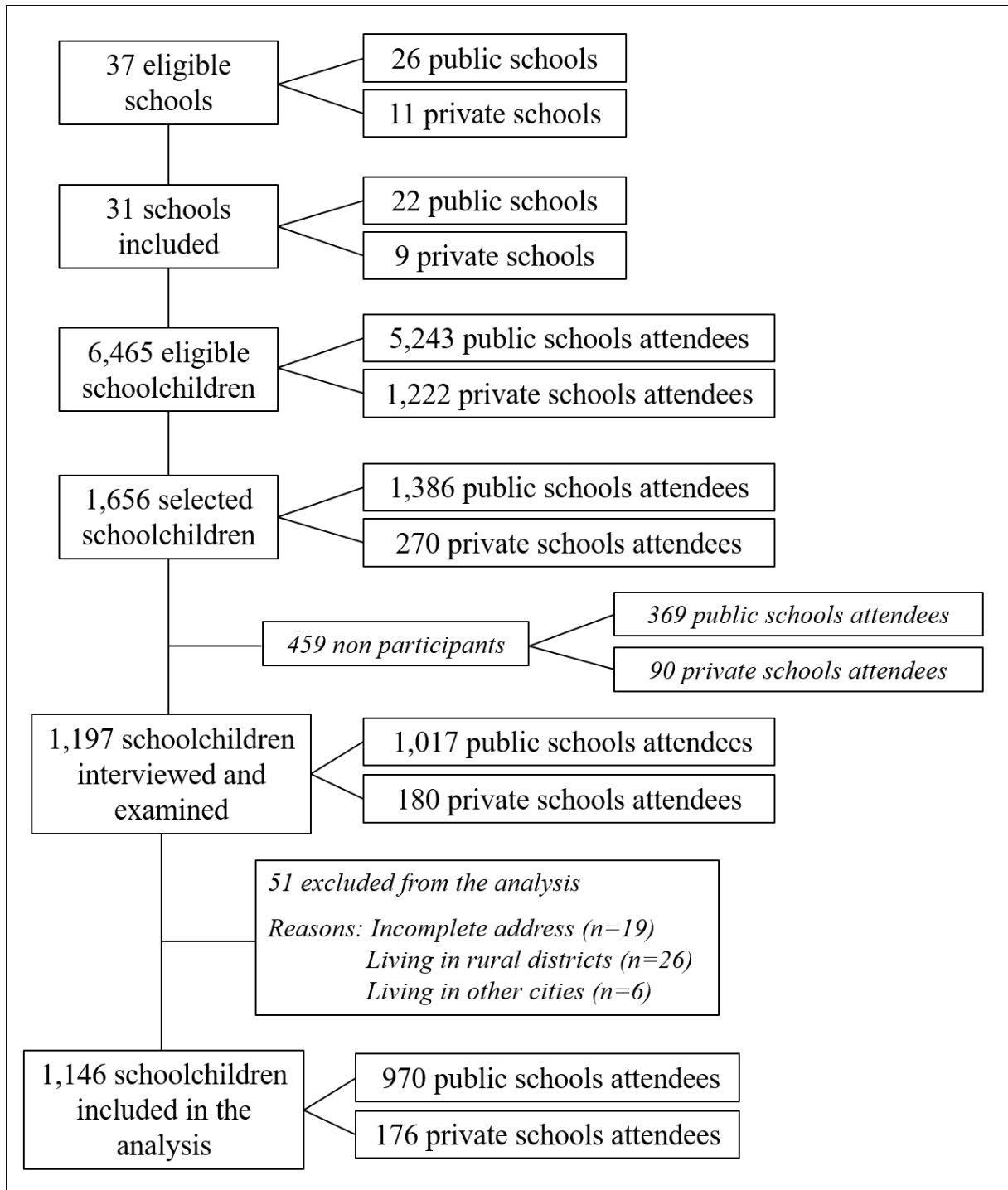


Figure 1. Study flowchart

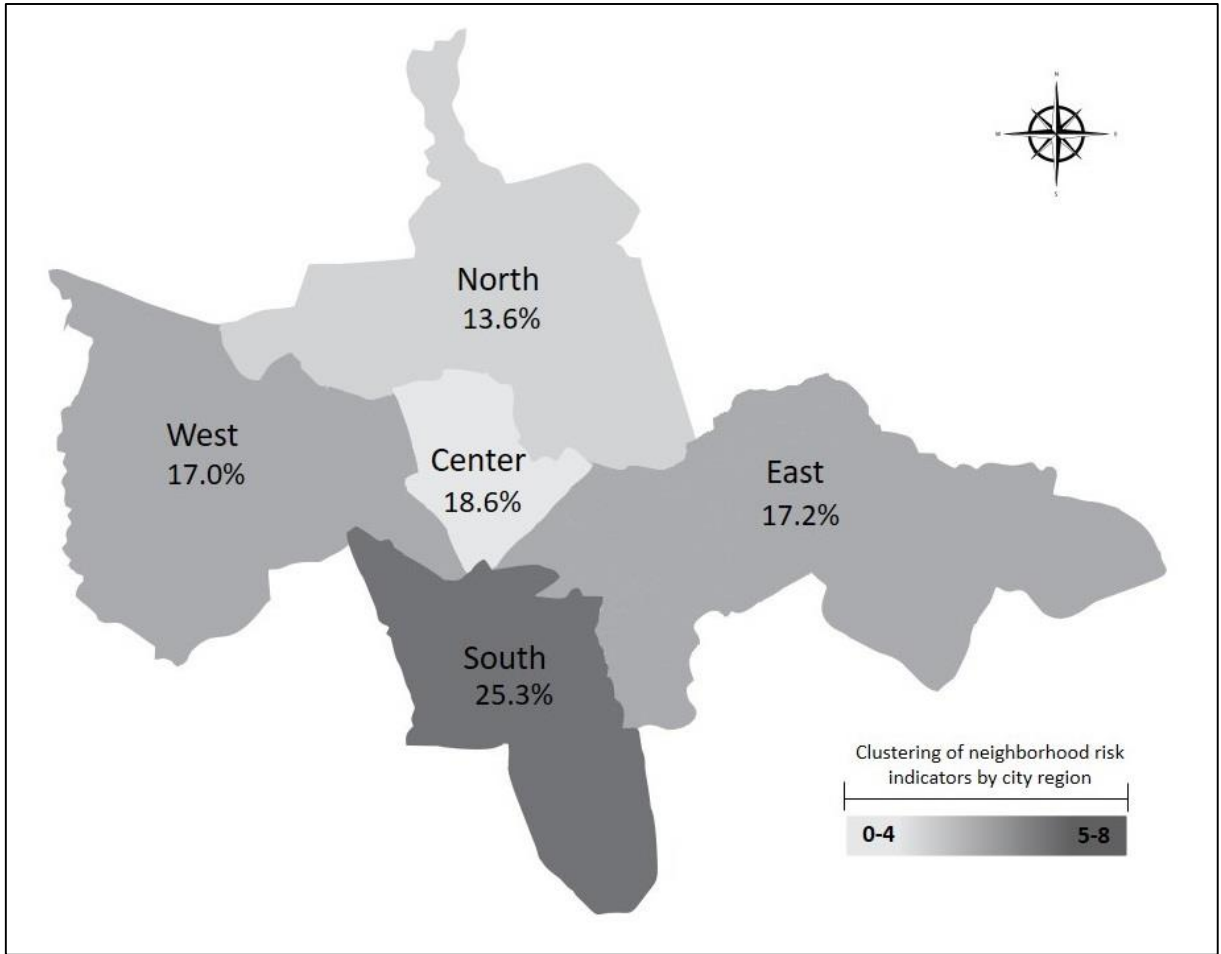


Figure 2 City map illustrating TDI prevalence in the different city regions, Santa Maria, southern Brazil.

4 DISCUSSÃO

O TD é considerado um problema de saúde pública devido à sua prevalência e repercussão na economia, bem-estar físico, social, psicossocial e emocional dos indivíduos afetados (GLENDOR, 2008; DA FONSECA et al., 2019; ANDERSON, 2013). Pode levar a restrições alimentares, dificuldades na fala, mudanças na aparência física e desconforto psicológico, podendo interferir negativamente nas relações interpessoais do indivíduo devido ao comprometimento estético e afetar a QVRSB (BILDER et al., 2016; CERQUEIRA-NETO, 2016; FREIRE-MAIA et al., 2018). Estudos anteriores mostram que mais de um bilhão de pessoas já tiveram uma lesão dentária traumática (PETTI; GLENDOR; ANDREASEN, 2018) e indivíduos que sofreram TD em dentes anteriores apresentam maior chances de sofrer novos episódios de TD (MAGNO et al., 2019).

Os resultados do Artigo 1 demonstraram que adolescentes que sofreram TD tiveram uma pior QVRSB do que adolescentes que não sofreram TD e esse efeito negativo foi relacionado aos domínios de limitação psicológica, limitação social e incapacidade. Deste modo, os adolescentes que apresentaram TD “acharam difícil relaxar” ou “ficaram um pouco envergonhados”, “ficaram um pouco irritados com outras pessoas” ou “tiveram dificuldade para fazer trabalhos habituais” e “consideraram que a vida em geral era menos satisfatória” ou “foram totalmente incapazes de realizar suas funções” devido a problemas nos dentes ou na boca. Assim como no estudo de Thelen et al. (2011), realizado na Albânia em faixa etária similar (adolescentes de 16 a 19 anos), indivíduos com TD com necessidade de tratamento apresentavam maior risco de sofrer impactos na QVRSB do que adolescentes sem TD. Esse efeito negativo foi relacionado a “sorrir e mostrar dentes sem constrangimento” e “gostar de ter contato com as pessoas”. Esses achados evidenciam que o efeito negativo do TD entre os adolescentes estava relacionado a problemas nas relações interpessoais, que é um achado concebível considerando a faixa etária estudada.

Apesar da baixa severidade observada no presente estudo (12% fratura de esmalte e apenas 5% trauma severo), o TD causou um efeito negativo significativo na QVRSB, mesmo após o ajuste para importantes fatores como sexo, idade, cor da pele, situação socioeconômica, prevalência de cárie dentária, má oclusão e gengivite. Portanto, mesmo o TD leve não deve ser negligenciado entre os adolescentes.

Os fatores mais comumente associados ao TD têm sido características individuais como variáveis sociodemográficas e clínicas (ALDRIGUI et al., 2014; SOARES et al., 2014). No entanto, evidências demonstram que o ambiente social exerce um efeito significativo sobre a

saúde das pessoas que vivem lá, independentemente do seu nível de risco individual, e isto poderia ser verdadeiro em relação ao TD (KALF et al. 2001; SISSON et al. 2007). No Artigo 2, fatores ambientais (socioeconômicos e estruturais) que poderiam ajudar a explicar a associação encontrada entre região e TD foram agrupados de acordo com as regiões da cidade. Nossa hipótese, de que os participantes que viviam em regiões que agrupam um maior número de indicadores de risco ambientais seriam mais propensos a ter TD, foi confirmada. Os resultados mostram que adolescentes que viviam na região sul da cidade tiveram 83% maior probabilidade de ter TD do que adolescentes que viviam na região norte, mesmo após o ajuste para conhecidos fatores individuais associados ao TD. Essa associação permaneceu consistente na análise de severidade, onde observou-se uma probabilidade de 82% maior de possuir trauma leve e 2,25 vezes maior de ter trauma severo em adolescentes morando na região sul do que aqueles morando na região norte. Comparando o número de indicadores de risco do bairro, esta região agrupou um número maior de indicadores de risco de bairro do que outras regiões.

Esses resultados reforçam o papel do contexto social nas condições individuais de saúde (SOLAR; IRWIN, 2010; VETTORE; AQEELI, 2016; HAYNES et al., 2003) e estão de acordo com o observado em estudo anteriores avaliando indicadores contextuais/ambientais e TD (BENDO et al., 2012; MATHUR et al., 2015). Por outro lado, outros estudos não encontraram associação entre variáveis contextuais (como coeficiente de Gini e índice de desenvolvimento humano-IDH) e prevalência de TD entre crianças em idade escolar (BOMFIM; HERRERA; DE-CARLI, 2017; FONSECA et al., 2019), o que poderia ser atribuído, pelo menos em parte, às grandes desigualdades regionais encontradas no Brasil.

Considerando os achados do presente estudo, o desenvolvimento de medidas educativas e preventivas são importantes para essa população, visto que o TD interferiu nas atividades diárias e nas relações interpessoais dos adolescentes estudados. Além disso, as maiores taxas de prevalência e severidade de TD encontradas em regiões com mais indicadores de risco ambientais evidenciam a necessidade de interação com outros setores a fim de melhorar o contexto social nos quais os adolescentes estão inseridos.

5 CONCLUSÕES

Com base dos achados da presente dissertação, pode-se concluir que:

- Apesar da baixa severidade, o TD esteve associado a uma pior QVRSB em adolescentes de 15 a 19 anos de idade de Santa Maria, RS, Brasil. Deste modo, mesmo o TD leve não deve ser negligenciado nesta população.

- Morar na região sul foi associado a uma maior taxa de prevalência e severidade de TD em adolescentes de 15 a 19 anos de idade de Santa Maria, RS, Brasil. Considerando que esta região agrupa o maior número de indicadores de risco ambientais, os achados deste estudo demonstram o papel do ambiente social na epidemiologia do TD.

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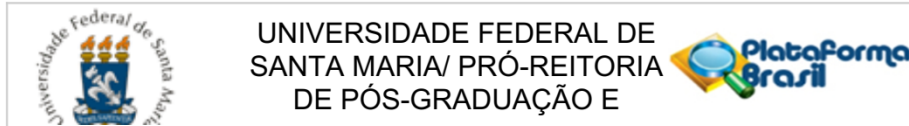
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ANEXO A: PARECER DO COMITÊ DE ÉTICA EM PESQUISA DA UNIVERSIDADE FEDERAL DE SANTA MARIA



PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: Saúde bucal de escolares de ensino médio de Santa Maria, RS: indicadores de risco, distribuição geográfica e impacto na qualidade de vida

Pesquisador: LUANA SEVERO ALVES

Área Temática:

Versão: 2

CAAE: 69901917.5.0000.5346

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

Patrocinador Principal: Financiamento Próprio

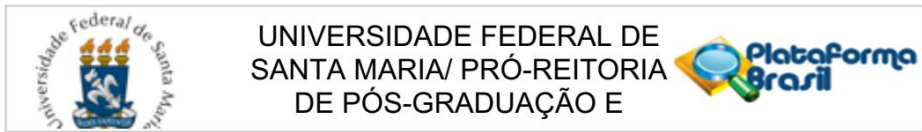
DADOS DO PARECER

Número do Parecer: 2.178.299

Apresentação do Projeto:

O projeto está assim apresentado pelos pesquisadores: "O levantamento de dados epidemiológicos permite o acompanhamento das condições de saúde bucal da população ao longo dos anos, possibilita a elaboração de indicadores de saúde bucal na faixa etária estudada e contribui com o planejamento e implementação de políticas e programas em saúde bucal. Estima-se que 1.800 indivíduos sejam necessários para a realização do presente levantamento. Todas as 36 escolas de ensino médio serão convidadas a participar. Os critérios de inclusão são: ano de nascimento 2002, 2001, 2000, 1999 ou 1998 (15 a 19 anos completos até o final de 2017) e frequência escolar regular. Os critérios de exclusão são: uso de aparelho ortodôntico fixo ou indivíduos com necessidades especiais. Um questionário estruturado será aplicado aos próprios escolares, contendo perguntas sobre características socioeconômicas, condição de moradia e ambiente social, acesso aos serviços odontológicos, hábitos de higiene oral, hábitos alimentares e comportamentais. Também serão abordadas perguntas que visam avaliar o impacto das condições de saúde bucal na autopercepção e qualidade de vida do indivíduo (Child Perceptions Questionnaire - CPQ11-14). Os escolares terão seu peso e altura registrados previamente ao início do exame clínico, que seguirá a seguinte sistemática: determinação do Índice de Sangramento Gengival, Índice de Estética Dental, Índice de

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Bairro: Camobi **CEP:** 97.105-970
UF: RS **Município:** SANTA MARIA
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Continuação do Parecer: 2.178.299

Traumatismo Dentário, limpeza dos dentes, isolamento relativo, Índice de Cárie Dentária, avaliação quanto ao uso e necessidade de Próteses Dentárias e Índice de Erosão Dentária. Os exames serão realizados por duas examinadoras previamente treinadas e calibradas (Kappa/ICC0,7). A associação entre as variáveis independentes e os desfechos será avaliada através de modelos de regressão de Poisson. Através dos endereços dos escolares, mapas do município de Santa Maria serão gerados para ilustrar espacialmente a distribuição geográfica da cárie e do traumatismo dentário, e relacioná-los com variáveis socioambientais e contextuais. A associação entre o escore final do Child Perceptions Questionnaire 11-14 e os agravos em estudo será investigada através de modelos de regressão adequados à distribuição dos dados."

Projeto apresenta cálculo amostral, cronograma compatível e orçamento. As despesas serão cobertas pelos pesquisadores e será solicitado auxílio a Prefeitura Municipal de Santa Maria, por meio da Secretaria de Saúde Bucal.

Objetivo da Pesquisa:

Objetivo geral: estudar a cárie dentária, gengivite, erosão dentária, traumatismo dentário, maloclusão dentária e necessidade de próteses dentárias em escolares do Ensino Médio de Santa Maria, RS.

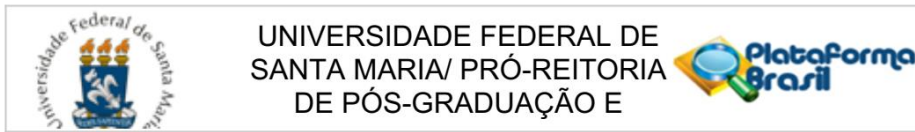
Objetivos específicos

- Estudar a prevalência, extensão e severidade da cárie dentária, gengivite, erosão dentária, traumatismo dentário e maloclusão dentária em escolares do Ensino Médio de Santa Maria, RS;
- Investigar o uso e a necessidade de próteses dentárias nesta população;
- Estudar a associação entre variáveis físicas, demográficas, socioeconômicas, ambientais e comportamentais e os agravos em estudo;
- Analisar a distribuição geográfica da cárie dentária e do traumatismo dentário em escolares do Ensino Médio de Santa Maria, RS, e sua relação com variáveis socioambientais e contextuais;
- Avaliar o impacto da cárie dentária, gengivite, erosão dentária, traumatismo dentário, maloclusão dentária e necessidade de prótese dentária na autopercepção e qualidade de vida dos adolescentes estudados.

Avaliação dos Riscos e Benefícios:

Sobre os riscos consta: "É possível que aconteça algum desconforto durante o preenchimento do

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Continuação do Parecer: 2.178.299

questionário ou durante a realização dos exames clínicos como cansaço, desconforto durante a escovação dos seus dentes ou por ficar de boca aberta, tontura pela posição sobre as classes. Pode haver também alguma vergonha ao responder as perguntas do questionário. A fim de minimizar tais risco, a qualquer momento você poderá pedir para interromper o exame clínico e continuar quando se sentir melhor ou marcar novo exame para outro dia. Os questionários serão respondidos em locais reservados a fim de evitar constrangimento. Todas as medidas de biossegurança (limpeza, esterilização dos materiais) serão tomadas.

Riscos estão descritos de maneira aceitável e coerente nos documentos.

Sobre os benefícios consta: "Como benefício direto, os indivíduos receberão informações sobre sua condição de saúde bucal, bem como orientações e informações sobre os problemas bucais que eventualmente apresentem. Será emitido um relatório sobre a saúde bucal. Também receberão uma escova dental. Caso apresentem necessidade de tratamento odontológico, serão orientados a procurar o serviço de Triagem do Curso de Odontologia da UFSM ou a Unidade Básica de Saúde mais próxima da residência."

Benefícios estão adequadamente descritos de forma consistente em todos os documentos.

Comentários e Considerações sobre a Pesquisa:

.

Considerações sobre os Termos de apresentação obrigatória:

Todos os termos estão apresentados de maneira adequada.

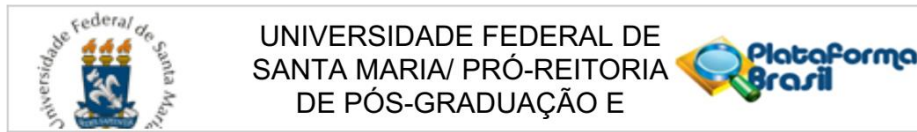
Recomendações:

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:

Recomenda-se aos pesquisadores incluir no TCLE e Assentimento a pesagem dos estudantes. Acrescentar a frase: "você deverá responder algumas perguntas e, em seguida você terá seu peso e

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Continuação do Parecer: 2.178.299

altura avaliados e passará por um exame clínico odontológico"

Os participantes e seus pais devem ser informados sobre todos os procedimentos que serão executados. Certos de que os pesquisadores irão atender a recomendação o projeto será liberado.

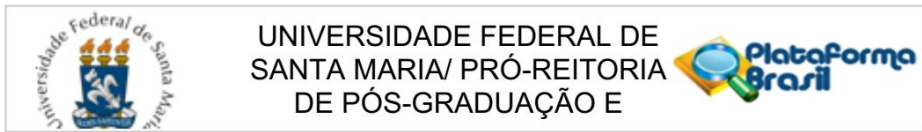
Os pesquisadores retiraram o decreto 7.724 da Autorização Institucional mas mantiveram o artigo 61 do referido decreto. Considerar-se-á que foi erro de digitação. O referido decreto não rege pesquisas com seres humanos e sua citação não está adequada conforme mencionado em relatoria anterior.

Considerações Finais a critério do CEP:

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_939135.pdf	18/07/2017 10:49:14		Aceito
Projeto Detalhado / Brochura Investigador	PROJETOok.docx	18/07/2017 10:47:56	LUANA SEVERO ALVES	Aceito
Declaração de Instituição e Infraestrutura	AINSTITUCIONALok.jpg	18/07/2017 10:37:24	LUANA SEVERO ALVES	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	CONSENTIMENTOPAISok.docx	17/07/2017 19:04:18	LUANA SEVERO ALVES	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	CONSENTIMENTOMAIORESok.docx	17/07/2017 19:04:09	LUANA SEVERO ALVES	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	ASSENTIMENTOMENORESok.docx	17/07/2017 19:03:58	LUANA SEVERO ALVES	Aceito
Declaração de Pesquisadores	Confidencialidade_ok.pdf	14/06/2017 19:34:36	LUANA SEVERO ALVES	Aceito
Declaração de Pesquisadores	registroSIE.pdf	09/06/2017 13:04:33	LUANA SEVERO ALVES	Aceito
Declaração de	AINSTITUCIONAL.jpg	09/06/2017	LUANA SEVERO	Aceito

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

Continuação do Parecer: 2.178.299

Instituição e Infraestrutura	AINSTITUCIONAL.jpg	12:59:09	ALVES	Aceito
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Situação do Parecer:

Aprovado

Necessita Apreciação da CONEP:

Não

SANTA MARIA, 19 de Julho de 2017

Assinado por:
CLAUDEMIR DE QUADROS
(Coordenador)

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ANEXO B – NORMAS PARA PUBLICAÇÃO NO PERIÓDICO *DENTAL TRAUMATOLOGY*

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/dt>

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 does not accept articles previously published on preprint servers.

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

2. AIMS AND SCOPE

Dental Traumatology is an international peer-reviewed journal which aims to convey scientific and clinical progress in all areas related to adult and pediatric dental traumatology. It aims to

promote communication among clinicians, educators, researchers, administrators and others interested in dental traumatology. The journal publishes original scientific articles, review articles in the form of comprehensive reviews or mini reviews of a smaller area, short communication about clinical methods or techniques, Letters to the Editor and case reports. The journal focuses on the following areas *as they relate to dental trauma*:

- Epidemiology and Social Aspects
- Periodontal and Soft Tissue Aspects
- Endodontic Aspects
- Pediatric and Orthodontic Aspects
- Oral and Maxillofacial Surgery / Transplants/ Implants
- Esthetics / Restorations / Prosthetic Aspects
- Prevention and Sports Dentistry
- Epidemiology, Social Aspects, Education and Diagnostic Aspects.

3. MANUSCRIPT CATEGORIES AND REQUIREMENTS

Original Research Articles in all areas related to adult and pediatric dental traumatology are of interest to Dental Traumatology. Examples of such areas are Epidemiology and Social Aspects, Periodontal and Soft Tissue Aspects, Endodontic Aspects, Pediatric and Orthodontic Aspects, Oral and Maxillofacial Surgery/Transplants/Implants, Esthetics/Restorations/Prosthetic Aspects, Prevention and Sports Dentistry, Epidemiology, Social Aspects, Education and Diagnostic Aspects.

Review Papers: *Dental Traumatology* commissions specific topical review papers and mini reviews of small areas of interest. The journal also welcomes uninvited reviews. Reviews should be submitted via the online submission site and are subject to peer-review.

Comprehensive Reviews should be a complete coverage of a subject discussed with the Editor-in-Chief prior to submission. Comprehensive review articles should include a description of the search strategy of the relevant literature, the inclusion criteria, exclusion criteria, method for evaluation of papers, level of evidence, etc.

Mini Reviews cover a smaller area and may be written in a more free format.

Case Reports: Dental Traumatology may accept Case Reports that illustrate unusual and clinically relevant observations or management. Case reports should demonstrate something new or unique, and they should not present common clinical scenarios. Case reports should be kept brief (within 3-4 printed pages) and need not follow the usual division into Material and Methods etc. There should be an Abstract written as a short paragraph. The Abstract should not be structured with specific sections (i.e. do not use aims, methods, results, conclusions). The Introduction should be kept short. Thereafter the case is described followed by a short Discussion. Case reports should have adequate follow-up to demonstrate the outcome of the treatment provided or the long-term prognosis of the presented problem. Typically, cases with treatment should have at least 4-5 years follow-up radiographs, photographs, etc. to show the outcome. Case reports are subject to peer review.

Short Communications of 1-2 pages may be accepted for publication. These papers need not

follow the usual division into Material and Methods, etc., but should have an Abstract. They should contain important new information to warrant publication and may reflect improvements in clinical practice such as introduction of new technology or practical approaches. They should conform to high scientific and high clinical practice standards. Short communications are subject to peer review.

Letters to the Editor may be considered for publication if they are of broad interest to dental traumatology. They may deal with material in papers already published in Dental Traumatology or they may raise new issues, but they should have important implications for dental traumatology.

Meetings: advance information about and reports from international meetings are welcome, but should not be submitted via the online submission site – these should be sent directly to the Editorial Office: **EDToffice@wiley.com**

4. PREPARING THE SUBMISSION

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: title page; main text file; figures.

Title Page

The title page should contain:

1. A short informative title containing the major key words. The title should not contain abbreviations (see Wiley's best practice SEO tips) and should not be a question about the aim. The title should not be a statement of the results or conclusions;
2. A short running title of less than 60 characters;
3. The full names of the authors;
4. 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;
5. Acknowledgments.

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.

Main Text File

As papers are double-blind peer reviewed, the main text file should not include any information that might identify the authors.

The main text file should be presented in the following order:

1. Title, abstract, and key words;
2. Main text;
3. References;
4. Tables (each table complete with title and footnotes);
5. Figure legends.

Do not use any sub-headings within the above sections.

The text in the main document should be double-spaced.

Figures and supporting information should be supplied as separate files.

Abstract

The abstract is limited to 300 words in length and should contain no abbreviations. The abstract should be included in the manuscript document uploaded for review as well as inserted separately where specified in the submission process. The abstract should convey a brief background statement plus the essential purpose and message of the paper in an abbreviated form. For Original Scientific Articles, the abstract should be structured with the following headings: Background/Aim, Material and Methods, Results, and Conclusions. For other article types (e.g. Case Reports, Reviews Papers, Short Communications) headings are not required and the Abstract should be in the form of a paragraph that briefly summarizes the paper.

Keywords

Please provide 3-6 keywords. Keywords should be carefully chosen to ensure they reflect the content of the manuscript.

Main Text of Original Articles

- As papers are double-blind peer reviewed, the main text file should not include any information that might identify the authors.
- The main text should be divided into the following sections: Introduction, Material and Methods, Results and Discussion.
 - **Introduction:** This section should be focused, outlining the historical or logical origins of the study. It should not summarize the results and exhaustive literature reviews are inappropriate. Give only strict and pertinent references and do not include data or conclusions from the work being reported. The introduction should close with an explicit, but brief, statement of the specific aims of the investigation or hypothesis tested. Do not include details of the methods in the statement of the aims.

- **Materials and Methods:** This section 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. Describe your selection of observational or experimental participants clearly. Identify the method, apparatus and procedures in sufficient detail. Give references to established methods, including statistical methods, describe new or modified methods. Identify precisely all drugs used by their generic names and route of administration. If a method or tool is introduced in the study, including software, questionnaires, and scales, the author should state the license this is available under and any requirement for permission for use. If an existing method or tool is used in the research, the authors are responsible for checking the license and obtaining the permission. If permission was required, a statement confirming permission should be included in the Methods and Materials section.
- **Results** should clearly and simply present the observations/results without reference to other literature and without any interpretation of the data. Present the results in a logical sequence in the text, tables and illustrations giving the main or most important findings first. Do not duplicate data in graphs and tables.
- **Discussion** usually starts with a brief summary of the major findings. Repetition of parts of the Introduction or of the Results sections should be avoided. Statements and interpretation of the data should be appropriately supported by original references. A comment on the potential clinical relevance of the findings should be included. The Discussion section should end with a brief conclusion, but the conclusion should not be a repeat of the results and it should not extrapolate beyond the findings of the study. Link the conclusions to the aim of the study. Do not use sub-headings in the Discussion section, The Discussion should flow from one paragraph to the next in a cohesive and logical manner.
- **Randomised control clinical trials** should be reported using the Preferred Reporting Items for Randomized Trials in Endodontics (PRIRATE) 2020 guidelines. A PRIRATE checklist and flowchart (as a Figure) should also be completed and included in the submission material. The PRIRATE 2020 checklist and flowchart can be downloaded from: <http://pride-endodonticguidelines.org/prirate/>

It is recommended that authors consult the following papers, which explains the rationale for the PRIRATE 2020 guidelines and their importance when writing manuscripts:

- - Nagendrababu V, Duncan HF, Bjørndal L, Kvist T, Priya E, Jayaraman J, Pulikkotil SJ, Pigg M, Rechenberg DK, Vaeth M, Dummer P. PRIRATE 2020 guidelines for reporting randomized trials in Endodontics: a consensus-based development. *Int Endod J.* 2020 Mar 20. doi: 10.1111/iej.13294. (<https://onlinelibrary.wiley.com/doi/abs/10.1111/iej.13294>)
 - Nagendrababu V, Duncan HF, Bjørndal L, Kvist T, Priya E, Jayaraman J, Pulikkotil SJ, Dummer P. PRIRATE 2020 guidelines for reporting randomized trials in Endodontics: Explanation and elaboration. *Int Endod J.* 2020 April 8. doi: 10.1111/iej.13304 (<https://onlinelibrary.wiley.com/doi/abs/10.1111/iej.13304>)

Main Text of Review Articles

- As papers are double-blind peer reviewed, the main text file should not include any information that might identify the authors.
- The main text should comprise an introduction and a running text structured in a suitable way according to the subject treated. A final section with conclusions may be added.
- The main text should be double-spaced.

Main Text of Case Studies

Case reports should be written using the Preferred Reporting Items for Case reports in Endodontics (PRICE) 2020 guidelines. A PRICE checklist and flowchart (as a Figure) should also be completed and included in the submission material. The PRICE 2020 checklist and flowchart can be downloaded from: <http://pride-endodonticguidelines.org/price/>.

It is recommended that authors consult the following papers, which explains the rationale for the PRICE 2020 guidelines and their importance when writing manuscripts:

- Nagendrababu V, Chong BS, McCabe P, Shah PK, Priya E, Jayaraman J, Pulikkotil SJ, Setzer FC, Sunde PT, Dummer PMH. PRICE 2020 guidelines for reporting case reports in Endodontics: a consensus-based development. *Int Endod J.* 2020 Feb 23. doi: 10.1111/iej.13285. (<https://www.ncbi.nlm.nih.gov/pubmed/32090342>)
- Nagendrababu V, Chong BS, McCabe P, Shah PK, Priya E, Jayaraman J, Pulikkotil SJ, Dummer PMH. PRICE 2020 guidelines for reporting case reports in Endodontics: Explanation and elaboration. *Int Endod J.* (<https://onlinelibrary.wiley.com/doi/abs/10.1111/iej.13300>)

References

All references should be numbered consecutively in order of appearance and should be as complete as possible. In text citations should be superscript numbers. Journal titles must be abbreviated; correct abbreviations may be found in the following: **MEDLINE**, **Index Medicus**, or **CalTech Library**.

Submissions are not required to reflect the precise reference formatting of the journal (use of italics, use of capital letters, bold etc.). However it is important that all key elements of each reference are included. Please see below for examples of reference content requirements.

For more information about this reference style, please see the **Vancouver Reference Style Guide**.

Reference examples follow:

Journal Articles

Lam R, Abbott PV, Lloyd C, Lloyd CA, Kruger E, Tennant M. Dental trauma in an Australian Rural Centre. *Dent Traumatol* 2008; 24: 663-70.

Text book chapters

Andreasen J, Andreasen F. Classification, etiology and epidemiology. IN: Andreasen JO, Andreasen FM, eds. Textbook and Color Atlas of Traumatic Injuries to the Teeth. 3rd Edn. Munksgaard, Copenhagen. 1994;151-80.

Thesis or Dissertation

Lauridsen, E. Dental trauma – combination injuries. Injury pattern and pulp prognosis for permanent incisors with luxation injuries and concomitant crown fractures. Denmark: The University of Copenhagen. 2011. PhD Thesis.

Corporate Author

European Society of Endodontology. Quality guidelines for endodontic treatment: consensus report of the European Society of Endodontology. Int Endod J 2006;39:921-30.

American Association of Endodontists. The treatment of traumatic dental injuries. Available at: URL:

‘http://www.aae.org/uploadedfiles/publications_and_research/newsletters/endodontics_colleagues_for_excellence_newsletter/ecfe_summer2014%20final.pdf’. Accessed September 2015.

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.

Color Figures. Figures submitted in color will be reproduced in colour online. 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.

Data Citation

Please review **Wiley’s data citation policy**.

Additional Files

Appendices

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- Results
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EXAMPLES OF REFERENCES

Journals

Bhutta ZA, Darmstadt GL, Hasan BS, Haws RA. Community-based interventions for

improving perinatal and neonatal health outcomes in developing countries: a review of the evidence. *Pediatrics*. 2005;115(2 Suppl):519-617. <https://doi.org/10.1542/peds.2004-1441>

Articles with title and text in a language other than English

Li YJ, He X, Liu LN, Lan YY, Wang AM, Wang YL. [Studies on chemical constituents in herb of *Polygonum orientale*]. *Zhongguo Ahong Yao Za Zhi*. 2005 Mar;30(6):444-6. Chinese.

Supplements or Special Editions

Pucca Junior GA, Lucena EHG, Cawahisa PT. Financing national policy on oral health in Brazil in the context of the Unified Health System. *Braz Oral Res*. 2010 Aug;24 Spec Iss 1:26-32.

Books

Stedman TL. *Stedman's medical dictionary: a vocabulary of medicine and its allied sciences, with pronunciations and derivations*. 20th ed. Baltimore: Williams & Wilkins; 1961.

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Foley KM, Gelband H, editors. *Improving palliative care for cancer* [monograph on the Internet]. Washington: National Academy Press; 2001 [cited 2002 Jul 9]. Available from: <http://www.nap.edu/books/0309074029/html/>

Websites

Cancer-Pain.org [homepage on the Internet]. New York: Association of Cancer Online Resources, Inc.; c2000 [cited 2002 Jul 9]. Available from: <http://www.cancer-pain.org/>
 Instituto Brasileiro de Geografia e Estatística [homepage]. Brasília (DF): Instituto Brasileiro de Geografia e Estatística; 2010 [cited 2010 Nov 27]. Available from: <http://www.ibge.gov.br/home/default.php>

World Health Organization [homepage]. Geneva: World Health Organization; 2011 [cited 2011 Jan 17]. Available from: <http://www.who.int/en/>